



Pacific Northwest
NATIONAL LABORATORY

Proudly Operated by Battelle Since 1965

Analysis of Respirator Cartridge Performance Testing on Hanford Tank A-101

January 2017

SK Nune
J Liu
CJ Freeman
TM Brouns
LA Mahoney

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor Battelle Memorial Institute, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or Battelle Memorial Institute. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

PACIFIC NORTHWEST NATIONAL LABORATORY
operated by
BATTELLE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC05-76RL01830

Printed in the United States of America

Available to DOE and DOE contractors from the
Office of Scientific and Technical Information,
P.O. Box 62, Oak Ridge, TN 37831-0062;
ph: (865) 576-8401
fax: (865) 576-5728
email: reports@adonis.osti.gov

Available to the public from the National Technical Information Service
5301 Shawnee Rd., Alexandria, VA 22312
ph: (800) 553-NTIS (6847)
email: orders@ntis.gov <<http://www.ntis.gov/about/form.aspx>>
Online ordering: <http://www.ntis.gov>



This document was printed on recycled paper.

(82010)

Analysis of Respirator Cartridge Performance Testing on Hanford Tank A-101

SK Nune
J Liu
CJ Freeman
TM Brouns
LA Mahoney

January 2017

Prepared for
the U.S. Department of Energy
under Contract DE-AC05-76RL01830

Pacific Northwest National Laboratory
Richland, Washington 99352

Executive Summary

Washington River Protection Solutions (WRPS) conducted tests using two types of chemical cartridges for use in air purifying respirators to determine the period of time that the cartridges would provide adequate protection to workers when exposed to a mixture of Chemicals of Potential Concern (COPCs) from vapors emanating from the headspace of tank A-101 on the Hanford Site. The Occupational Safety and Health Administration (OSHA) identifies cartridge testing as a valid approach for establishing a cartridge change-out schedule. Testing is commonly applied in situations where mixtures of COPCs exist, and where other approaches, such as manufacturer recommendations and modeling, are less reliable. The tests were designed and conducted to ensure measurement and/or control of the key variables OSHA identified as important to estimate cartridge service life, including temperature, humidity, COPC concentration, breathing rate, and cartridge adsorption capacity.

Testing was conducted over a period from July 22–24, 2016, using headspace vapors from Hanford tank A-101 under static conditions fed to a respirator cartridge test stand developed by WRPS in collaboration with HiLine Engineering (Richland, Washington). Multipurpose respirator cartridges, SCOTT 7422-SD1 and 7422-SC1 (SCOTT Safety, Monroe, North Carolina) were assessed on separate days with A-101 headspace vapors. Sample media (sorbent tubes) were used to collect samples of the vapor stream entering and exiting the respirator cartridge, and were subsequently analyzed for COPC concentrations. Pacific Northwest National Laboratory was tasked with conducting an independent analysis of the analytical results and making recommendations based on the results for respiratory cartridge performance and change-out frequency. The key conclusions from the analysis are briefly described below:

- Based on measurements of the cartridge inlet vapor concentrations from tank A-101, both ammonia and N-Nitrosodimethylamine (NDMA) exceeded their Occupational Exposure Limit, (OEL).¹ These measurements were generally consistent with maximum A-101 headspace measurements previously obtained for these two compounds.
- Ammonia had respirator cartridge outlet concentrations that exceeded 10% of the OEL for both cartridges tested, indicating breakthrough for each. For the SCOTT 7422-SD1 cartridge, ammonia breakthrough appeared to occur after 2 hours. For the SCOTT 7422-SC1 cartridge, ammonia breakthrough appeared to occur after 8 hours.
- Despite respirator inlet measurements for NDMA that were in excess of its OEL, all corresponding outlet measurements, from both respirator cartridges, were below analytical detection limits (DL) for the duration of the testing (16 hours), indicating no evidence of breakthrough. The analytical DL for NDMA corresponds to approximately 12% of its OEL.
- The inlet vapor concentration of two additional COPCs, mercury and N-Nitrosodiethylamine, exceeded 10% of their OEL. These measurements were generally consistent with average and maximum A-101 headspace measurements previously obtained. The outlet concentrations of both COPCs were consistently less than DLs, indicating no evidence of breakthrough.

¹ Occupational Exposure Limits accepted for Hanford Tank Farm use are based on OELs established by a U.S. governmental agency or national professional organization (e.g., OSHA, National Institute for Occupational Safety and Health, American Conference of Governmental Industrial Hygienists), or if no U.S. OEL exists, standard toxicological practices are applied to develop OELs using non-U.S. exposure limits, other established OELs for chemical surrogates when available, or other standard procedures. The OEL for NDMA was established in 2005 based on the MAK (Maximale Arbeitsplatzkonzentration) Commission standard adopted in Europe.

- All inlet and outlet measurements for N-Nitrosomethylethylamine (NMEA) from both respirator cartridges were below the analytical DL for the duration of the testing (16 hours), indicating no evidence of breakthrough. The analytical DL for NMEA corresponds to approximately 11% of its OEL.
- The inlet vapor concentrations of all other measured COPCs were below 10% of the OEL. For the majority of COPCs, the inlet vapor concentrations during cartridge testing and average measurements from historical A-101 headspace sampling were generally consistent. Five additional COPCs (furan, 1,3-butadiene, nitrous oxide, acetonitrile, and N-Nitrosomorpholine) have been previously measured in A-101 headspace at levels above 10% of their respective OELs, and above analytical reporting limits, but did not exceed 10% of OEL in this study.

Based on the measurements taken for this study, with the exception of ammonia, none of the COPCs indicated breakthrough behavior above 10% OEL during the 16-hour testing period. Therefore, the recommended change-out times of 2 hours and 6 hours for the SCOTT'S 7422-SD1 and 7422-SC1 cartridges, respectively, are based on ammonia performance only. However, any known changes in (respirator inlet) concentrations for any COPCs, compared to those measured in the current study, could increase or decrease the recommended cartridge change-out time. In these circumstances, additional respirator cartridge evaluations would be necessary to determine proper respiratory protection requirements.

Acronyms and Abbreviations

ALS	ALS Environmental Salt Lake City
APR	Air Purifying Respirator
CAS	Chemical Abstracts Service
CFR	Code of Federal Regulations
COPC	Chemicals Of Potential Concern
DL	Detection Limit
EPA	U.S. Environmental Protection Agency
IH	Industrial hygiene
NDEA	N-Nitrosodiethylamine
NDMA	N-Nitrosodimethylamine
NIOSH	National Institute for Occupational Safety and Health
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PNNL	Pacific Northwest National Laboratory
PPM	Parts Per Million
SCBA	Self-Contained Breathing Apparatus
SWIHD	Site-Wide Industrial Hygiene Database
TIC	Tentatively Identified Compound
TWINS	Tank Waste Information Network System
VOC	Volatile Organic Compound
WHL	222S – Wastren Hanford Laboratory
WRPS	Washington River Protection Solutions

Contents

Executive Summary	iii
Acronyms and Abbreviations	v
1.0 Introduction/Project Description	1.1
2.0 Regulatory Requirements	2.1
2.1 Background on Regulatory Requirements	2.1
2.2 OSHA-Approved Methods for Determining Cartridge Change-Out Times	2.1
3.0 Description of Testing Program	3.1
4.0 Data Analysis.....	4.1
5.0 Plots of COPCs with Significant Detected Values	5.1
6.0 Factoring in Historical Concentration Data	6.1
7.0 Conclusions	7.1
8.0 Recommendations	8.1
9.0 References	9.1
Appendix A – Description of Respirator Cartridge Testing Setup	A.1
Appendix B – Analytical Testing	B.1
Appendix C – Raw Analytical Data	C.1
Appendix D – Data Reduction Steps	D.1
Appendix E – Plots of Other COPCs with Significant (2–10% of OEL) Detected Values.....	E.1
Appendix F – Historical Data Comparison.....	F.1

Figures

1	Plot of Measured Ammonia Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1).	5.1
2	Plot of Measured Mercury Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1)	5.2
3	Plot of Measured Acetonitrile Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1).	5.3
4	Plot of Measured N-Nitrosodimethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1).	5.4
5	Plot of Measured N-Nitrosodiethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1).....	5.5
6	Plot of Measured N-Nitrosomethylethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1).....	5.6

Tables

1	Summary of Analyzed COPCs	4.2
2	Historical Tank A-101 Headspace Data for COPCs with Boiling Points less than 70°C.....	6.2

1.0 Introduction/Project Description

As the Tank Operations Contractor for U.S. Department of Energy operations at the Hanford site, Washington River Protection Solutions (WRPS) is responsible for managing highly radioactive wastes stored in tanks at Hanford. WRPS recently identified the need to test air purifying respirator (APR) chemical cartridges commonly used at Hanford Tank Farms to determine the period of time that the cartridges would provide adequate protection to workers when exposed to a mixture of Chemicals of Potential Concern (COPCs) from any vapors exiting headspaces in the tanks. Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulations (CFR) 1910.134(d)(3)(iii)(b)(2) specifies that for protection against gases and vapors, employers shall implement a change schedule for cartridges, based on objective information or data, to ensure that change-outs occur before the end of service life.[1-5] The primary function of the WRPS APR Cartridge Test Program is to obtain objective data to determine change-out schedules for the APR cartridges in use at Hanford Tank Farms. WRPS contracted Pacific Northwest National Laboratory (PNNL) to analyze the test data and offer an independent analysis and any recommendations. This report summarizes data analysis of cartridge testing on headspace vapors from the Hanford A-101 tank.

2.0 Regulatory Requirements

2.1 Background on Regulatory Requirements

OSHA Respiratory Protection Standard (29 CFR 1910.134) mandates/requires that 1) employers provide protective equipment, including respirators, to their employees to protect them against potential exposure to contaminants at or above documented Occupational Exposure Limits (OELs) and 2) establish cartridge change-out schedules to ensure cartridges are changed before the end of service life.[1] End of service life is the time when a respirator cartridge can no longer filter/capture harmful contaminants (i.e., the cartridge no longer functions effectively).

Protective respirator cartridges are frequently used in workplaces with low contaminant concentrations, and where respirators provide essential protection for longer periods of time (>2 hours). If the contaminant concentration in a workplace is high, supplied air respirators (SAR) or self-contained breathing apparatuses (SCBA) must be used to provide additional protection. While the use of SARs or SCBAs offers more protection, a tradeoff exists, particularly for SCBAs that employ a large, heavy (~30 pounds), back-mounted compressed air cylinder.[1]

2.2 OSHA-Approved Methods for Determining Cartridge Change-Out Times

The National Institute of Occupational Safety and Health (NIOSH) certifies organic vapor cartridges using the criteria in 42 CFR 84, Approval of Respiratory Protective Devices. Still, there is no widely accepted, standard protocol for performing service-life testing.[4] However, OSHA has identified three valid approaches for establishing cartridge change-out schedules.[3] These approaches are described below.

- *Conduct experimental tests* – Gather available information about the nature of all contaminants present in the workplace. Obtain breathing rates of workers and estimate worst-case exposures. For most employers, this approach is the most time consuming, and resources needed to perform these tests may not be available. If an employer has the resources needed to pursue this approach, it is the most reliable method of estimating cartridge service life. Concentrations at different points in time are obtained using actual respirator cartridges exposed to actual or simulated gases to gather service-life information. A safety factor that includes the assumptions made, variable factors, or conditions needs to be applied to the service life and used in the respiratory protection program. This approach is commonly used in situations where mixtures of contaminants are present and can also be used to validate an existing cartridge change-out schedule.
- *Use the manufacturer's recommendation* – Once information on airborne contaminants (including concentrations, temperature, and humidity) has been obtained, provide all the information to the manufacturer of the respirator to be used. Manufacturers should be able to provide the estimated service life of different cartridges for particular compounds. Manufacturers should also be able to provide the exact objective information they used to project the service life. Using the information obtained, change-out schedules are proposed. This approach is not as reliable as conducting application-specific experiments, and manufacturers may not have all the information for workplace hazards and user factors. If any safety factor is applied considering all the variable factors, it must be clearly identified in the respiratory protection program. For complex mixtures such as those present in the storage tanks at Hanford, manufacturer recommendations may be of limited value, and experimental testing is recommended.

- *Use mathematical models* – Mathematical models are usually applicable for single contaminant exposure situations. OSHA and NIOSH have worked over the years with researchers and industrial partners to develop mathematical models for predicting respirator cartridge service life.[3, 5-11] OSHA offers guidance on using mathematical models to estimate respirator cartridge service life based on single components, but the models have not been adopted for mixtures. NIOSH has developed a computer tool for estimating breakthrough times and service lives of respirator cartridges. Manufacturers can use those results to make service-life recommendations for their particular product (canister/cartridge) in multi-gas environments. Two types of mathematical models are used: 1) predictive models[3, 5-7] and 2) descriptive models.[9] Each model has its own mathematical basis for its estimations. To estimate the service lives of cartridges, the following information is needed:
 - the number of cartridges used by the respirator
 - the mass of the sorbent used in each cartridge
 - the carbon micro-pore volume
 - the density of the packed bed
 - the maximum temperature
 - the maximum relative humidity
 - the maximum concentration of the contaminants and the work (volumetric flow) rate.

The primary advantages of using mathematical models are that they are relatively inexpensive and results are obtained quickly. However, estimates provided by models are not as accurate as results obtained from testing; sometimes a model-estimated service life might be shorter than it needs to be because assumptions used during calculations were too conservative.

- *Rules of thumb* – In addition to the methods described above, “rules of thumb” can be allowed as part of the overall workplace organic vapor assessment for determining a cartridge change-out schedule. Chapter 36 of the American Industrial Hygiene Association publication, *The Occupational Environment: Its Evaluation and Control and Management*, outlines the approach.[12] The “rules of thumb” may not work for every chemical or situation, but can provide an estimate of cartridge service life. The following are rules of thumb outlined in the publication:
 - If the compound’s boiling point is $>70^{\circ}\text{C}$ and the concentration is less than 200 ppm, a service life of 8 hours at a normal work rate can be expected.
 - Service life is inversely proportional to worker breathing rate.
 - Reducing the concentration of a contaminant by a factor of 10 will increase service life by a factor of 5.
 - Relative humidity above 85% will reduce the service life by 50%.

These rules of thumb do not apply in certain situations, including for mixtures of hazardous contaminants (e.g., Hanford Tank Farm vapors) and inorganic gases such as ammonia, sulfur dioxide, and hydrogen sulfide; compositions that vary with time and location; and contaminants that undergo continuous reactions. However, some of the general drivers can help in interpreting the results obtained from experimental testing of respirator cartridges.

3.0 Description of Testing Program

Based on the OSHA guidance described in the previous section, a sample testing approach was pursued for quantifying respirator cartridge effectiveness for Hanford tank vapors. WRPS developed a sampling approach outlined in TFC-PLN-168, “Industrial Hygiene Sampling and Analysis Plan for Respirator Cartridge Testing,” and “Air Purifying Respirator Cartridge Test Apparatus, RPP-STE-59226.”[13,14]

Appendix A provides a description of the respirator cartridge testing setup developed by WRPS and used for measurements of vapors from the A-101 headspace.[13-15] The test system and methodology were developed in consultation with recognized subject matter experts to follow the example of tank farm headspace field sampling for the purposes of cartridge testing.

The Sampling and Analysis Plan was developed under the direction and oversight of the Industrial Hygienist in conjunction with the Tank Farms Operations Contractor Retrieval and Closure, and Tank Farms Project and/or Production Operations Project Management Team, as applicable. Trained Industrial Hygiene Technicians under the direction of a qualified Industrial Hygienist collected chemical vapor samples from the influent and effluent sides of the cartridge test apparatus. Training was performed at HiLine Engineering (Richland, Washington) on the test stands for WRPS Sampling Equipment Operators, Industrial Hygiene Technicians, and the Field Work Supervisors, prior to transport of the stands to tank farms.

The APR cartridge test assembly was designed and constructed to operate without negative effects on performance to the following environmental conditions:

- Temperature: 32 to 115°F
- Relative Humidity: 5% to 100%
- Precipitation: Up to 4 inches in 6 hours
- Wind: Up to 20 mph with blowing dust.

To ensure the cartridges effectively protect the worker, WRPS developed a testing program with the following conservative conditions:

- The flow rate through each cartridge was set at approximately 30 L/min (equivalent to 60 L/min for a pair of cartridges), which corresponds to more than twice the normal breathing rate and is slightly higher than OSHA recommended testing flow rate of 53.3 L/ min.[3,5]
- Tank farm vapors source sampling was performed on headspace vapors rather than from Hanford Tank Farm atmospheric concentrations (i.e., source sampling vs. the breathing zone).
- 10% OEL for each COPC was considered as a threshold concentration.

Using the cartridge testing setup shown in Appendix A, separate test surveys were performed on two NIOSH-approved respiratory protection twin cartridges: SCOTT 7422-SD1 for Survey 1, and SCOTT 7422-SC1 for Survey 2.[16] These cartridges were chosen because they are suitable for capturing organic vapors, acid gases, ammonia, formaldehyde, and particulates.[16]

Vapor concentrations upstream and downstream of the APR cartridge were monitored with an array of sorbent tubes (see Appendix B). Influent (upstream) concentrations were measured at the beginning and end of each 16-hour verification survey. Downstream sorbent tubes were changed out every 2 hours until the experiment was finished. A measured quantity of sample air was drawn in through the sorbent tube (see Appendix A).[13,14] Compounds from the sorbent tubes were extracted and analyzed using analytical methods referenced in Appendix B.

The characteristics of 59 COPCs were the primary focus of the testing. The 59 COPCs represent a set of tank vapor chemicals found in a tank farm source greater than 10% of the OEL, or are considered “known” or “probable” carcinogens by the International Agency for Research Cancer or other regulatory agencies.[17,18] A full listing of these COPCs is shown in Section 4.0.

4.0 Data Analysis

During the period of July 22-24, 2016, each cartridge was tested for approximately 16 hours of continuous run time. Testing and analysis focused on the 59 COPCs identified in Table 1 and other hazardous airborne contaminants. Sorbent tubes were changed every 2 hours, and more than 200 sorbent tubes were sent to the 222S Laboratory at Hanford and dispositioned for analysis. Appendix C lists the raw data for all of contaminants analyzed during the tests, and Appendix D lists the corresponding calculated concentrations. Appendix C also gives the the average temperatures of the sample slipstream during testing, which ranged from 69 to 90°F as well as the average relative humidity measurements, which ranged from 45 to 94%. Table 1 provides an overview of the results for each of the 59 COPCs. Note that nitrous oxide was not analyzed as it is not susceptible to respirator filtration, and there are no known NIOSH-approved respirator filtration cartridges approved for nitrous oxide. Additionally, methanol was not quantified as part of the COPC data set because it is used as a standard solvent and calibration standard in the analytical procedure for volatile organic compounds (VOC).

Table 1 shows the measured concentrations in the current study for all of the COPCs tested. This table further provides a summary of the test information. For example, if all of the measurements for a specific compound were less than detection limits (DL),¹ that compound is marked accordingly. Further, if concentrations were detected for a compound, the extent of the detection is also described. Based on the summary in Table 1 there were six COPCs with detected concentrations greater than 10% of their corresponding OEL. These compounds (highlighted in yellow in the table) were ammonia, mercury, acetonitrile, N-Nitrosodimethylamine (NDMA), N-Nitrosodiethylamine (NDEA), and N-Nitrosomethylethylamine (NMEA). Plots of the specific data for each of these compounds is given in the following section.

¹ The term “detection limit” is used here to refer either to analytical reporting limit or DL. The use of either a reporting limit or DL varied among analytical laboratories. The reporting limit (equivalent to a limit of quantification) was used instead of a DL by several laboratories for specific COPC analyses. See Appendix C and Appendix F for additional information on the the specific use of reporting limits or DLs for each COPC. Nitrosamine analysis results were quantified to a reporting limit.

Table 1. Summary of Analyzed COPCs

COPC Number and Name	CAS Number	Highest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL ¹ (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
<i>Inorganic</i>						
1 Ammonia	7664-41-7	121 ppm	25 ppm	2.55%		Up to 484% of OEL for inlet values and 348% for outlets
2 Nitrous Oxide	10024-97-2	Not Measured	50 ppm			
3 Mercury	7439-97-6	8.32 ug/m ³	25 ug/m ³	7.38%		Up to 34% of OEL for inlet values. All outlets <DL
<i>Hydrocarbons</i>						
4 1,3-Butadiene	106-99-0	0.024 ppm	1 ppm	2.44-2.64%		Up to 2.4% of OEL for inlet and outlet values
5 Benzene	71-43-2	0.0007 ppm	0.5 ppm	0.030%		Up to 0.13% of OEL for inlet values and 0.03% for outlets
6 Biphenyl	92-52-4	0.0006 ppm	0.2 ppm	0.290%	X	
<i>Alcohols</i>						
7 1-Butanol	71-36-3	0.026 ppm	20 ppm	0.004%		Up to 0.13% of OEL for inlet values and 0.004% for outlets
8 Methanol	67-56-1	Not Measured	200 ppm			
<i>Ketones</i>						
9 2-Hexanone	591-78-6	0.0010 ppm	5 ppm	0.016%		Up to 0.02% of OEL for inlet values and 0.003% for outlets
10 3-Methyl-3-butene-2-one	814-78-8	Not Detected	0.02 ppm	TIC ²	X	
11 4-Methyl-2-hexanone	105-42-0	0.0002 ppm	0.5 ppm	0.033%	X	
12 6-Methyl-2-heptanone	928-68-7	Not Detected	8 ppm	TIC	X	
13 3-Buten-2-one	78-94-4	0.0013 ppm	0.2 ppm	0.093%		Up to 0.64% of OEL for inlet and outlet values
<i>Aldehydes</i>						
14 Formaldehyde	50-00-0	0.0157 ppm	0.3 ppm	0.607%		Up to 5.22% of OEL for inlet values and 2.08% for outlets
15 Acetaldehyde	75-07-0	0.0555 ppm	25 ppm	0.005%		Up to 0.22% of OEL for inlet values and 0.13% for outlets
16 Butanal	123-72-8	0.0019 ppm	25 ppm	0.001%		Up to 0.008% of OEL for inlet values and 0.002% for outlets
17 2-Methyl-2-butenal	1115-11-3	Not Detected	0.03 ppm	TIC	X	
18 2-Ethyl-hex-2-enal	645-62-5	Not Detected	0.1 ppm	TIC	X	

¹ Approximate DLs are calculated using the reported DLs (or reporting limits) from the analytical laboratory and the average volume (from flowrate × time) of vapor exposed to the sorbent tube.

² Tentatively identified compound (TIC) indicates that a mass spectrometry “peak” not associated with calibrated compounds has been tentatively assigned to a compound based on an adequate match to the analytical methods reference library. Reference standards for the compound are not available to accurately quantify, assign an analytical DL, or definitively confirm the identity of the TIC. TICs are reported when the peak area is sufficiently large, estimated as ≥5 nanograms of TIC mass, and other analytical criteria are met. For respirator cartridge testing, this mass of TIC represents an approximate concentration of <1.0 ppb, based on the average of all TICs in the COPC list.

Table 1. (continued)

COPC Number and Name	CAS Number	Highest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL ¹ (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
Furans						
19 Furan	110-00-9	0.048 ppb	1 ppb	0.87%		Up to 4.84% of OEL for inlet values and 1.29% for outlets
20 2,3-Dihydrofuran	1191-99-7	0.042 ppb	1 ppb	1.77%		Up to 4.23% of OEL for inlet values and 2.55% for outlets
21 2,5-Dihydrofuran	1708-29-8	0.038 ppb	1 ppb	2.17%		Up to 3.84% of OEL for inlet and outlet values
22 2-Methylfuran	534-22-5	0.021 ppb	1 ppb	1.93%		Up to 2.12% of OEL for inlet and outlet values
23 2,5-Dimethylfuran	625-86-5	0.031 ppb	1 ppb	3.08%	X	
24 2-Ethyl-5-methylfuran	1703-52-2	Not Detected	1 ppb	TIC	X	
25 4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9	Not Detected	1 ppb	TIC	X	
26 3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4	Not Detected	1 ppb	TIC	X	
27 2-Pentylfuran	3777-69-3	0.027 ppb	1 ppb	1.70%		Up to 2.73% of OEL for inlet and outlet values
28 2-Heptylfuran	3777-71-7	0.018 ppb	1 ppb	1.06%		Up to 1.82 % of OEL for inlet and outlet values
29 2-Propylfuran	4229-91-8	0.034 ppb	1 ppb	2.75%		Up to 3.37% of OEL for inlet values. All outlets <DL
30 2-Octylfuran	4179-38-8	Not Detected	1 ppb	TIC	X	
31 2-(3-Oxo-3-phenylprop-1-enyl)furan	717-21-5	Not Detected	1 ppb	TIC	X	
32 2-(2-Methyl-6-oxoheptyl)furan	51595-87-0	Not Detected	1 ppb	TIC	X	
Phthalates						
33 Diethylphthalate	84-66-2	0.0064 mg/m3	5 mg/m3	0.127%	X	
Nitriles						
34 Acetonitrile	75-05-8	2.48 ppm	20 ppm	0.001%		12.4% of OEL for one outlet value. All other values <1.5%.
35 Propanenitrile	107-12-0	0.0040 ppm	6 ppm	0.004%		Up to 0.07% of OEL for inlet and outlet values
36 Butanenitrile	109-74-0	0.0034 ppm	8 ppm	0.003%		Up to 0.043% of OEL for inlet values. All outlets <DL
37 Pentanenitrile	110-59-8	0.0009 ppm	6 ppm	0.004%		Up to 0.015% of OEL for inlet values and 0.006% for outlets
38 Hexanenitrile	628-73-9	0.0002 ppm	6 ppm	0.003%		Up to 0.003% of OEL for inlet and outlet values
39 Heptanenitrile	629-08-3	Not Detected	6 ppm	TIC	X	
40 2-Methylene butanenitrile	1647-11-6	Not Detected	0.3 ppm	TIC	X	
41 2,4-Pentadienenitrile	1615-70-9	Not Detected	0.3 ppm	TIC	X	

Table 1. (continued)

COPC Number and Name	CAS Number	Highest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL ¹ (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
Amines						
42 Ethylamine	75-04-7	0.0168 ppm	5 ppm	0.10%		Up to 0.34% of OEL for inlet values. All outlets <DL
Nitrosamines						
43 N-Nitrosodimethylamine	62-75-9	0.67 ppb	0.3 ppb	8.4-12.1%		Up to 224% of OEL for inlet values. All outlets <DL
44 N-Nitrosodiethylamine	55-18-5	0.07 ppb	0.1 ppb	28.7%		Up to 73.6% of OEL for inlet values. All outlets <DL
45 N-Nitrosomethylethylamine	10595-95-6	0.03 ppb	0.3 ppb	11.1%	X	11.1% of OEL for one outlet value. All values <DL
46 N-Nitrosomorpholine	59-89-2	0.05 ppb	0.6 ppb	3.33%		Up to 7.97% of OEL for inlet values. All outlets <DL
Organophosphates						
47 Tributyl phosphate	126-73-8	0.0005 ppm	0.2 ppm	0.230%	X	
48 Dibutyl butylphosphonate	78-46-6	0.0003 ppm	0.007 ppm	4.54%	X	
Halogenated						
49 Chlorinated Biphenyls	Varies	Not Detected	1 mg/m ³	TIC	X	
50 2-Fluoropropene	1184-60-7	Not Detected	0.1 ppm	TIC	X	
Pyridines						
51 Pyridine	110-86-1	0.0016 ppm	1 ppm	0.030%		Up to 0.16% of OEL for inlet values. All outlets <DL
52 2,4-Dimethylpyridine	108-47-4	0.0003 ppm	0.5 ppm	0.060%	X	
Organonitrites						
53 Methyl nitrite	624-91-9	Not Detected	0.1 ppm	TIC	X	
54 Butyl nitrite	544-16-1	Not Detected	0.1 ppm	TIC	X	
Organonitrates						
55 Butyl nitrate	928-45-0	Not Detected	2.5 ppm	TIC	X	
56 1,4-Butanediol, dinitrate	3457-91-8	Not Detected	0.05 ppm	TIC	X	
57 2-Nitro-2-methylpropane	594-70-7	Not Detected	0.3 ppm	TIC	X	
58 1,2,3-Propanetriol, 1,3-dinitrate	623-87-0	Not Detected	0.05 ppm	TIC	X	
Isocyanates						
59 Methyl Isocyanate	624-83-9	Not Detected	20 ppb	TIC	X	

5.0 Plots of COPCs with Significant Detected Values

Of the 59 COPCs in Table 1, six had detected concentrations greater than 10% of their corresponding OEL. These compounds (highlighted in yellow in the table) were ammonia, mercury, acetonitrile, NDMA, NDEA, and NMEA. This section provides more detail on those results, along with plots of the corresponding data. Note that Appendix E shows plots and descriptions for other COPCs with measured inlet concentrations between 2% and 10%, or DLs >10% of their corresponding OELs.

Ammonia (see Figure 1) – The DL for ammonia corresponds to approximately 2.6% of the OEL. For both respirator cartridges, inlet concentrations ranged from 192 to 484% of the OEL. The measured outlet concentrations from the SCOTT 7422-SD1 cartridge increased with time, eventually exceeding 300% of the OEL, although the outlet concentrations from this cartridge were somewhat scattered. Nevertheless, the measurements suggest ammonia breakthrough from the SCOTT 7422-SD1 cartridge during the second measurement period, between 2 and 4 hours of testing. The outlet measurements for the SCOTT 7422-SC1 cartridge were also somewhat scattered, with the highest measurement at 314% of the OEL. These measurements suggest ammonia breakthrough, above 10% OEL, during the 8 to 10 hour measurement period.

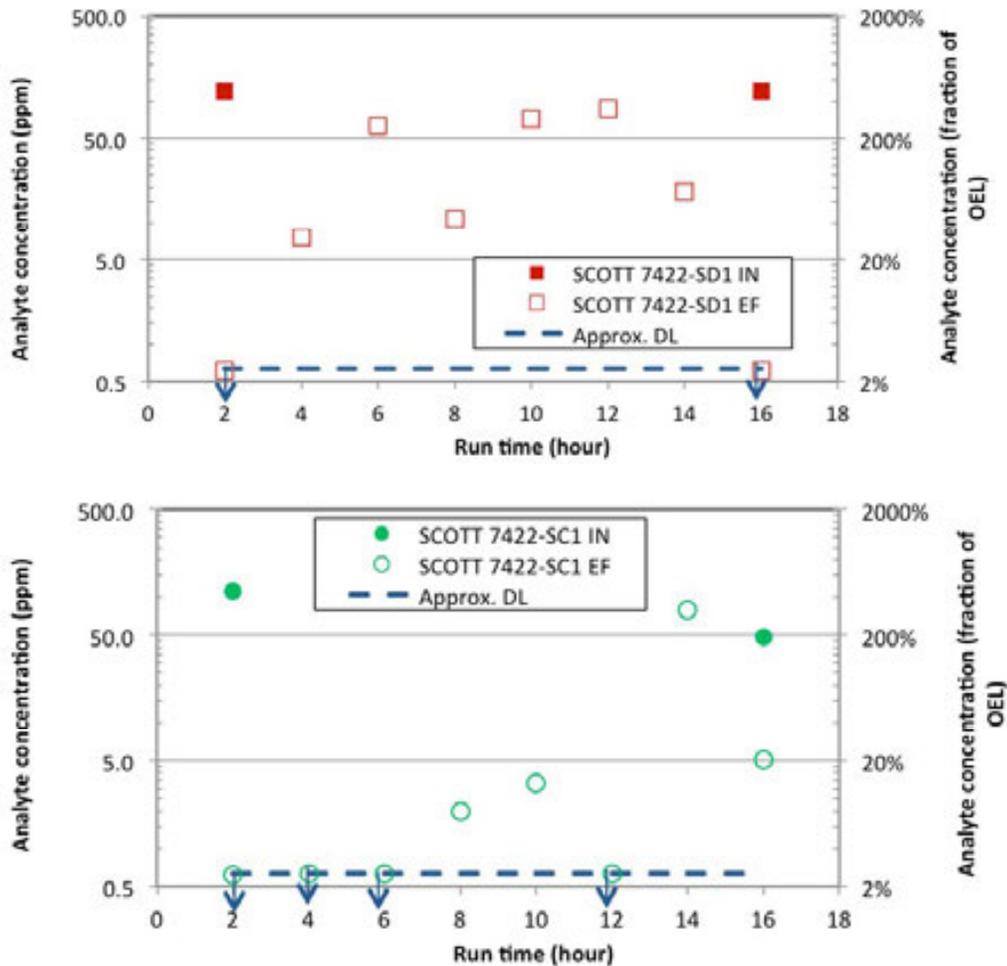


Figure 1. Plot of Measured Ammonia Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

Mercury (see Figure 2) – The DL for mercury corresponds to approximately 7.4% of the OEL. For both respirator cartridges, inlet concentrations ranged from 30 to 34% of the OEL. All of the measured outlet concentrations from both respirator cartridges tested were below the DL for mercury. Therefore, there is no evidence of mercury breakthrough over the measured time period.

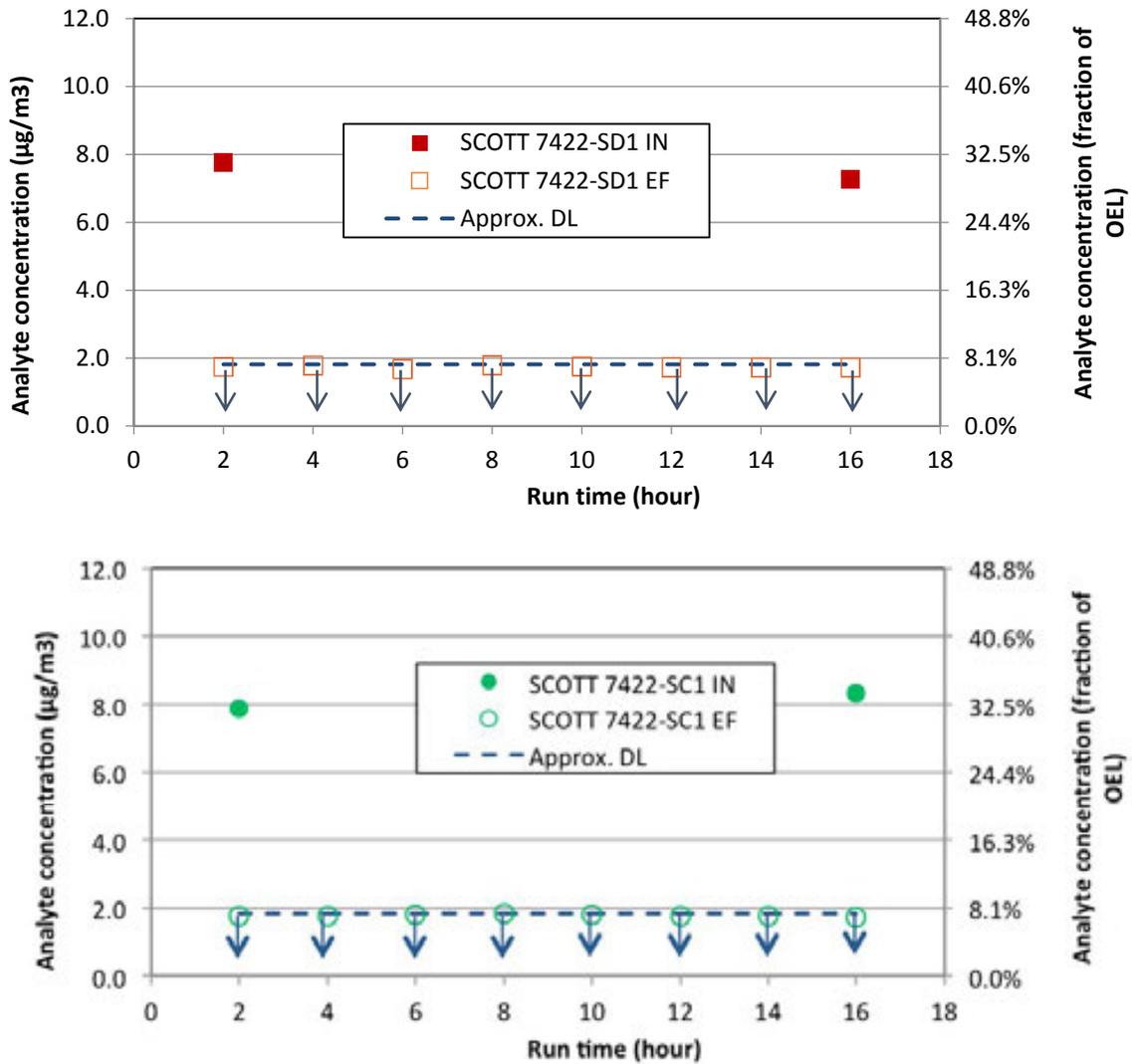


Figure 2. Plot of Measured Mercury Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

Acetonitrile (see Figure 3) – The DL for acetonitrile corresponds to approximately 0.001% of the OEL. For both respirator cartridges, inlet concentrations ranged from 0.2 to 0.7% of the OEL.¹ All of the measured outlet concentrations from both respirator cartridges were greater than the DL for acetonitrile, but less than 1.5% of the OEL, with the exception of a single data point. The outlet concentration over the 8-hour period for SCOTT 7422-SC1 was measured at 12.4% of the OEL. However, because this data point is much higher than all of the other inlet and outlet values, analytical error is suspected. Future measurements, with higher inlet concentrations for acetonitrile, are recommended to fully ascertain respirator performance.

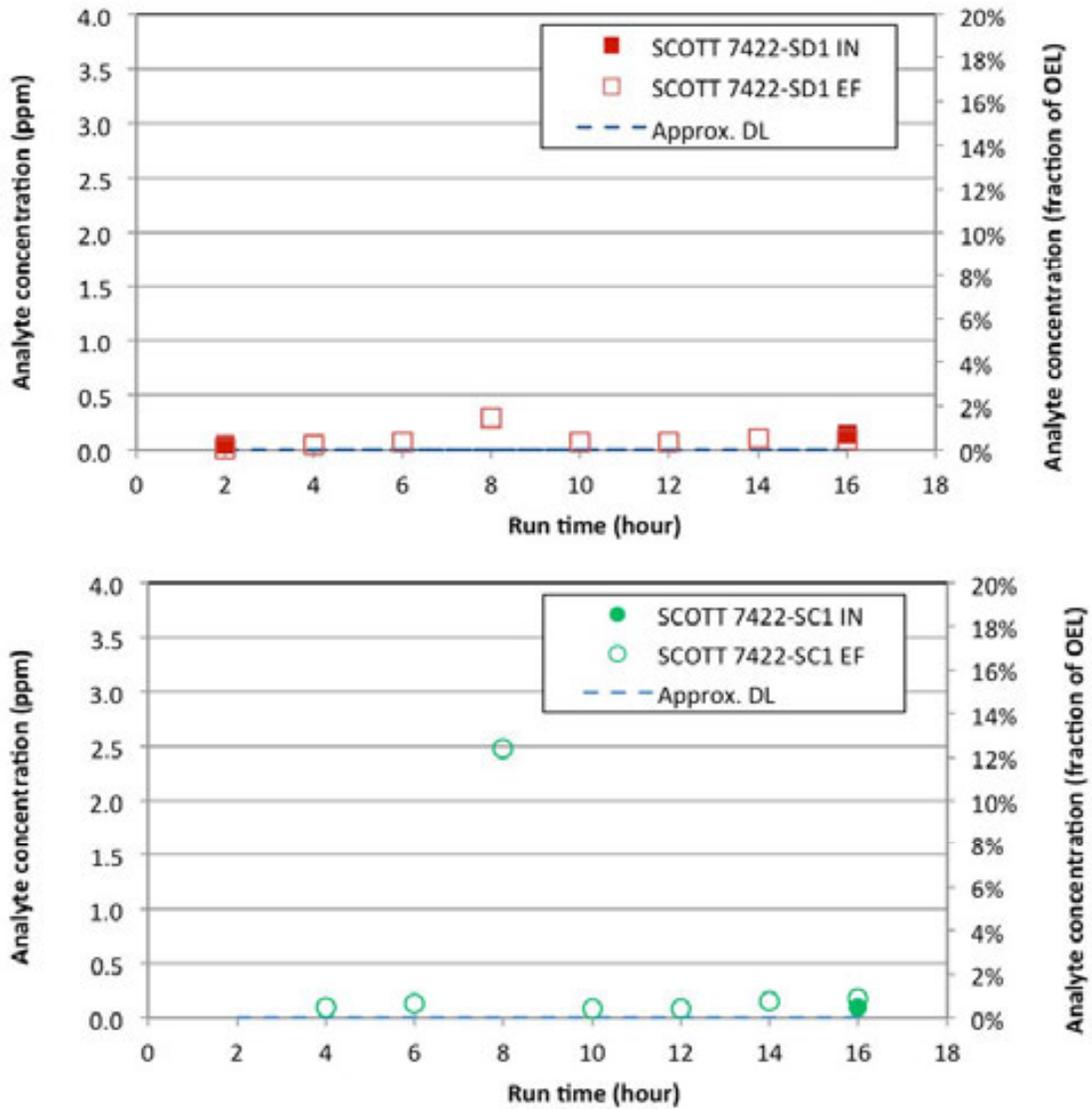


Figure 3. Plot of Measured Acetonitrile Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1).

¹ Neither inlet nor outlet concentrations at the 2-hour period were recorded for the SCOTT 7422-SC1 test because of either a broken sorbent tube or analytical laboratory malfunction.

N-Nitrosodimethylamine (see Figure 4) – The DL for NDMA corresponded to approximately 8.4%, with an increase to 12.1% for the last few data points for the second respirator cartridge¹. For both respirator cartridges, inlet concentrations ranged from 43 to 224% of the OEL. All of the respirator outlet measurements were below the analytical DL for NDMA. Therefore, there is no evidence of NDMA breakthrough over the measured time period.

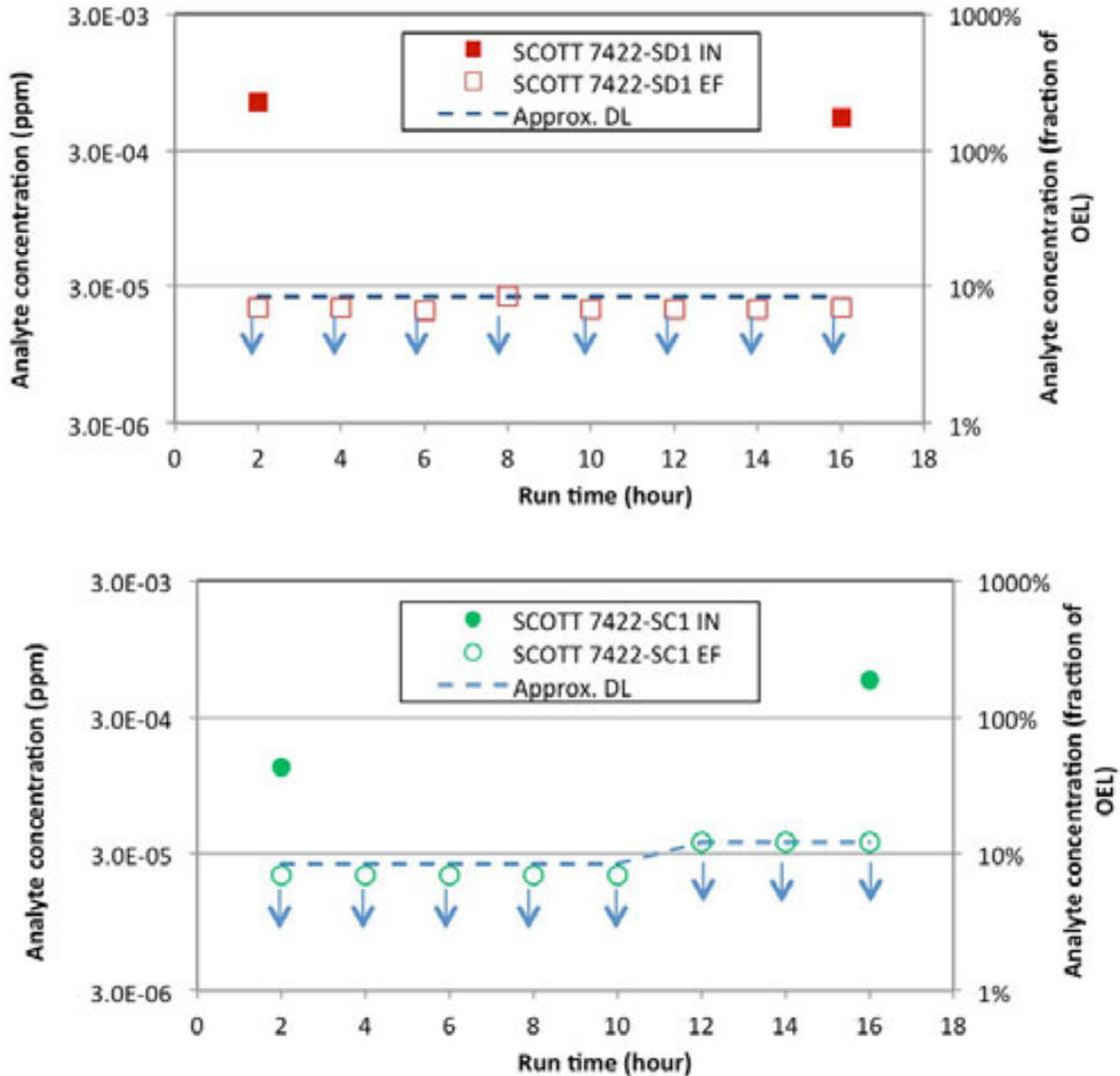


Figure 4. Plot of Measured N-Nitrosodimethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

¹ The increase in DL for samples from the SCOTT 7422-SC1 testing resulted from a change in the calculated reporting limit (RL) from the analytical laboratory. The “RL” can vary for any sample batch based on the instrument performance and desorption efficiency of laboratory control samples.

N-Nitrosodiethylamine (see Figure 5) – The DL for NDEA corresponds to ~29% of the OEL. For both respirator cartridges, inlet concentrations ranged from 23 to 74% of the OEL. All of the measured outlet concentrations from both respirator cartridges were less than the DL for NDEA. Because the detection level is greater than 10%, it is recommended that this current NDEA DL (28.7% of OEL) be used for making respirator performance determinations. Therefore, based on the outlet measurements and the revised threshold recommendation there is no evidence of breakthrough over the measured time period for either cartridge tested.

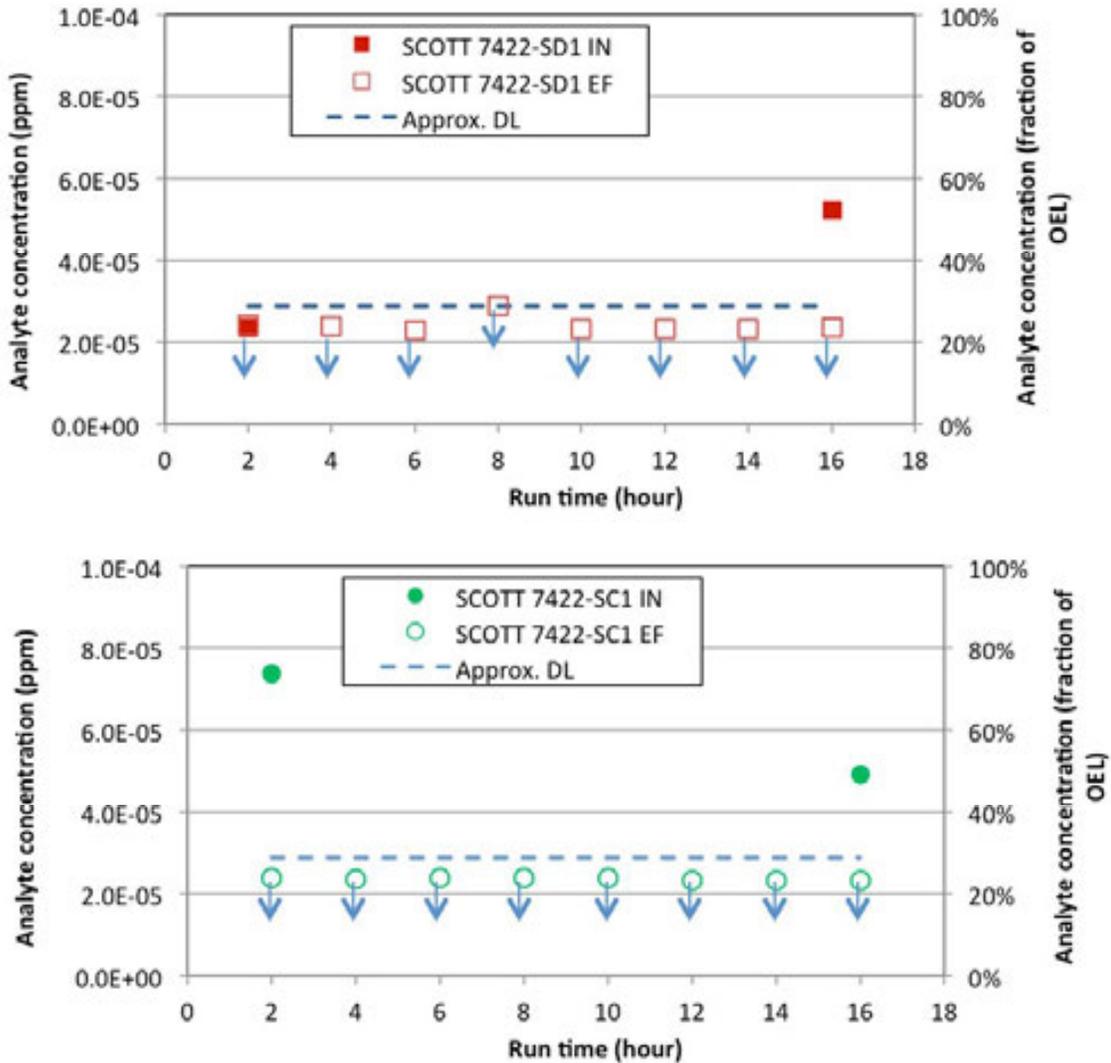


Figure 5. Plot of Measured N-Nitrosodiethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

N-Nitrosomethylethylamine (see Figure 6) – The DL for NMEA corresponds to approximately 11.1% of the OEL. For both respirator cartridges, inlet concentrations ranged from 8.6 to 9.1% of the OEL, which are less than the DL for NMEA. All of the measured outlet concentrations from both respirator cartridges were less than the DL. Because the DL is greater than 10%, it is recommended that this current NMEA DL (11.1% of OEL) be used for making respirator performance determinations. Therefore, based on the outlet measurements and the revised threshold recommendation there is no evidence of breakthrough over the measured time period for either cartridge tested.

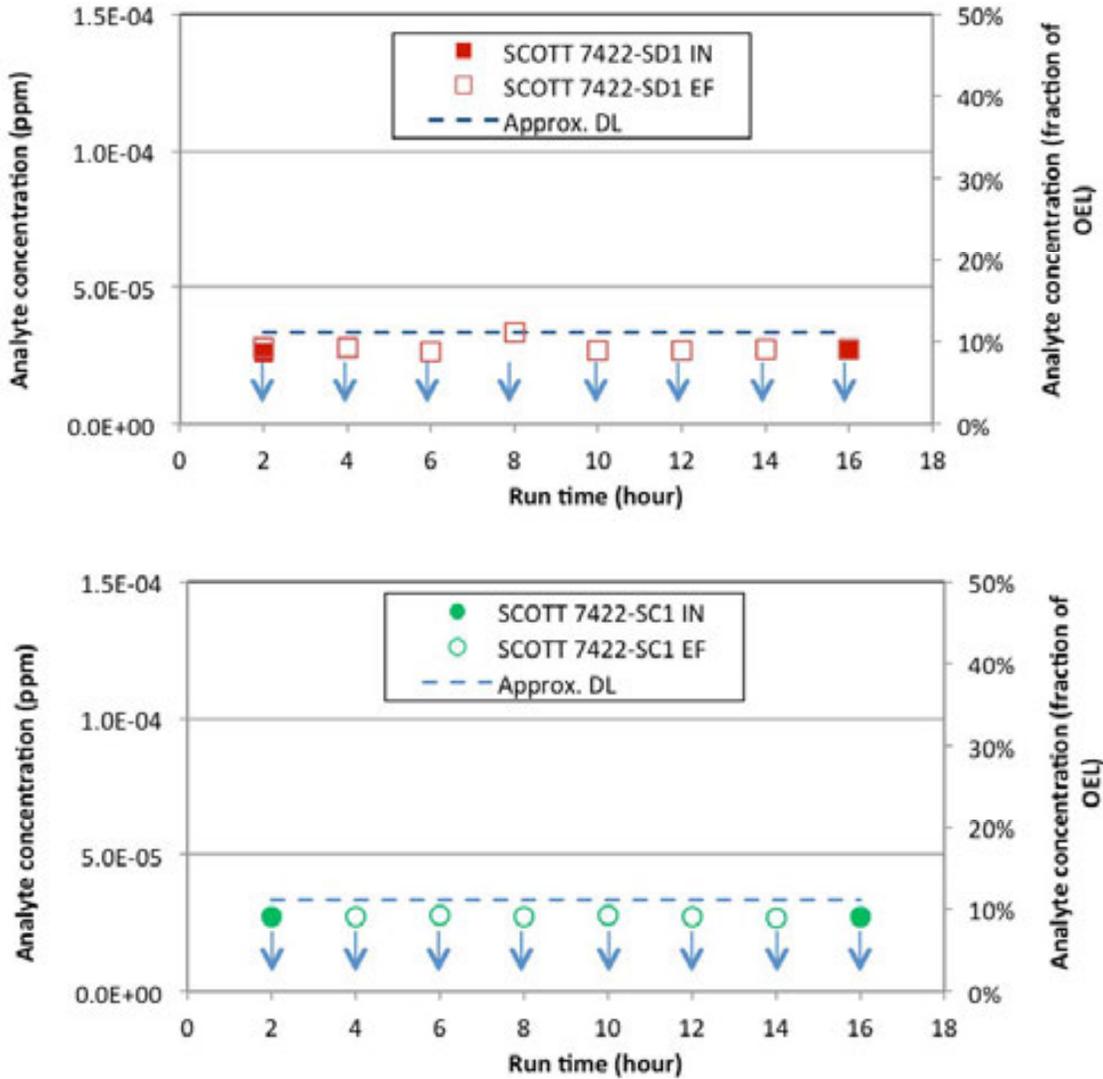


Figure 6. Plot of Measured N-Nitrosomethylethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

6.0 Factoring in Historical Concentration Data

To fully assess respirator performance for COPC removal, historical data were reviewed to determine if the recent inlet measurements were representative of typical values. Historical A-101 data from TWINS and the Site-Wide Industrial Hygiene Database were used for this assessment.

A complete table with historical and measured results for all 59 COPCs and their boiling point data is provided in Appendix F, along with a description of the historic source data that were used. Table 2 shows a subset of data for COPCs with boiling points below 70°C because a low boiling point can be a general indicator of poor adsorption on solid media.

In total, 10 COPCs have been previously measured in the A-101 headspace at concentrations above 10% of their respective OELs and above analytical reporting limits (RL). These COPCs include ammonia, nitrous oxide, mercury, 1,3-butadiene, furan, acetonitrile, methyl nitrite (TIC), and three nitrosamines: NDMA, NDEA, and N-Nitrosomorpholine. Of these 10 COPCs:

- Ammonia, mercury, NDMA, and NDEA average and maximum inlet concentrations measured in this cartridge study were generally consistent¹ with historic headspace measurements.
- Furan average and maximum inlet concentrations were consistently less than 5% of OEL in the cartridge study, significantly lower than the historic average headspace concentration of 317% of OEL. Historic measurements of other furan-based compounds (i.e., substituted furans) have consistently been found to be less than the RL.
- 1,3-butadiene cartridge inlet concentrations were comparable to the historical average headspace concentration of 2.9% of OEL, but less than the maximum historic concentration of 51% of OEL.
- Acetonitrile cartridge inlet concentrations were consistently less than 1% of OEL, whereas historic headspace measurements ranged from an average of 4.4% to a maximum of 26% of OEL.
- N-Nitrosomorpholine cartridge inlet concentrations were generally consistent with the historical average headspace concentration of 11% of OEL, but less than the maximum historic concentration of 24% of OEL.
- Methyl nitrite was not detected in this cartridge study, but has been reported in three pre-2006 headspace samples as a TIC at a concentration greater than 300% of OEL. This COPC has not been detected in more recent analyses of A-101 headspace.
- Nitrous oxide was not measured in this cartridge study as previously noted, but has been reported in pre-2006 headspace samples at a concentration greater than 300% of OEL. This COPC has only been reported as <RL in the more recent single analysis result from A-101.

¹ Inlet concentrations were considered generally consistent if they were within $\pm 100\%$ of historic maximum and average headspace concentrations. Maximum inlet concentrations for these COPCs were 18 to 46% less than historic maxima, and average inlet concentrations ranged from 60% less to 70% higher than the historic average.

Table 2. Historical Tank A-101 Headspace Data for COPCs with Boiling Points less than 70°C (158°F)

COPC Number and Name	CAS Number	Boiling Point (°F)	OEL	Historical Measurements ¹						Measurements in this Study	
				# of Values	Max. Value	Average Value	Max. Value (% OEL)	Average Value (% OEL)	Max Inlet Value (% OEL)	Highest Value from Respirator Outlet (% OEL)	
2 Nitrous Oxide	10024-97-2	-127	50 ppm	1 20	<RL 250	<RL 158	<RL 500%	<RL 316%	Not Measured		
1 Ammonia	7664-41-7	-28	25 ppm	15 21	148 800	58.7* 257	592% 3200%	235%* 1028%	484%	348%	
50 2-Fluoropropene	1184-60-7	-11	0.1 ppm	1	<RL	<RL	<RL	<RL	Not Detected - TIC		
14 Formaldehyde	50-00-0	-6	0.3 ppm	15	0.024	0.00726	8.0%	2.4%	5.2%	2.1%	
53 Methyl nitrite	624-91-9	10	0.1 ppm	0 3	n/a 0.43	n/a 0.318	n/a 430%	n/a 318%	Not Detected - TIC		
4 1,3-Butadiene	106-99-0	24	1 ppm	37	0.512	0.0287*	51%	2.9%*	2.0% (RL) ²	2.6% (RL)	
42 Ethylamine	75-04-7	62	5 ppm	17	<RL	<RL	<RL	<RL	0.34%	0.10% (RL)	
15 Acetaldehyde	75-07-0	69	25 ppm	24	0.142	0.0308	0.57%	0.12%	0.22%	0.13%	
19 Furan	110-00-9	88	1 ppb	40	<RL	3.17	<RL	317%	4.8%	1.3%	
59 Methyl Isocyanate	624-83-9	103	0.02 ppm	2	<RL	<RL	<RL	<RL	Not Detected - TIC		
20 2,3-Dihydrofuran	1191-99-7	130	1 ppb	13	<RL	<RL	<RL	<RL	4.2%	2.6%	
22 2-Methylfuran	534-22-5	147	1 ppb	39	<RL	<RL	<RL	<RL	1.9% (DL)	2.1%	
8 Methanol	67-56-1	148	200 ppm	6	0.43	0.251	0.22%	0.13%	Not Measured		
21 2,5-Dihydrofuran	1708-29-8	152	1 ppb	40	<RL	<RL	<RL	<RL	2.2% (DL)	3.8%	

¹ Historical data from TWINS industrial hygiene vapor database and SWIH database; see Appendix F for additional information and dates of queries. Values in italics include those data plus data from the TWINS headspace database, all samples earlier than May 2005.

* indicates that the value of the average would differ by a factor of 2 or more (in either direction) if non-reports were excluded.

"< RL" indicates that all pertinent measurements of the analyte were less than the reporting limit

Plain font in the table indicates that only the recent databases (SWIHD headspace and TWINS Industrial Hygiene) were included.

Italics (second row for nitrous oxide and ammonia only) mean that the pre-2006 TWINS headspace data were also included.

"n/a" indicates no historical data was found in the databases

² "(DL)" indicates value represents approximate detection limit (DL), which is calculated using the reported detection limit (or reporting limit - RL, where noted) from the analytical laboratory and the average volume (from flowrate x time) of vapor exposed to the sorbent

7.0 Conclusions

Testing was conducted during the July 22–24, 2016 period using headspace vapors from Hanford tank A-101 under static conditions. The vapors were fed to a respirator cartridge test stand developed by WRPS in collaboration with HiLine Engineering (Richland, Washington). Multipurpose respirator cartridges SCOTT 7422-SD1 and 7422-SC1 (SCOTT Safety, Monroe, North Carolina) were each assessed with the tank headspace vapors in tests conducted on separate days. Sorbent tubes were used to collect samples of the vapor stream entering and exiting the respirator cartridge, and were subsequently analyzed for COPC concentrations. PNNL was tasked to conduct independent analysis of the analytical results, and make recommendations based on the results for respiratory cartridge performance and change-out frequency.

The A-101 data are expected to provide conservatively high COPC concentrations compared to the ambient concentrations inside and outside the tank farm. Further, the flow rate through each respirator cartridge was maintained conservatively high compared to normal human breathing rates. The average temperatures of the sample slipstream during testing ranged from 69 to 90°F, and the average relative humidity ranged from 45 to 94%. The inlet concentrations measured are shown in Table 1. Thus, any conclusions on respirator cartridge performance pertain to the above-stated conditions.

The following are the key conclusions from the assessment of the 59 COPCs in the current analysis:

- Based on measurements of the cartridge inlet vapor concentrations from tank A-101, four compounds had measured values that exceeded 10% of their corresponding OELs. These were ammonia, mercury, NDMA, and NDEA. The inlet concentrations for ammonia and NDMA were greater than 100% of their respective OELs.
- Of the compounds identified above, only ammonia had respirator cartridge outlet concentrations (for both cartridges tested) that were in excess of 10% of the OEL. These measurements indicate breakthrough for each of the cartridges tested. For the SCOTT 7422-SD1 cartridge, ammonia breakthrough above 10% OEL appeared to occur after 2 hours. For the SCOTT 7422-SC1 cartridge, ammonia breakthrough above 10% OEL appeared to occur after 8 hours.
- Inlet vapor concentrations of all other measured COPCs were below 10% of OEL thresholds, and in many cases, they also were less than the corresponding analytical DLs; thus, there is no evidence of cartridge breakthrough above 10% OEL for any compounds over the 16 hours of testing.

Historical concentrations of the COPCs in A-101 headspace were analyzed to identify any differences compared to those measured in this current study. Ten COPCs, including the four measured in this study, have been previously measured in the A-101 headspace at concentrations above 10% of their respective OELs and above analytical RLs. Of the 10 COPCs, ammonia, mercury, NDMA, and NDEA inlet concentrations measured in this cartridge study were generally consistent with historic headspace measurements. Of the remaining six COPCs from historic A-101 analysis, four—furan, acetonitrile, 1,3-butadiene, and N-Nitrosomorpholine—were detected at lower concentrations in cartridge testing than either average or maximum historic headspace concentrations. The remaining two COPC were either not measured (methyl nitrite), or not analyzed (nitrous oxide).

8.0 Recommendations

- Based on the measurements taken for this study, none of the COPCs, other than ammonia, indicated breakthrough behavior above 10% OEL during the 16-hour testing period. Therefore, the recommended change-out times for the SCOTT'S 7422-SD1 and 7422-SC1 cartridges are based on ammonia performance only. The recommended change-out time is 2 hours and 8 hours, respectively.
- Any known changes in concentrations for any COPCs at the respirator inlet, compared to those measured in the current study, could alter (e.g., increase or decrease) the above recommended cartridge change-out period, especially if OEL thresholds are exceeded. Decreases to change-out times may also be recommended if there are significant increases in temperature or relative humidity of the gas entering respirator cartridges compared to those represented in the current testing.
- Additional recommendations related to NDMA and NDEA DLs, TICs, further data assessment, and future testing documented in PNNL-25860¹ for respirator cartridge testing on a slipstream from the Hanford AP tank exhauster are also relevant to testing the A-101 headspace. Future testing and analysis of tank vapors with higher concentrations of COPCs such as furans should help improve understanding of cartridge performance.

¹ Nune, SK, J Liu, CJ Freeman, and TM Brouns. 2016. *Analysis of Respirator Cartridge Performance Testing on a Hanford AP Tank Farm Primary Exhauster Slipstream*. PNNL-25860, Pacific Northwest National Laboratory, Richland, Washington. (Unpublished)

9.0 References

1. OSHA 29 CFR 1910.134, https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=12716
2. OSHA Respirator Change Schedules - Decision Logic Flowcharts, <https://www.osha.gov/SLTC/etools/respiratory/decisionlogic/flowcharti.html>
3. OSHA Respirator Change Schedules Mathematical Modeling, and Factors that Influence Cartridge Service Life, https://www.osha.gov/SLTC/etools/respiratory/change_schedule.html
4. OSHA Standard Respirator Testing Procedures, <http://www.cdc.gov/niosh/npptl/stps/aprespnbrn.html>
5. Wood, GO. Estimating Service Lives of Organic Vapor Cartridges. *Am Ind Hyg Assoc J* 1994, 55, 11-15.
6. Wood, GO. Estimating Service Lives of Organic Vapor Cartridges II: A Single Vapor at All Humidities. *J Occup Environ Hyg* 2004, 1, 472-492.
7. Wood, GO, JL Snyder. Estimating Service Lives of Organic Vapor Cartridges III: Multiple Vapors at All Humidities. *J Occup Environ Hyg* 2007, 4, 363-374.
8. Janvier, F, L Tuduri, D Cossement, D Drolet, J Lara. Systematic Evaluation of the Adsorption of Organic Vapors onto a Miniaturized Cartridge Device using Breakthrough Tests in Parallel Experiment with a Full Size Respirator Cartridge. *Adsorpt Sci Technol* 2016, 34, 287-306.
9. Yoon, YH, JH Nelson, J Lara. Respirator Cartridge Service Life: Exposure to Mixtures. *Am Ind Hyg Assoc J* 1996, 57, 809-819.
10. 3M Service life software Version 3.3, <http://extra8.3m.com/SLSWeb/serviceLifeDisclaimer.html?regId=20&langCode=EN&countryName=United%20States>
11. Scotts Surelife Cartridge Calculator, <https://www.scottsurelife.com/DesktopUI/SelectRegion.aspx>
12. Respiratory Protection, Chapter 36 of the American Industrial Hygiene Association publication, *The Occupational Environment: Its Evaluation and Control and Management*, ISBN 1-931504-43-1
13. Industrial Hygiene Sampling and Analysis plan for Respirator Cartridge Testing, TFC-PLN-168, REV A, June 16, 2016
14. Air Purifying Respirator Cartridge Test Apparatus Special Tool and Equipment Evaluation, RPP-STE-59226, Rev 0, June 22, 2016.
15. Cohen, HJ, SP Levine, RP Garrison. Development of a Field Method for Calculating the Service Lives of Organic Vapor Cartridges - Part IV. Results of field validation trials, *American Industrial Hygiene Association Journal* (1991), pages 263-270.
16. Scott Air Purifying Respirators (742 Twin Cartridges), https://www.scottsafety.com/en/us/DocumentandMedia1/Poster_742SelectionGuide_HS_6411_0313.pdf
17. Meacham JE, JO Honeyman, TJ Anderson, ML Zabel, and JL Huckaby. 2006. *Industrial Hygiene Chemical Vapor Technical Basis*. RPP-22491, Rev. 1, CH2M Hill Hanford Group, Inc., Richland, Washington.
18. Industrial Hygiene Exposure Assessment Strategy, TFC-PLN-34, REV E-6, February 22, 2013.

Appendix A

Description of Respirator Cartridge Testing Setup

Appendix A

Description of Respirator Cartridge Testing Setup

The respirator cartridge testing system was developed by Washington River Protection Solutions and HiLine Engineering as a means to comprehensively test respirator cartridge performance with actual Hanford tank headspace gases. The system was designed to draw vapors from a tank or exhauster and flow the vapors through the respirator cartridge being tested.[13,14] The test equipment allows for sampling the vapor stream both before and after the cartridge so performance for a given COPC can be quantified. Sorbent media tubes were used to capture the COPCs and other hazardous contaminants. After a given test segment, the sorbent tubes were removed and analyzed. Exhaust gas samples were taken every 2 hours, but this timing can be modified as necessary.

Figure A.1 provide a general schematic diagram for the respirator cartridge test apparatus, and Figure A.2 shows photographs of the actual equipment. The test system operates using vacuum pressure to draw tank gases/vapors into the unit so that the potential for leakage to atmosphere is minimized until the gases/vapors are under positive pressure downstream of the vacuum pumps. By the time gases reach the vacuum pump, the COPCs are essentially captured/ removed by either the sorbent tubes or the respirator cartridge.[13,14]

Flows through the respirator cartridge and each sorbent tube are set and controlled/maintained using manual flow control valves on the outlet of each rotameter, and rotameters were calibrated against Dry-Cal primary flow calibrators before and after testing. All equipment connections were leak tested prior to initiation of the test. Temperature, relative humidity, and pressure of the inlet gas/vapor stream are monitored by calibrated instrumentation.

Using Industrial Hygiene-approved materials, cartridge test equipment was constructed so it would not influence/interfere with vapor analysis. Stainless steel or Teflon tubing and fittings were incorporated into the design where possible because of their relatively inert nature to the vapors being analyzed. Limited portions of the assembly used acrylic, Viton, glass, and Masterflex C-flex tubing, which are commonly used for various vapor-sampling applications.

Appendix B
Analytical Testing

Appendix B

Analytical Testing

The Sampling and Analysis Plan was developed under the direction and oversight of the Industrial Hygienist in conjunction with the Tank Farms Operations Contractor Retrieval and Closure, and Tank Farms Project and/or Production Operations Project Management Team.

Chemical compounds in the tank samples were analyzed using approved industrial hygiene methods or National Institute of Occupational Safety and Health (NIOSH)-approved methods for quantifying hazardous airborne contaminants in the tank farm vapors. Methods including gas chromatography/mass spectrometry, were used as the primary analytical techniques for identifying hazardous airborne contaminants (see Table B.1).

Table B.1. Information on Sorbent Media used to Capture Contaminants, Flow Rates Used, Analytical Methods to Extract Analyte from Sorbent Media, and Method Analysis to Quantify or Estimate the Concentrations of Hazardous Contaminant

Analyte	Media	Flow Rate (mL/min)	Analytical Method ^a	Instrument Used ^b	Analysis Location ^c
Acetonitrile	Charcoal Tube, SKC-226-09	100	NIOSH 1606	GC-FID	ALS
Acetonitrile	Carbotrap 300 TDU Tube	33	EPA TO-17 Modified	GC/MS	WRPS
Furans	TDU Tenax TA	33	EPA TO-17 Modified	GC/MS	WRPS
Semivolatile Organic Compounds	Carbotrap 150 TDU Tube	33	EPA TO-17 Modified	GC/MS	WRPS
Volatile Organic Compounds	Carbotrap 300 TDU tube	33	EPA TO-17 Modified	GC/MS	WRPS
Mercury	Anasorb C300, SKC-226-17-1A	250	NIOSH-6009	CVAA	WHL
Ammonia	Anasorb 747 (sulfuric acid), SKC-226-29	200	OSHA-ID-188	IC	WHL
1,3-butadiene	Charcoal, SKC-226-37, (Part A and Part B)	200	NIOSH-1024	GC-FID	ALS
Aldehyde	DNPH Treated Silica Gel, SKC-226-119	200	EPA TO-11A	HPLC	ALS
Pyridine	Coconut Shell Charcoal, SKC-226-01offsite	1000	NIOSH-1613	GC-FID	ALS

Analyte	Media	Flow Rate (mL/min)	Analytical Method^a	Instrument Used^b	Analysis Location^c
Nitrosamines	Thermosorb/N	2000	NIOSH-2522 Modified	GC-TEA	CBAL
Ethylamine	XAD-7 (NBD) Chloride), SKC 226-96	200	OSHA-ID-34, 36, 40, and 41	HPLC-UV	ALS

^a Analytical Method

NIOSH: National Institute of Occupation Safety and Health

EPA: U.S. Environmental Protection Agency

OSHA: Occupational Safety and Health Administration

^b Instrument Used

GC-FID: Gas Chromatography-Flame Ionization Detector

GC/MS: Gas Chromatography-Mass Spectrometry

CVAA: Cold Vapor Atomic Absorption

IC: Ion Chromatography

HPLC: High Performance Liquid Chromatography

GC-TEA: Gas Chromatography-Thermal Energy Analyzer

HPLC-UV: High Performance Liquid Chromatography-Ultraviolet Detector

^c Analysis Location

ALS: ALS Environmental Salt Lake City

WRPS-222S: Washington River Protection Solutions, Organic Studies Group

WHL-222S: Wastren Hanford Laboratory

CBAL: Columbia Basin Analytical Laboratory, part of the RJ Lee Group

Appendix C

Raw Analytical Data

Appendix C

Raw Analytical Data

Table of Contents

Description.....	C-2
Experiment parameters	C-4
Flow rates.....	C-4
Temperature, pressure and relative humidity	C-6
Raw analytical data.....	C-7
Semivolatile organic compound and semivolatile organic compound tentatively indentified compound	C-7
Volatile organic compound and volatile organic compound tentatively indentified compound	C-57
Furans.....	C-155
Amines	C-181
Acetonitrile	C-194
Mercury.....	C-206
Ammonia	C-223
Aldehydes	C-238
1, 3-Butadiene.....	C-263
Pyridines	C-283
Nitrosamines	C-296

Description

This appendix includes raw data of flow rate, temperature, pressure, and humidity, and analytical data for the A-101 data set. Calculations using this data are given in Appendix D.

The raw analytical data is only given in this appendix. Washington River Protection Solutions (WRPS) converted these data into Excel data spreadsheets that were transmitted to Pacific Northwest National Laboratory. The following are comments on that conversion:

- The analytical measurement results listed in results spreadsheet columns were transferred from entries labeled 'result' in the raw analytical .pdf files. The results were transferred into three rows in the spreadsheets. The first row contained the relevant information with the appropriate units. Where a results entry was given as 'ND' in the .pdf, a '<' symbol was used. Where a detection/reporting limit (RL) was listed as 'n/a,' the result entry in the spreadsheet was given as '0.0.'
- The use of the terms RL or detection limit (DL) varied among analytical laboratories. The term RL (equivalent to a limit of quantification) was used instead of a DL by ALS Environmental Salt Lake City, CBAL, and 222S – Wastren Hanford Laboratory (see Table F.1 in Appendix F for a complete correlation of which Chemicals Of Potential Concern used an RL or a DL). The WRPS laboratory provided a DL, in contrast to an RL. Neither reporting nor DLs were provided for tentatively identified compounds (TICs).
- Chain of custody information is provided clearly in the raw analytical data .pdf files, including analyte name, sample numbers and laboratory-assigned numbers. Chemical Abstract Service numbers were not provided.

The nomenclature of the sample identification (ID) is the same for every set of chemicals. It is generally composed of a survey number, tank farm ID, test location, sample line, and tube bundle ID. Descriptions of these nomenclatures are given as follows:

- 'BK-BASE' means measurements obtained for blank experiment before plugging into the system. 'BASE' means measurement obtained for ambient air (fresh air vs. tank vapor).
- '6172' designations correspond to testing with the SCOTT 7422-SD1 respirator cartridge, whereas '6173' designations correspond to testing with the SCOTT 7422-SC1 respirator cartridge.
- Position designators 'A1' and 'H1' were respirator cartridge inlet measurements at 0 to 2 hours and 14 to 16 hours, respectively. The other position designators corresponded to respirator cartridge outlet measurements: A2 (0 to 2 hours), B1 (2 to 4 hours), C1 (4 to 6 hours), D1 (6 to 8 hours), (8 to 10 hours), F1 (10 to 12 hours), G1 (12 to 14 hours), and H2 (14 to 16 hours).
- For example, sample ID 16-06172-5-A1 corresponds to the first cartridge survey (16-06172), sample line 5, and the first (0 to 2 hours) influent sample bundle (A1).

The flow rate passing through the respirator cartridge was approximately 30 L/min, while the sampling flow rates through the sorption tubes ranged between 30 and 200 mL/min for different chemicals that were being collected. WRPS provided these flow rates in files 'A-Farm 7-22 7-23.xlsx' and 'A-Farm 7-23 7-24.xlsx.' The information is shown in the tables below.

WRPS provided the temperature and humidity information in files 'A-101 DRI July 22-23.xls' and 'A-101 DRI July 23-24.xls.' The information is shown in the tables provided in this appendix.

The raw analytical data for chemicals in each category are summarized together. Examples of chemicals in each category follow:

- SVOC (or SVOA): Biphenyl, Diethylphthalate, Tributyl phosphate, Dibutyl butylphosphonate, Dodecane, Hexadecane
- SVOCTIC (or SVOATIC): Undecane, Cyclotetrasiloxane, octamethyl, Decamethylcyclopentasiloxane, Dodecane,4,6-dimethyl
- VOC (or VOA): Acetone, Acetonitrile, Acetophenone, Benzene, Butanal,1-Butanol, Butanenitrile, 3-Buten-2-one, Cyclohexane, Decane, Ethanol, Ethylbenzene, Furan, Hexane, Hexanone, Methylene Chloride, Propanenitrile, Styrene, Tetrachloroethene, Toluene, Trichlorofluoromethane
- VOCTIC (or VOATIC): 2,6-Dimethyldecane, Decane, 2,3,5,8-tetramethyl-, Decane, 3,7-dimethyl-, Methenamine, Undecane, 2,6-dimethyl-
- Furans: 2,3-Dihydrofuran, 2-Pentylfuran, Furan, Tetrafulan
- Ethylamine (amines): Dimethylamine, Ethylamine, Methylamine
- Acetonitrile: Acetonitrile
- Mercury: Mercury
- Ammonia: Ammonia
- Aldehyde: Acetaldehyde, Acetone, Butyraldehyde. Formaldehyde, Hexanal, Propionaldehyde, Valeraldehyde
- 1,3 Butadiene: 1,3-Butadiene
- Pyridines: 2,4-Dimethylpyridine, Pyridine
- Nitrosamines: N-Nitrosodimethylamine.

First Cartridge, or Survey 1 (7/22-23) A-101

Volumes Air Collected (L)

Sample Box Number		Mach.	Mach.	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2
Analyte	Line	Base 1	Base 2										
SVOC	A	4.02	4.21	3.90	4.30	4.08	4.25	4.07	3.87	3.95	3.90	3.93	3.96
VOC	B	4.23	3.99	4.23	3.84	3.79	4.11	3.91	3.94	3.97	3.96	3.49	3.92
Furans	C	4.10	3.93	4.19	3.98	4.43	4.24	3.99	3.93	3.89	3.89	3.93	3.90
Ethylamine	D	12.21	12.46	12.61	12.87	12.14	12.52	12.17	11.81	11.84	11.69	11.91	12.05
Acetonitrile	E	12.40	12.20	12.56	12.39	12.11	12.73	11.88	11.93	11.77	12.00	11.96	12.13
Mercury	F	30.44	30.53	30.65	30.76	30.04	31.88	29.50	29.70	29.93	30.04	29.98	29.87
Ammonia	G	24.66	24.50	24.69	24.63	24.23	25.30	24.05	23.80	22.89	24.22	23.67	23.98
Aldehyde	H	24.40	24.45	24.65	24.12	24.40	25.74	24.56	23.89	23.61	23.68	23.69	23.89
1,3-Butadiene	I	24.46	24.16	24.69	24.50	23.89	24.95	24.14	23.85	23.47	23.89	23.74	23.92
Pyridine	J	124.38	124.08	124.98	123.66	124.38	130.47	122.40	121.80	121.80	121.80	120.60	120.00
Nitrosamines	K	240.00	241.62	243.30	240.00	240.30	251.81	197.06	241.80	240.00	238.20	240.60	234.00

Flow Rates (ml/min)

Sample Box Number		Mach.	Mach.	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2
Analyte	Line	Base 1	Base 2										
SVOC	A	33.48	35.12	32.54	35.81	34.00	33.76	33.12	32.29	32.88	32.53	32.77	33.00
VOC	B	35.22	33.22	35.28	31.97	31.56	32.66	31.77	32.83	33.10	33.02	29.11	32.70
Furans	C	34.20	32.72	34.95	33.15	36.88	33.63	32.43	32.79	32.41	32.41	32.79	32.50
Ethylamine	D	101.76	103.83	105.07	107.28	101.18	99.36	98.92	98.38	98.69	97.45	99.22	100.40
Acetonitrile	E	103.31	101.65	104.65	103.22	100.88	101.05	96.61	99.45	98.05	99.98	99.66	101.10
Mercury	F	253.69	254.38	255.39	256.32	250.34	252.99	239.85	247.47	249.40	250.32	249.83	248.95
Ammonia	G	205.50	204.15	205.71	205.26	201.91	200.82	195.54	198.33	190.75	201.86	197.28	199.85
Aldehyde	H	203.35	203.79	205.39	201.00	203.31	204.27	199.65	199.07	196.78	197.32	197.41	199.10
1,3-Butadiene	I	203.85	201.34	205.79	204.13	199.08	198.04	196.23	198.79	195.62	199.12	197.86	199.35
Pyridine	J	1036.5	1034.0	1041.5	1030.5	1036.5	1035.5	995.1	1015.0	1015.0	1015.0	1005.0	1000.0
Nitrosamines	K	2000.0	2013.5	2027.5	2000.0	2002.5	1998.5	1602.1	2015.0	2000.0	1985.0	2005.0	1950.0

Notes: VOC: volatile organic compound; SVOC: semi-volatile organic compound.

Second Cartridge, or Survey 2 (7/23-7/24) A-101

Volumes Air Collected (L)

Sample Box Number	Mach.	Mach.	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2	
Analyte	Line	Base 1	Base 2										
SVOC	A	3.94	4.33	2.25	3.75	3.79	3.95	3.84	3.89	3.92	0.00	1.16	1.85
VOC	B	4.23	3.96	4.22	4.08	3.91	3.94	3.91	3.92	3.92	3.96	3.88	3.90
Furans	C	4.18	3.93	4.06	3.93	4.01	4.09	3.80	3.92	3.94	4.03	3.92	3.99
Ethylamine	D	12.45	12.54	12.37	12.62	12.63	12.35	11.99	11.77	11.65	11.83	11.99	12.08
Acetonitrile	E	12.53	12.33	12.03	12.17	11.93	12.09	12.07	11.86	11.88	11.72	11.95	11.81
Mercury	F	30.38	30.75	30.45	30.68	30.29	30.19	29.69	29.86	29.70	29.83	29.74	30.12
Ammonia	G	24.34	24.57	25.49	24.47	24.05	24.14	23.82	23.85	23.59	23.80	23.86	23.93
Aldehyde	H	24.15	24.50	24.45	23.98	24.11	24.27	24.38	28.71	23.88	23.62	23.81	23.74
1,3-Butadiene	I	24.33	24.51	24.26	18.36	24.13	24.31	24.18	23.66	23.82	23.71	23.89	23.59
Pyridine	J	123.00	122.22	123.60	120.60	121.80	123.00	121.80	120.60	120.60	120.60	121.20	120.60
Nitrosamines	K	240.96	244.80	241.80	242.40	243.60	241.80	244.20	240.60	242.40	241.20	241.80	237.60

Flow Rates (ml/min)

Sample Box Number	Mach.	Mach.	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2	
Analyte	Line	Base 1	Base 2										
SVOC	A	32.87	36.05	19.75	32.93	31.61	32.92	32.00	32.40	32.67	0.00	9.70	15.45
VOC	B	35.24	32.97	37.01	35.81	32.60	32.85	32.55	32.65	32.70	33.00	32.31	32.50
Furans	C	34.85	32.71	35.61	34.51	33.44	34.10	31.66	32.65	32.80	33.60	32.66	33.25
Ethylamine	D	103.72	104.52	108.52	110.66	105.26	102.88	99.89	98.06	97.10	98.59	99.95	100.65
Acetonitrile	E	104.41	102.73	105.51	106.79	99.41	100.73	100.59	98.85	99.00	97.70	99.60	98.45
Mercury	F	253.14	256.28	267.08	269.15	252.41	251.60	247.39	248.83	247.46	248.55	247.85	251.00
Ammonia	G	202.84	204.77	212.44	214.64	200.41	201.13	198.49	198.75	196.60	198.37	198.80	199.45
Aldehyde	H	201.24	204.20	214.50	210.34	200.91	202.24	203.17	239.27	199.00	196.80	198.45	197.85
1,3-Butadiene	I	202.74	204.23	212.78	161.07	201.12	202.57	201.46	197.17	198.50	197.61	199.10	196.60
Pyridine	J	1025.0	1018.5	1084.2	1057.9	1015.0	1025.0	1015.0	1005.0	1005.0	1005.0	1010.0	1005.0
Nitrosamines	K	2008.0	2040.0	2121.1	2126.3	2030.0	2015.0	2035.0	2005.0	2020.0	2010.0	2015.0	1980.0

First Cartridge, or Survey 1 - A-101 - 28 L/min through main respirator

Influent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	73.5	81.9	87.1	85.2	84.3	74	69.1	68.6	68.6
Pressure	Torr	737.9	734.2	735.2	735.2	735.6	736.4	738	737.3	736.2
Relative Humidity	%	62.4	45.3	66.7	72.7	75.1	86.1	78.7	82.4	88.8
NH3	ppm									
VOC	ppm									

Influent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	81.4	89.8	85	85.1	75.3	69.4	68.4	69.4	68.6
Pressure	Torr	738.1	733.7	735.1	735.4	736.4	737.1	737.9	737.2	736.1
Relative Humidity	%	51.1	65.5	73.8	73.9	86.9	87.8	85.7	77.8	84.2
NH3	ppm		99+	~100 d						
VOC	ppm		8.53							

Effluent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	73.2	81.3	86.5	86.5	84.4	75.9	70.2	68.8	66.9
Pressure	Torr	370.3	376.1	380.8	385.3	383.3	384	391.1	389.2	393.1
Relative Humidity	%	35.8	33.1	37.1	37.2	38.1	39.9	42.2	42.3	42.1
NH3	ppm									
VOC	ppm									

Effluent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	80.2	87.9	88.4	86.4	78.4	71	68.9	68	66.9
Pressure	Torr	395.1	402.9	398.1	398.5	389	395.4	393.9	394.3	396
Relative Humidity	%	32.8	38.3	36.4	37.5	39.7	43	43.4	67.9	45.8
NH3	ppm		1	41	4.8					
VOC	ppm		2.2	1.9	99+					

Second Cartridge, or Survey 2 - A-101 - 25 L/min through main respirator (pre at 30L, post at 20L)

Influent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	71.4	83.6	85.4	88.2	87.4	84.4	77.2	73.9	70.1
Pressure	Torr	793.3	735.5	735.7	734.9	734.1	733.1	733.9	735.1	733.8
Relative Humidity	%	78.7	89	94.1	72.6	72.4	77.4	83.5	81.5	82
NH3	ppm									
VOC	ppm									

Influent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	82.1	87.9	88.6	87.3	87.5	77.3	74.9	72.9	68.7
Pressure	Torr	738.5	735.1	734.7	734.3	733.6	733.7	734.2	735	734
Relative Humidity	%	55.9	84.8	74	73.5	71.3	84.9	82.9	79.6	80.7
NH3	ppm		99+							
VOC	ppm		3.8							

Effluent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	70.8	83.9	85.4	90	91.9	89.1	80.8	74.4	69.9
Pressure	Torr	381.9	391.1	390.9	392.7	403.7	399.4	401.3	398.3	399.5
Relative Humidity	%	33.8	34.6	40.8	35.4	33.9	34.7	38	40.7	43
NH3	ppm									
VOC	ppm									

Effluent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	84.1	89.9	92.5	93	91.4	82.1	77.1	73.2	69.3
Pressure	Torr	407.4	411	408.2	408.1	406.8	404.4	404.7	401.4	402.1
Relative Humidity	%	28.5	39.2	34.6	33.5	33.8	38.2	40.4	41.2	43.1
NH3	ppm		3		99+					
VOC	ppm		2		3.8					

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:
 Customer Sample ID: 16-06173-1-A1
 Customer Sample ID: 16-06173-1-A1

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flag
VMEQR-TDU SVQA #2															
S161021633			0891-98-3	2,6,10-Terhydrodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021633			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S161021633			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021633			82-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S161021633			78-46-6	Dibutyl phosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S161021633			84-86-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S161021633			112-40-3	Dodecane	NGS	97	<0.55	3.0	n/a	n/a	n/a	n/a	0.55	n/a	
S161021633			944-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021633			829-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021633			128-73-8	Triethyl phosphate	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021633			629-50-5	Tridecane	NGS	94	<1.6	1.1	n/a	n/a	n/a	n/a	1.6	n/a	
S161021633			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021633			628-62-9	Peradecane	NGS	100	<3.0	3.2	n/a	n/a	n/a	n/a	3.0	n/a	

Open for
 8/22/18

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-A2

Customer Sample ID: 16-06173-1-A2

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU SVQA #2															
S16T021634			8991-96-3	2,6,10-Trimethyldodecane	NCS	96	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021634			95-48-7	2-Methylphenol	NCS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021634			106-39-4M	Cresol (m & p)	NCS	96	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021634			82-52-4	Biphenyl	NCS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021634			78-48-6	Diethyl butylphosphonate	NCS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021634			84-86-2	Diethylphthalate	NCS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021634			112-40-3	Dodecane	NCS	97	<0.55	48	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021634			544-76-3	Hexadecane-	NCS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021634			829-59-4	Tetradecane	NCS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021634			126-73-8	Triethyl phosphate	NCS	96	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021634			629-50-5	Tetradecane	NCS	94	<1.6	15	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021634			829-76-7	Heptadecane	NCS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021634			629-62-9	Peradecane	NCS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:
 Customer Sample ID: 16-06173-1-B1
 Customer Sample ID: 16-06173-1-B1

Sample	R	Alt	CAS #	Analyte	Unit	\$10 %	Bunk	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Corr Err %	Qual Flags
VAPOR-TOU SVDA #2															
S16T021635			9891-98-3	2,6,10-Trimethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021635			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021635			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021635			92-52-4	Biohenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021635			78-46-8	Diethyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021635			94-26-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021635			112-40-3	Dodecane	NGS	97	<0.55	87	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021635			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021635			628-59-4	Tetradecane	NGS	100	<3.9	7.4	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021635			126-73-8	Tributyl phosphate	NGS	95	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021635			629-50-5	Tridecane	NGS	94	<1.6	26	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021635			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021635			629-62-9	Pentadecane	NGS	100	<3.0	4.3	n/a	n/a	n/a	n/a	3.0	n/a	J

T - Tentatively Identified Compound N - Named TIC E - Outside Calibration Range J - Estimated NA = Not Analyzed, ND = Not Detected
 Q - Qualitative

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:
 Customer Sample ID: 16-06173-1-BLANK
 Customer Sample ID: 16-06173-1-BLANK

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	DetLimit	Out Err %	Qual Flags
VAPOR-TOU SVDA #2															
S16T021636			9891-88-3	2,6,10-Trimethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021636			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021636			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021636			92-52-4	Biotenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021636			76-46-6	Diethyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021636			94-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021636			112-40-3	Dodecane	NGS	97	<0.55	0.70	n/a	n/a	n/a	n/a	0.55	n/a	J
S16T021636			644-76-3	Heptadecane	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021636			628-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021636			126-73-8	Tributyl phosphite	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021636			628-50-5	Tridecane	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021636			628-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021636			629-60-9	Peradecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:
 Customer Sample ID: 16-06173-1-C1
 Customer Sample ID: 16-06173-1-C1

Sample#	R	As#	CAS #	Analyte	Unit	STD %	Blind	Result	Duplicate	Average	RPD %	Spot Rec %	Det Limit	Conc Err %	Qual Flag
VAPOUR-TDU SVQA #2															
S161021637			3661-98-3	2,6,10-Trimethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021637			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S161021637			106-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021637			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S161021637			78-46-6	Diethyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S161021637			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S161021637			112-40-3	Decane	NGS	97	<0.55	1.0	n/a	n/a	n/a	n/a	0.55	n/a	E
S161021637			544-78-3	Heptadecane	NGS	94	<3.3	8.9	n/a	n/a	n/a	n/a	3.3	n/a	J
S161021637			629-59-4	Tetradecane	NGS	100	<3.9	1.2	n/a	n/a	n/a	n/a	3.9	n/a	
S161021637			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	D
S161021637			829-50-5	Tridecane	NGS	94	<1.6	5.8	n/a	n/a	n/a	n/a	1.6	n/a	E
S161021637			629-78-7	Heptadecane	NGS	91	<2.4	1.2	n/a	n/a	n/a	n/a	2.4	n/a	D
S161021637			629-62-9	Pentadecane	NGS	100	<3.0	1.5	n/a	n/a	n/a	n/a	3.0	n/a	

T - Tentatively Identified Compound
 Q - Quasi-stable

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-D1

Customer Sample ID: 16-06173-1-D1

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Que Flag
VAPOR-TDU SVQA #2															
S161021638			9391-96-3	2,6,10-Trimethyldodecane	MCS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021638			95-48-7	2-Methylphenol	MCS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S161021638			106-39-6M	Cresol (m & p)	MCS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021638			92-52-4	Biphenyl	MCS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S161021638			78-46-6	Dibutyl butylphosphonate	MCS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S161021638			84-66-2	Diethylphthalate	MCS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S161021638			112-40-3	Dodecane	MCS	97	<0.55	33	n/a	n/a	n/a	n/a	0.55	n/a	
S161021638			544-76-3	Hexadecane-	MCS	94	<3.3	6.7	n/a	n/a	n/a	n/a	3.3	n/a	
S161021638			829-59-4	Tetradecane	MCS	100	<3.9	7.0	n/a	n/a	n/a	n/a	3.9	n/a	
S161021638			126-73-8	Triethyl phosphate	MCS	99	<5.0	<5.0	n/a	n/a	n/a	n/a	5.0	n/a	
S161021638			829-50-5	Tridecane	MCS	94	<1.6	11	n/a	n/a	n/a	n/a	1.6	n/a	
S161021638			829-78-7	Heptadecane	MCS	91	<2.4	8.6	n/a	n/a	n/a	n/a	2.4	n/a	
S161021638			829-62-9	Pentadecane	MCS	100	<3.0	10	n/a	n/a	n/a	n/a	3.0	n/a	

T - Testably Identified Compound
 Q - Qualitative
 N - Named TIC
 E - Outside Calibration Range
 J - Estimated
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-E1

Customer Sample ID: 16-08173-1-E1

Sample #	R	Alt	CAS #	Analyte	Unit	STD %	Bunk	Result	Duplicate	Average	PPD %	Sqa Rec %	Out Limit	Car Err %	Qual Flags
VAPOR-TDU SVQA #2															
S16T021639			3891-99-3	2,6,10-Termyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021639			85-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021639			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021639			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021639			76-46-6	Diethyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021639			84-86-2	Diethylthioketone	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021639			112-40-3	Dodecane	NGS	97	<0.55	57	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021639			944-76-3	Heptadecane	NGS	94	<3.3	4.0	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021639			829-59-4	Tetradecane	NGS	100	<3.9	6.1	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021639			126-73-8	Tributyl phosphite	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021639			829-50-5	Tridecane	NGS	94	<1.6	18	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021639			829-76-7	Heptadecane	NGS	91	<2.4	3.6	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021639			829-62-9	Peradecane	NGS	100	<3.0	7.5	n/a	n/a	n/a	n/a	3.0	n/a	J

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-EFF-BASE

Customer Sample ID: 16-06173-1-EFF-BASE

Sample	R	Alt	CAS #	Analyte	Unit	\$10 %	Bunk	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Corr Err %	Qual Flags
VAPOR-TDU SVCA #2															
S16T021640			3991-99-3	2,6,10-Terethylododecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021640			96-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021640			103-39-4M	Cresol (m & p)	NGS	90	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021640			92-52-4	Biotenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021640			78-46-6	Diethyl ethylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021640			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021640			112-40-3	Dodecane	NGS	97	<0.55	58	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021640			544-76-3	Hexadecane	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021640			629-69-4	Tetradecane	NGS	100	<3.9	6.3	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021640			126-73-8	Tributyl phosphite	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021640			629-60-5	Tridecane	NGS	94	<1.6	26	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021640			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021640			629-62-9	Pentadecane	NGS	100	<3.0	7.2	n/a	n/a	n/a	n/a	3.0	n/a	J

NA = Not Analyzed, ND = Not Detected

T - Tentatively Identified Compound

N - Named TIC

E - Outside Calibration Range

J - Estimated

Q - Qualitative

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:
 Customer Sample ID: 16-06173-1-F1
 Customer Sample ID: 16-06173-1-F1

Sampler	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cut Err %	Qual Flags
MAPOR-TDU SVDA #2															
S161021641			0891-98-3	2,6,10-Triethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021641			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S161021641			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021641			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S161021641			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S161021641			94-06-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S161021641			112-40-3	Dodecane	NGS	97	<0.55	30	n/a	n/a	n/a	n/a	0.55	n/a	
S161021641			944-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021641			829-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021641			126-73-6	Triethyl phosphite	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021641			829-50-5	Tridecane	NGS	94	<1.6	5.1	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021641			829-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021641			829-82-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-G1

Customer Sample ID: 16-06173-1-G1

Sample #	R	Alt	CAS #	Analyte	Unit	STD %	Bunk	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Crit Err %	Qual Flags
VAPOR:TDU SVOK #2															
S16T021642			8991-96-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021642			92-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021642			106-39-4M	Cresol (m & p)	NGS	96	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021642			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021642			76-46-6	Diethyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021642			84-96-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021642			112-40-3	Dodecane	NGS	97	<0.55	1.5	n/a	n/a	n/a	n/a	0.55	n/a	J
S16T021642			944-76-3	tridecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021642			628-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021642			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	Q
S16T021642			628-50-5	Tridecane	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021642			629-76-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021642			629-02-8	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-H1

Customer Sample ID: 16-06173-1-H1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Bias%	Result	Duplicate	Average	RSD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR:TOU SVQA #2															
S16T021643			8991-88-3	2,6,10-Triethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021643			85-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021643			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021643			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021643			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021643			84-86-2	Diethyl malonate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021643			112-40-3	Dodecane	NGS	97	<0.55	12	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021643			844-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021643			829-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021643			126-73-8	Tributyl phosphite	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021643			828-50-5	Tridecane	NGS	94	<1.6	4.7	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021643			829-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021643			829-62-8	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-H2

Customer Sample ID: 16-06173-1-H2

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TOU SVDA #2															
S16T021644			8991-88-3	2,6,10-Tetradecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021644			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021644			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021644			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021644			79-48-6	Dialyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021644			94-66-2	Diallyl malate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021644			112-40-3	Dodecane	NGS	97	<0.55	18	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021644			944-76-3	Heptadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021644			629-69-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021644			126-73-8	Tributyl phosphate	NGS	99	<5.9	<5.9	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021644			629-50-5	Tridecane	NGS	94	<1.6	5.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021644			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021644			629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-IN-BASE

Customer Sample ID: 16-06173-1-IN-BASE

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TOU SVOA #2															
S16T021645			8991-98-3	2,6,10-Triethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021645			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021645			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021645			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021645			78-46-6	Diethyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021645			94-99-2	Diethylmalonate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021645			112-40-3	Dodecane	NGS	97	<0.55	0.2	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021645			544-76-3	Heptadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021645			628-59-4	Tetradecane	NGS	100	<3.9	4.3	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021645			126-73-8	Tributyl phosphite	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021645			828-50-5	Tridecane	NGS	94	<1.6	1.2	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021645			628-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021645			629-62-9	Peradecane	NGS	100	<3.0	4.5	n/a	n/a	n/a	n/a	3.0	n/a	J

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:

Customer Sample ID: 16-06173-1-A1
 Customer Sample ID: 16-06173-1-A1

Sample	R	Ad	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021633				Unknown-1		4.35	NGS	120	JT
S16T021633				Acetophenone	98-96-2	5.18	NGS	13	JNT
S16T021633				Undecane	1120-21-4	5.45	NGS	41	JNT
S16T021633				Decamethylcyclopentasiloxane	541-02-8	5.72	NGS	130	JNT
S16T021633				Ethanal, 2-pyrenyl-	122-99-8	6.50	NGS	32	JNT
S16T021633				Benzenohazole	95-16-9	6.59	NGS	31	JNT
S16T021633				Dodecane, 2,6,11-trimethyl-	31285-56-4	6.90	NGS	30	JNT
S16T021633				Dodecane?methylcyclohexasiloxane	540-97-6	7.07	NGS	38	JNT

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:

Customer Sample ID: 16-06173-1-A2
 Customer Sample ID: 16-06173-1-A2

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021634				Unknown-1		4.35	NGS	110	JT
S16T021634				Undecane	1120-21-4	5.45	NGS	61	JNT
S16T021634				2-Nonen-1-ol	22104-79-6	5.50	NGS	27	JNT
S16T021634				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	120	JNT
S16T021634				Benzothazole	95-16-9	6.60	NGS	73	JNT
S16T021634				Dodecane, 2,6,11-trimethyl-	31295-59-4	6.90	NGS	44	JNT
S16T021634				Dodecamethylcyclotetrasiloxane	540-87-6	7.07	NGS	30	JNT
S16T021634				Decane, 2,3,5-trimethyl-	192823-15-7	7.25	NGS	36	JNT

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-B1

Customer Sample ID: 16-06173-1-B1

Sample	R	AI	QC Type	Analysis	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR:TDU SV04 #2									
S16T021635				Benzaldehyde	100-52-7	4.24	NGS	63 JNT	
S16T021635				Unknown-1		4.35	NGS	260 JT	
S16T021635				Phenol	108-95-2	4.43	NGS	27 JNT	
S16T021635				2-Propyl-1-propanol	58175-57-8	4.84	NGS	55 JNT	
S16T021635				1-Octene, 3,7-dimethyl-	4994-01-4	4.89	NGS	45 JNT	
S16T021635				Decane, 3,7-dimethyl-	17312-64-8	5.06	NGS	78 JNT	
S16T021635				Decane, 2,4,6-trimethyl-	82109-27-4	5.11	NGS	24 JNT	
S16T021635				Acetophenone	98-86-2	5.19	NGS	57 JNT	
S16T021635				Benzene, 1-methyl-4-(2-propenyl)	3333-13-9	5.35	NGS	80 JNT	
S16T021635				Undecane	1120-21-4	5.45	NGS	240 JNT	
S16T021635				Undecane, 2,8-dimethyl-	17301-23-4	5.50	NGS	27 JNT	
S16T021635				Dodecamethylcyclopentasiloxane	341-02-6	5.72	NGS	110 JNT	
S16T021635				Benzaldehyde, 3-ethyl-	34246-64-3	6.05	NGS	54 JNT	
S16T021635				Benzothiazole	95-16-9	6.62	NGS	95 JNT	
S16T021635				2-Propenoic acid, octyl ester	2499-59-4	6.67	NGS	48 JNT	
S16T021635				Acetic acid, trifluoro-, 3,7-d	28745-07-5	6.72	NGS	25 JNT	
S16T021635				Dodecane, 2,5,11-trimethyl-	31295-66-4	6.91	NGS	64 JNT	
S16T021635				Dodecamethylcyclopentasiloxane	540-97-6	7.07	NGS	45 JNT	
S16T021635				Decane, 2,3,5,9-tetramethyl-	192623-15-7	7.27	NGS	49 JNT	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:

Customer Sample ID: 16-06173-1-C1

Customer Sample ID: 16-06173-1-C1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021637				Unknown-1		4.35	NGS	190 JT	
S16T021637				2-Propyl-1-pentanol	58176-67-8	4.84	NGS	32 JNT	
S16T021637				Decane, 3,7-dimethyl-	17312-64-8	5.06	NGS	67 JNT	
S16T021637				Acetophenone	88-68-2	5.19	NGS	44 JNT	
S16T021637				Undecane	1120-21-4	5.45	NGS	150 JNT	
S16T021637				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	26 JNT	
S16T021637				Decamethylcyclopentasiloxane	541-02-0	5.72	NGS	160 JNT	
S16T021637				Hexanoic acid, 2-ethyl-	149-57-5	5.80	NGS	29 JNT	
S16T021637				Benzo[h]azole	95-19-9	6.62	NGS	110 JNT	
S16T021637				1-Octanol, 3,7-dimethyl-	105-21-8	6.67	NGS	29 JNT	
S16T021637				Dodecane, 2,6,11-trimethyl-	31295-66-4	6.91	NGS	80 JNT	
S16T021637				Dodecamethylcyclotetrasiloxane	640-97-6	7.08	NGS	75 JNT	
S16T021637				Decane, 2,3,5,8-tetramethyl-	192623-15-7	7.27	NGS	65 JNT	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:

Customer Sample ID: 16-06173-1-D1
 Customer Sample ID: 16-06173-1-D1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S161021638				Unknown-1		4.35	NGS	190	JT
S161021638				Decane, 3,7-dimethyl-	17312-94-8	5.06	NGS	51	JNT
S161021638				Acetophenone	98-86-2	5.19	NGS	36	JNT
S161021638				Undecane	1120-21-4	5.45	NGS	100	JNT
S161021638				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	22	JNT
S161021638				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	110	JNT
S161021638				Benzothiazole	95-18-9	6.60	NGS	28	JNT
S161021638				Dodecane, 2,6,11-trimethyl-	31295-95-4	6.90	NGS	28	JNT
S161021638				Dodecamethylcyclotrisiloxane	540-87-6	7.07	NGS	50	JNT

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:
 Customer Sample ID: 16-06173-1-E1
 Customer Sample ID: 16-06173-1-E1

Sample	R	AE	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Our Flags
VAPOR-TDU SVOA #2									
S16T021639				Unknown-1		4.35	NGS	150 JT	
S16T021639				Decane, 3,7-dimethyl-	17312-64-8	5.06	NGS	37 JMT	
S16T021639				Acetophenone	98-88-2	5.19	NGS	26 JMT	
S16T021639				Undecane	1120-21-4	5.45	NGS	110 JMT	
S16T021639				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	24 JMT	
S16T021639				Decarboxydecahydronaphthalene	541-02-6	5.72	NGS	110 JMT	
S16T021639				Benzo[h]azolo	95-18-9	6.61	NGS	79 JMT	
S16T021639				Dodecane, 2,6,11-trimethyl-	31295-96-4	6.90	NGS	47 JMT	
S16T021639				Dodecamethylcyclohexasixane	540-97-6	7.07	NGS	38 JMT	
S16T021639				Decane, 2,3,5-trimethyl-	192823-15-7	7.26	NGS	35 JMT	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected

J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:

Customer Sample ID: 16-06173-1-EFF-BASE

Customer Sample ID: 16-06173-1-EFF-BASE

Sample#	R	AI	QC Type	Analysis	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021640				Unknown-1		4.35	NGS	200	JT
S16T021640				1-Methanol, 2-ethyl-	104-76-7	4.83	NGS	25	JNT
S16T021640				Decane, 3,7-dimethyl-	17312-64-8	5.06	NGS	45	JNT
S16T021640				Decane, 2,6-bis(methyl)-	82108-27-4	5.10	NGS	15	JNT
S16T021640				Acetophenone	98-06-2	5.18	NGS	22	JNT
S16T021640				Undecane	1120-21-4	5.45	NGS	110	JNT
S16T021640				Nonanal	124-19-6	5.50	NGS	31	JNT
S16T021640				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	94	JNT
S16T021640				Benzothiazole	95-16-9	6.60	NGS	50	JNT
S16T021640				Dodecane, 2,8,11-trimethyl-	31295-95-4	6.90	NGS	38	JNT
S16T021640				Dodecamethylcyclohexasiloxane	540-67-6	7.07	NGS	28	JNT
S16T021640				Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.26	NGS	30	JNT

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:

Customer Sample ID: 16-06173-1-F1

Customer Sample ID: 16-06173-1-F1

Sample	R	AI	QC Type	Analysis	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR:TDU SVQA #2									
S16T021641				Unknown-1		4.35	NGS	97 JT	
S16T021641				Decane, 3,7-dimethyl-	17312-54-8	5.05	NGS	30 JNT	
S16T021641				Acetophenone	98-06-2	5.18	NGS	11 JNT	
S16T021641				Undecane	1120-21-4	5.45	NGS	69 JNT	
S16T021641				Undecane, 2,6-dimethyl-	17301-23-4	5.49	NGS	15 JNT	
S16T021641				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	76 JNT	
S16T021641				Benzothiazole	95-16-9	6.60	NGS	52 JNT	
S16T021641				Dodecane, 2,6,11-trimethyl-	01295-56-4	6.90	NGS	27 JNT	
S16T021641				Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.26	NGS	26 JNT	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-G1

Customer Sample ID: 16-06173-1-G1

Sample	R	All	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVDA #2									
S161021642				Lidocaine	1120-21-4	5.44	MGSS	5.5	JNT

T - Tentatively Identified Compound
Q - Qualitative

N - Named TIC

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected

J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142
 SDG Number:

Customer Sample ID: 16-06173-1-H1

Customer Sample ID: 16-06173-1-H1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TOU SVOA #2									
S16T021643				Unknown-1		4.35	NGS	79	JT
S16T021643				Undecane	1120-21-4	5.44	NGS	21	JNT
S16T021643				Undecane, 2,6-dimethyl-	17301-23-4	5.49	NGS	11	JNT
S16T021643				Decamethylcyclopentasiloxane	541-02-6	5.71	NGS	38	JNT
S16T021643				Dodecane, 2,6,11-trimethyl-	31295-66-4	6.89	NGS	7.1	JNT

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-H2

Customer Sample ID: 16-06173-1-H2

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TOU SVQA #2									
S161021644				Unknown-1		4.35	NCS	8.5 JT	
S161021644				Acetophenone	98-98-2	5.18	NCS	5.5 JNT	
S161021644				Decane	124-18-5	5.45	NCS	27 JNT	
S161021644				Decamethylcyclopentasiloxane	541-02-6	5.71	NCS	9.1 JNT	
S161021644				Unknown-2		6.04	NCS	27 JT	
S161021644				Dodecane, 2,6,11-trimethyl-	31295-99-4	6.89	NCS	9.7 JNT	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected

J - Estimated

Sample Group: 20162142
 SDG Number:

Cartridge Evaluation
 Data Summary of All Results

Customer Sample ID: 16-06173-1-IN-BASE
 Customer Sample ID: 16-06173-1-IN-BASE

Sample	R	AE	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVDA #2									
S16T021645				Unknown-1		4.35	NGS	230 JT	
S16T021645				Unknown-2		4.83	NGS	47 JT	
S16T021645				2,6-Dimethyldecane	13150-61-7	5.05	NGS	39 JNT	
S16T021645				Decane, 2,4,6-trimethyl-	82108-27-4	5.10	NGS	10 JNT	
S16T021645				Acetophenone	98-96-2	5.19	NGS	24 JNT	
S16T021645				Undecane	1120-21-4	5.45	NGS	89 JNT	
S16T021645				Nonanal	124-19-6	5.50	NGS	28 JNT	
S16T021645				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	150 JNT	
S16T021645				Benzothiazole	95-16-9	6.01	NGS	78 JNT	
S16T021645				Dodecane, 2,6,11-trimethyl-	31285-66-4	6.90	NGS	46 JNT	
S16T021645				Dodecamethylcyclododeasiloxane	540-97-6	7.07	NGS	73 JNT	
S16T021645				Decane, 2,3,5-trimethyl-	152823-15-7	7.26	NGS	33 JNT	

T - Tentatively Identified Compound
 Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-A1
 Customer Sample ID: 16-06172-1-A1

Sample	R	As	CAS #	Analyte	Unit	STD %	Bias	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Crit Err %	Qual Flags
VAPOR,TOU SVDA #2															
S16T021620			9891-49-3	2,6,10-Trimethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021620			95-48-7	2-Methylphenol	NGS	93	<4.9	10	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021620			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021620			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021620			79-46-6	Diouyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021620			84-86-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021620			112-40-3	Dodecane	NGS	98	<0.60	63	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021620			944-76-3	Hexadecane-	NGS	95	<3.3	4.6	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021620			829-59-4	Tetradecane	NGS	95	<3.9	7.5	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021620			126-73-8	Triaryl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	CU
S16T021620			829-50-5	Tridecane	NGS	90	<1.6	22	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021620			829-79-7	Heptadecane	NGS	94	<2.4	6.0	n/a	n/a	n/a	n/a	2.4	n/a	JO
S16T021620			829-62-9	Pentadecane	NGS	96	<3.0	7.8	n/a	n/a	n/a	n/a	3.0	n/a	J

John Drey
 8/25/16

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-A2
 Customer Sample ID: 16-06172-1-A2

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Bank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOB-TDU			SVDA #2												
S16T021621			3891-88-3	2,6,10-Terethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021621			85-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021621			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021621			82-62-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021621			76-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021621			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021621			112-40-3	Dodecane	NGS	89	<0.60	71	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021621			544-76-3	Hexadecane-	NGS	85	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S16T021621			629-69-4	Tetradecane	NGS	95	<3.9	5.8	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021621			126-73-8	Tributyl phosphite	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021621			629-50-5	Tridecane	NGS	90	<1.6	20	n/a	n/a	n/a	n/a	1.6	n/a	U
S16T021621			629-76-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	U
S16T021621			629-62-9	Pentadecane	NGS	96	<3.0	4.7	n/a	n/a	n/a	n/a	3.0	n/a	J

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141

SDG Number:

Customer Sample ID: 16-06172-1-B1

Customer Sample ID: 16-06172-1-B1

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RSD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU SVQA #2															
S161021622			3891-99-3	2,6,10-Trimethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S161021622			95-46-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S161021622			104-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S161021622			82-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S161021622			78-46-8	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S161021622			84-66-2	Diethylphosphate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S161021622			112-40-3	Dodecane	NGS	98	<0.80	0.2	n/a	n/a	n/a	n/a	0.55	n/a	E
S161021622			844-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S161021622			829-59-4	Tetradecane	NGS	95	<3.9	6.2	n/a	n/a	n/a	n/a	3.9	n/a	J
S161021622			126-73-6	Tetrayl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S161021622			829-50-5	Tetradecane	NGS	90	<1.6	26	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021622			829-78-7	Heptadecane	NGS	94	<2.4	2.9	n/a	n/a	n/a	n/a	2.4	n/a	J
S161021622			829-62-9	Pentadecane	NGS	95	<3.0	5.0	n/a	n/a	n/a	n/a	3.0	n/a	J

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-BLANK
 Customer Sample ID: 16-06172-1-BLANK

Sample	R	Alt	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPO %	Spl Rec %	Det Limit	Chk Err %	Qual Flags
VAOQR-TDU SVQA #2															
S16T021623			3891-98-3	2,6,10-Triethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021623			85-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021623			106-39-4M	Cresol (m & p)	NGS	96	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021623			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021623			78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021623			94-06-2	Diethylhexylphosphate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021623			112-40-3	Dodecane	NGS	90	<0.80	0.70	n/a	n/a	n/a	n/a	0.55	n/a	J
S16T021623			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S16T021623			829-59-4	Tetradecane	NGS	95	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021623			126-73-6	Tetradyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021623			829-50-5	Tridecane	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	U
S16T021623			829-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	U
S16T021623			829-82-9	Pentadecane	NGS	96	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	U

E - Outside Calibration Range
 O - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-C1
 Customer Sample ID: 16-06172-1-C1

Sample	R	All	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc %	Qual Flags
VAPOR-TDU SVQA #2															
S16T021624			3991-98-3	2,6,10-Triethyl-dodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021624			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021624			106-39-6M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021624			82-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021624			78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021624			84-96-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021624			112-40-3	Dodecane	NGS	98	<0.60	94	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021624			544-76-3	Heaododecane-	NGS	95	<3.3	5.1	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021624			629-59-4	Tetradecane	NGS	95	<3.9	8.7	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021624			128-73-8	Tributyl phosphite	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021624			623-50-5	Tridecane	NGS	90	<1.6	44	n/a	n/a	n/a	n/a	1.6	n/a	U
S16T021624			609-76-7	Heptadecane	NGS	94	<2.4	5.5	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021624			623-62-9	Pentadecane	NGS	98	<3.0	10	n/a	n/a	n/a	n/a	3.0	n/a	J

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-D1
 Customer Sample ID: 16-06172-1-D1

Sample	R	All	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VA-QR-TDU SVQA #2															
S161021625			3991-98-3	2,6,10-Triethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S161021625			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S161021625			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S161021625			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S161021625			78-48-6	Diethyl phosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S161021625			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S161021625			112-40-3	Dodecane	NGS	98	<0.60	25	n/a	n/a	n/a	n/a	0.55	n/a	
S161021625			944-76-3	Hexadecane-	NGS	95	<3.3	4.2	n/a	n/a	n/a	n/a	3.3	n/a	J
S161021625			829-59-4	Tetradecane	NGS	95	<3.9	5.1	n/a	n/a	n/a	n/a	3.9	n/a	J
S161021625			126-73-8	Tricetyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S161021625			629-50-5	Tetradecane	NGS	90	<1.6	7.0	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021625			629-78-7	Heptadecane	NGS	94	<2.4	4.8	n/a	n/a	n/a	n/a	2.4	n/a	J
S161021625			629-82-9	Peradecane	NGS	96	<3.0	6.5	n/a	n/a	n/a	n/a	3.0	n/a	J

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-E1
 Customer Sample ID: 16-06172-1-E1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Det Err %	Qual Flags
VAPOR-TDU SVQA #2															
S16T021626			3691-99-3	2,6,10-Trimethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021626			95-46-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021626			104-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021626			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021626			78-46-8	Dibutyl hydrophosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021626			84-96-2	Diethylphosphate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021626			112-40-3	Dodecane	NGS	98	<0.00	42	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021626			544-76-3	Hexadecano-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S16T021626			829-59-4	Tetradecane	NGS	95	<3.9	4.1	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021626			126-73-8	Tributyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021626			829-50-5	Tridecane	NGS	90	<1.6	13	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021626			829-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	U
S16T021626			829-62-9	Pentadecane	NGS	95	<3.0	4.3	n/a	n/a	n/a	n/a	3.0	n/a	U

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-EFF-BASE
 Customer Sample ID: 16-06172-1-EFF-BASE

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RFD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU SVDA #2															
S16T021627			3391-95-3	2,6,10-Triethyldecane	NCS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021627			95-49-7	2-Methylphenol	NCS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021627			108-39-4M	Cresol (m & p)	NCS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021627			92-52-4	Biphenyl	NCS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021627			78-48-6	Diethyl butylphosphonate	NCS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021627			84-66-2	Diethylphthalate	NCS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021627			112-40-3	Dodecane	NCS	99	<0.60	68	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021627			544-76-3	Hexadecane-	NCS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S16T021627			629-59-4	Tetradecane	NCS	95	<3.9	7.2	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021627			128-73-8	Triethyl phosphite	NCS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021627			629-50-5	Tetradecane	NCS	90	<1.6	29	n/a	n/a	n/a	n/a	1.6	n/a	U
S16T021627			629-76-7	Heptadecane	NCS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	U
S16T021627			629-62-9	Peradecane	NCS	96	<3.0	6.8	n/a	n/a	n/a	n/a	3.0	n/a	J

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-F1
 Customer Sample ID: 16-06172-1-F1

Sample	R	AI	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU SVOA #2															
S161021628			0891-98-3	2,6,10-Triethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021628			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S161021628			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021628			82-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S161021628			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S161021628			94-06-2	Diethyl hexylate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S161021628			112-40-3	Dodecane	NGS	97	<0.55	32	n/a	n/a	n/a	n/a	0.55	n/a	
S161021628			544-76-3	Hexadecano-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021628			829-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021628			126-73-6	Tributyl phosphite	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021628			829-50-5	Tridecane	NGS	94	<1.6	8.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021628			829-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021628			829-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-G1
 Customer Sample ID: 16-06172-1-G1

Sample	R	All CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	POD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAQOR-TDU SVQA #2														
S161021629		9991-98-3	2,6,10-Trimethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021629		95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S161021629		108-39-4M	Creosol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021629		92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S161021629		78-46-6	Diaryl butylphosphoxalate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S161021629		84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S161021629		112-40-3	Dodecane	NGS	97	<0.55	33	n/a	n/a	n/a	n/a	0.55	n/a	
S161021629		544-78-3	Heptadecane	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021629		629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021629		128-73-6	Triethyl phosphite	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021629		629-50-5	Tridecane	NGS	94	<1.6	8.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021629		629-79-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021629		629-82-9	Pentadecane	NGS	100	<3.0	3.0	n/a	n/a	n/a	n/a	3.0	n/a	J

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-H1
 Customer Sample ID: 16-06172-1-H1

Cartridge Evaluation
 Data Summary of All Results

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flag
VAPOR-TDU SVQA #2															
S161021630			9991-98-3	2,6,10-Trimethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021630			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S161021630			105-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021630			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S161021630			78-48-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S161021630			94-69-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S161021630			112-40-3	Dodecane	NGS	97	<0.55	43	n/a	n/a	n/a	n/a	0.55	n/a	
S161021630			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021630			829-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021630			126-73-8	Tricetyl phosphate	NGS	95	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021630			829-50-5	Tridecane	NGS	94	<1.6	16	n/a	n/a	n/a	n/a	1.6	n/a	
S161021630			829-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021630			829-62-9	Peradecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141

SDG Number:

Customer Sample ID: 16-06172-1-H2

Customer Sample ID: 16-06172-1-H2

Sample	R	All	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU SVQA #2															
S161021631			3891-98-3	2,6,10-Trimethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021631			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S161021631			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021631			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S161021631			78-48-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S161021631			84-69-2	Dialkylphosphate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S161021631			112-40-3	Dodecane	NGS	97	<0.55	33	n/a	n/a	n/a	n/a	0.55	n/a	
S161021631			544-76-3	Heptadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021631			829-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021631			126-73-8	Triethyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021631			829-59-5	Tridecane	NGS	94	<1.6	9.5	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021631			829-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021631			829-82-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Loss Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141

SDG Number:

Customer Sample ID: 16-06172-1-IN-BASE

Customer Sample ID: 16-06172-1-IN-BASE

Sample	R	All	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RSD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU SVQA #2															
S161021632			3991-98-3	2,6,10-Triethyldecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S161021632			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S161021632			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021632			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S161021632			78-48-6	Dibutyl sebacate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S161021632			84-66-2	Dibutyl sebacate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S161021632			112-40-3	Dodecane	NGS	97	<0.55	65	n/a	n/a	n/a	n/a	0.55	n/a	E
S161021632			544-79-3	Heptadecane	NGS	94	<3.3	3.4	n/a	n/a	n/a	n/a	3.3	n/a	J
S161021632			629-59-4	Tetradecane	NGS	100	<3.9	5.1	n/a	n/a	n/a	n/a	3.9	n/a	J
S161021632			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S161021632			629-50-5	Tridecane	NGS	94	<1.6	15	n/a	n/a	n/a	n/a	1.6	n/a	
S161021632			629-78-7	Heptadecane	NGS	91	<2.4	3.4	n/a	n/a	n/a	n/a	2.4	n/a	J
S161021632			629-62-9	Pentadecane	NGS	100	<3.0	6.8	n/a	n/a	n/a	n/a	3.0	n/a	J

E - Outside Calibration Range
 Q - Qualitative

T - Tentatively Identified Compound
 U - Less Than Detection Limit

N - Named TIC

NA = Not Analyzed, ND = Not Detected
 J - Estimated

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-A1
 Customer Sample ID: 16-06172-1-A1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
S161021620				Cyclohexisoxane, octamethyl	556-67-2	4.36	NGS	290 JNT	
S161021620				Phenol	108-95-2	4.46	NGS	34 JNT	
S161021620				1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	51 JNT	
S161021620				Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	87 JNT	
S161021620				Decane, 2,4,6-trimethyl-	82108-27-4	5.11	NGS	36 JNT	
S161021620				Acetophenone	98-06-2	5.19	NGS	39 JNT	
S161021620				Unknown-1		5.28	NGS	50 JT	
S161021620				Undecane	1120-21-4	5.45	NGS	190 JNT	
S161021620				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	130 JNT	
S161021620				Undecane, 3-methyl-	1082-43-3	6.06	NGS	7.8 JNT	
S161021620				Ethanol, 2-phenoxyl-	122-99-6	6.56	NGS	66 JNT	
S161021620				Benzothiazole	95-16-9	6.61	NGS	50 JNT	
S161021620				Decane, 2,3,5,8-tetramethyl-	152823-15-7	6.90	NGS	52 JNT	
S161021620				Dodecane, 2,6,11-trimethyl-	31285-56-4	6.97	NGS	13 JNT	
S161021620				Dodecane, 4,8-dimethyl	540-97-6	7.07	NGS	58 JNT	
S161021620				Propionic acid, 2-methyl-, 1-	51141-72-8	7.27	NGS	57 JNT	
S161021620					74381-40-1	9.20	NGS	71 JNT	

Janet J. Spasie

T - Tentatively Identified Compound
 Q - Qualitative
 E - Outside Calibration Range
 J - Estimated
 U - Less Than Detection Limit
 NA = Not Analyzed, ND = Not Detected
 N - Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141

SDG Number:

Customer Sample ID: 16-06172-1-A2

Customer Sample ID: 16-06172-1-A2

Sample	R	AI	QC Type	Analysis	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021621				Cyclohexanone, octamethyl	556-67-2	4.35	NGS	200	JNT
S16T021621				1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	28	JNT
S16T021621				Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	70	JNT
S16T021621				Decane, 2,4,6-trimethyl-	82108-27-4	5.11	NGS	25	JNT
S16T021621				Acetophenone	98-88-2	5.19	NGS	21	JNT
S16T021621				Undecane	1120-21-4	5.45	NGS	150	JNT
S16T021621				Hydroxylamine, O-decyl-	29612-79-1	5.50	NGS	28	JNT
S16T021621				Decamethylcyclopentasiloxane	541-02-8	5.72	NGS	120	JNT
S16T021621				Undecane, 3-methyl-	1062-43-3	6.05	NGS	11	JNT
S16T021621				Undecane, 2,6-dimethyl-	17301-23-4	6.40	NGS	5.4	JNT
S16T021621				Benzenethiazole	95-16-9	6.81	NGS	75	JNT
S16T021621				Decane, 2,3,6-trimethyl-	152823-15-7	6.90	NGS	60	JNT
S16T021621				Dodecane, 2,6,11-trimethyl-	31295-66-4	6.97	NGS	14	JNT
S16T021621				Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	16	JNT
S16T021621				Dodecamethylcyclotrisiloxane	540-97-6	7.07	NGS	41	JNT
S16T021621				Dodecane, 4,8-dimethyl-	91141-72-8	7.26	NGS	45	JNT

NA = Not Analyzed, ND = Not Detected

N = Named TIC

U = Less Than Detection Limit

E - Outside Calibration Range
 J - Estimated

T - Tentatively Identified Compound
 O - Qualitative

Sample Group: 20162141
 SDG Number:

Cartridge Evaluation
 Data Summary of All Results

Customer Sample ID: 16-06172-1-B1
 Customer Sample ID: 16-06172-1-B1

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR:TDU SVQA #2									
S161021622				Propanoic acid, 2,2-dimethyl-	75-98-9	3.16	NGS	32	JNT
S161021622				Cyclohexane, octamethyl	556-67-2	4.35	NGS	230	JNT
S161021622				Isodanol	29952-21-8	4.94	NGS	51	JNT
S161021622				1-Hexanol, 2,4-dimethyl-, (2S)	18450-74-3	4.87	NGS	49	JNT
S161021622				1-Hexanol, 6-methyl-	1653-40-3	4.90	NGS	37	JNT
S161021622				Decane, 3,7-dimethyl-	17312-64-8	5.06	NGS	90	JNT
S161021622				Decane, 2,4,6-trimethyl-	82106-27-4	5.11	NGS	28	JNT
S161021622				Acetophenone	98-69-2	5.19	NGS	29	JNT
S161021622				Hexyl octyl ether	17071-64-4	5.39	NGS	43	JNT
S161021622				Undecane	1120-21-4	5.45	NGS	210	JNT
S161021622				Decamethylcyclopentasiloxane	541-02-8	5.72	NGS	110	JNT
S161021622				Undecane, 2,6-dimethyl-	17301-23-4	6.41	NGS	6.8	JNT
S161021622				1,2-Benzoisoxazole	272-16-2	6.62	NGS	82	JNT
S161021622				Ethylene diacrylate	2274-11-0	6.68	NGS	32	JNT
S161021622				Decane, 2,3,5,6-tetramethyl-	192823-15-7	6.91	NGS	53	JNT
S161021622				Dodecane, 2,6,11-trimethyl-	31295-96-4	6.97	NGS	13	JNT
S161021622				Undecane, 3,7-dimethyl-	17301-29-0	7.02	NGS	14	JNT
S161021622				Dodecamethylcyclotrisiloxane	540-97-6	7.07	NGS	48	JNT
S161021622				Dodecane, 4,8-dimethyl	61141-72-6	7.27	NGS	46	JNT

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected
 N - Named TIC

Sample Group: 20162141
 SDG Number:

Cartridge Evaluation
 Data Summary of All Results

Customer Sample ID: 16-06172-1-C1
 Customer Sample ID: 16-06172-1-C1

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVDA #2									
S16T021624				Propionic acid, 2,2-dimethyl-	75-98-9	3.15	NGS	31	JNT
S16T021624				Cyclohexanone, octamethyl	556-67-2	4.35	NGS	230	JNT
S16T021624				1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	33	JNT
S16T021624				Decane, 3,7-dimethyl-	17312-54-8	5.05	NGS	71	JNT
S16T021624				Decane, 2,4,6-trimethyl-	92108-27-4	5.11	NGS	25	JNT
S16T021624				Acetophenone	98-96-2	5.19	NGS	31	JNT
S16T021624				Hexyl octyl ether	17071-54-4	5.39	NGS	27	JNT
S16T021624				Undecane	1120-21-4	5.45	NGS	150	JNT
S16T021624				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	98	JNT
S16T021624				Undecane, 3-methyl-	1002-43-3	6.05	NGS	6.8	JNT
S16T021624				Benzothiazole	95-16-9	6.62	NGS	71	JNT
S16T021624				Dodecane, 2,7,10-trimethyl-	74545-98-0	6.91	NGS	46	JNT
S16T021624				Dodecane, 2,6,11-trimethyl-	31295-96-4	6.97	NGS	12	JNT
S16T021624				Undecane, 3,7-dimethyl-	17301-29-0	7.02	NGS	10	JNT
S16T021624				Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	45	JNT
S16T021624				Dodecane, 4,6-dimethyl-	51141-72-8	7.27	NGS	38	JNT

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected
 N - Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141

SDG Number:

Customer Sample ID: 16-06172-1-D1

Customer Sample ID: 16-06172-1-D1

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR, TDU SVQA #2									
S16T021625				Cyclohexane, octamethyl	556-67-2	4.35	NGS	150	JNT
S16T021625				Decane, 3,7-dimethyl-	17312-64-8	5.06	NGS	50	JNT
S16T021625				Decane, 2,4,8-trimethyl-	82106-27-4	5.10	NGS	19	JNT
S16T021625				Acetophenone	98-85-2	5.18	NGS	27	JNT
S16T021625				Undecane	1120-21-4	5.45	NGS	94	JNT
S16T021625				Undecane, 2,6-dimethyl-	17301-23-4	5.49	NGS	16	JNT
S16T021625				Decamethylcyclopentadecane	541-02-6	5.71	NGS	100	JNT
S16T021625				Undecane, 3-methyl-	1002-43-3	6.05	NGS	5.0	JNT
S16T021625				Dodecane, 2,7,10-trimethyl-	74945-88-0	6.90	NGS	29	JNT
S16T021625				Dodecane, 2,6,11-trimethyl-	31295-96-4	6.96	NGS	6.2	JNT
S16T021625				Dodecane, 4,8-dimethyl	61141-72-8	7.26	NGS	15	JNT

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected
 N - Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:
 Customer Sample ID: 16-06172-1-E1
 Customer Sample ID: 16-06172-1-E1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qcr Flags
VAPOR, TDU SV04 #2									
S16T021626				Cyclohexanone, octamethyl	556-67-2	4.35	NGS	150	JNT
S16T021626				1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	28	JNT
S16T021626				3,3-Dimethylhexane	503-16-6	4.88	NGS	37	JNT
S16T021626				Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	63	JNT
S16T021626				Decane, 2,4,6-trimethyl-	82108-27-4	5.11	NGS	20	JNT
S16T021626				Acetophenone	98-86-2	5.18	NGS	24	JNT
S16T021626				Undecane	1120-21-4	5.45	NGS	120	JNT
S16T021626				Dodecylcyclopentasiloxane	541-02-6	5.72	NGS	120	JNT
S16T021626				Undecane, 2-methyl-	7045-71-8	6.00	NGS	5.5	JNT
S16T021626				Undecane, 3-methyl-	1002-43-3	6.05	NGS	5.2	JNT
S16T021626				Benzothiazole	95-16-9	6.80	NGS	69	JNT
S16T021626				Decane, 2,3,5,8-tetramethyl-	152823-15-7	6.90	NGS	41	JNT
S16T021626				Dodecane, 2,6,11-trimethyl-	31295-55-4	6.96	NGS	9.3	JNT
S16T021626				Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	9.8	JNT
S16T021626				Dodecylmethylcyclohexasiloxane	540-87-6	7.07	NGS	45	JNT
S16T021626				Dodecane,4,6-dimethyl	51141-72-8	7.25	NGS	28	JNT

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected
 N = Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141

SDG Number:

Customer Sample ID: 16-06172-1-EFF-BASE

Customer Sample ID: 16-06172-1-EFF-BASE

Sample	R	AI	QC Type	Analysis	CAS No.	Retention Time (Min:Sec)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021627				3-Methoxy-3-methylbutanol	55539-66-3	3.92	NGS	36	JNT
S16T021627				Cyclohexanone, octamethyl	556-87-2	4.36	NGS	200	JNT
S16T021627				2,2,7,7-tetramethyldecane	1071-31-4	4.49	NGS	65	JNT
S16T021627				Nonane, 2,2,3-trimethyl-	55459-04-2	4.77	NGS	28	JNT
S16T021627				1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	68	JNT
S16T021627				Octane, 2,3,6,7-tetramethyl-	52670-34-6	4.89	NGS	93	JNT
S16T021627				Octane, 3,5-dimethyl-	15669-93-9	5.06	NGS	65	JNT
S16T021627				Decane, 2,5,9-trimethyl-	62108-22-9	5.14	NGS	37	JNT
S16T021627				Acetophenone	98-95-2	5.19	NGS	11	JNT
S16T021627				2,5-Dimethyldecane	13150-61-7	5.25	NGS	69	JNT
S16T021627				Undecane	1120-21-4	5.45	NGS	120	JNT
S16T021627				Decylmethylcyclopentasiloxane	541-02-9	5.72	NGS	83	JNT
S16T021627				Benzenazole	95-16-9	6.61	NGS	40	JNT
S16T021627				Decane, 2,3,5,8-tetramethyl-	182823-15-7	6.90	NGS	29	JNT
S16T021627				Dodecamethylcyclotetrasiloxane	340-97-6	7.07	NGS	28	JNT
S16T021627				Dodecane, 2,6,11-trimethyl-	31295-56-4	7.26	NGS	24	JNT
S16T021627				Undecane, 2-methyl-	7045-71-8	7.33	NGS	9.5	JNT

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected

N - Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:

Customer Sample ID: 16-06172-1-F1
 Customer Sample ID: 16-06172-1-F1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVDA #2									
S16T021626				Unknown-1		4.35	NGS	110	JT
S16T021626				2,6-Dimethyldecane	13150-61-7	5.06	NGS	32	JNT
S16T021626				Acetophenone	98-06-2	5.18	NGS	16	JNT
S16T021626				Undecane	1120-21-4	5.44	NGS	73	JNT
S16T021626				Decamethylcyclopentasiloxane	541-02-6	5.71	NGS	67	JNT
S16T021626				Benzo[h]azolo	95-16-9	6.80	NGS	41	JNT
S16T021626				Dodecane, 2,6,11-trimethyl-	31285-66-4	6.90	NGS	22	JNT

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected
 N - Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141

SDG Number:

Customer Sample ID: 16-06172-1-G1

Customer Sample ID: 16-06172-1-G1

Sample	R	AP	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S161021629				Unknown-1		4.35	NGS	130	JT
S161021629				Decane, 3,7-dimethyl-	17312-54-8	5.05	NGS	35	JNT
S161021629				Acetophenone	88-85-2	5.18	NGS	12	JNT
S161021629				Undecane	1120-21-4	5.45	NGS	77	JNT
S161021629				Decamethylcyclopentasiloxane	541-02-0	5.72	NGS	110	JNT
S161021629				Benzothiazole	95-16-9	6.59	NGS	34	JNT
S161021629				Methanamine	100-97-0	6.66	NGS	18	JNT
S161021629				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	31	JNT

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected
 N - Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:

Customer Sample ID: 16-06172-1-H1
 Customer Sample ID: 16-06172-1-H1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S161021630				Unknown-1		4.35	NGS	220 JT	
S161021630				Phenol	108-95-2	4.42	NGS	30 JNT	
S161021630				1-Hexanol, 2-ethyl-	104-76-7	4.82	NGS	29 JNT	
S161021630				Acetophenone	98-86-2	5.18	NGS	18 JNT	
S161021630				Undecane	1120-21-4	5.45	NGS	100 JNT	
S161021630				Dodecanthylcyclopentasiloxane	541-02-6	5.72	NGS	88 JNT	
S161021630				Benzothiazole	95-16-9	6.60	NGS	45 JNT	
S161021630				Dodecane, 2,6,11-trimethyl-	31285-58-4	6.90	NGS	25 JNT	
S161021630				2,2,4-Trimethyl-1,3-pentanediol	8946-50-0	9.18	NGS	26 JNT	

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected
 N - Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141
 SDG Number:

Customer Sample ID: 16-06172-1-H2

Customer Sample ID: 16-06172-1-H2

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021631				Unknown-1		4.35	NGS	98 JT	
S16T021631				Acetophenone	98-86-2	5.19	NGS	11 JNT	
S16T021631				Undecane	1120-21-4	5.45	NGS	65 JNT	
S16T021631				Undecane, 2,6-dimethyl-	17301-23-4	5.49	NGS	14 JNT	
S16T021631				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	79 JNT	
S16T021631				Benzothiazole	95-18-9	6.60	NGS	37 JNT	
S16T021631				Dodecane, 2,6,11-trimethyl-	31295-66-4	6.90	NGS	19 JNT	

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected
 N - Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162141

SDG Number:

Customer Sample ID: 16-06172-1-IN-BASE

Customer Sample ID: 16-06172-1-IN-BASE

Sample #	RI	MI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SWOA #2									
S161021632				2-Butoxyethanol	111-76-2	3.71	NGS	17 JNT	
S161021632				Undecan-1		4.35	NGS	370 JT	
S161021632				Phenol	109-85-2	4.43	NGS	31 JNT	
S161021632				Undecan-2		4.84	NGS	46 JT	
S161021632				Methylcyclohexylsilyl	17928-28-8	5.00	NGS	27 JNT	
S161021632				Decane, 3,7-dimethyl-	17312-64-8	5.06	NGS	67 JNT	
S161021632				Decane, 2,4,6-trimethyl-	62109-27-4	5.11	NGS	23 JNT	
S161021632				Acetophenone	98-86-2	5.19	NGS	19 JNT	
S161021632				Undecane	1120-21-4	5.45	NGS	150 JNT	
S161021632				Undecane, 2,5-dimethyl-	17301-23-4	5.50	NGS	20 JNT	
S161021632				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	150 JNT	
S161021632				Benzotriazole	95-16-9	6.62	NGS	81 JNT	
S161021632				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	49 JNT	
S161021632				Dodecamethylcyclotetrasiloxane	540-97-6	7.68	NGS	71 JNT	
S161021632				Undecane, 3,7-dimethyl-	17301-29-0	7.27	NGS	35 JNT	
S161021632				2,2,4-Trimethyl-1,3-pentadiene	5946-50-0	9.18	NGS	28 JNT	

T - Tentatively Identified Compound
 Q - Qualitative

E - Outside Calibration Range
 J - Estimated

U - Less Than Detection Limit

NA = Not Analyzed, ND = Not Detected
 N = Named TIC

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-A1
 Customer Sample ID: 16-06172-2-A1

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	PPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S161021648			79-34-5	1,1,2,2-Tetrachloroethane	NCSS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S161021648			79-00-5	1,1,2-Trichloroethane	NCSS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021648			75-34-3	1,1-Dichloroethane	NCSS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021648			75-35-4	1,1-Dichloroethene	NCSS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021648			107-05-2	1,2-Dichloroethane	NCSS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021648			942-75-6	1,3-Dichloropropene (Total)	NCSS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021648			106-46-7	1,4-Dichlorobenzene	NCSS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021648			123-91-1	1,4-Dioxane	NCSS	99	<2.0	3.6	n/a	n/a	n/a	n/a	2.0	n/a	J
S161021648			71-36-3	1-Butanol	NCSS	110	<4.3	31.0	n/a	n/a	n/a	n/a	4.3	n/a	
S161021648			111-70-6	1-Hexanol	NCSS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S161021648			71-23-8	1-Propanol	NCSS	100	<8.9	11.0	n/a	n/a	n/a	n/a	8.9	n/a	
S161021648			108-47-4	2,4-Dimethylpyridine	NCSS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021648			1708-29-8	2,5-Dihydrofuran	NCSS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021648			78-53-3	2-Butanone	NCSS	96	<3.1	27.0	n/a	n/a	n/a	n/a	3.1	n/a	
S161021648			110-43-0	2-Hexanone	NCSS	98	<2.6	9.4	n/a	n/a	n/a	n/a	2.6	n/a	J
S161021648			991-78-6	2-Hexanone	NCSS	96	<2.5	1.6	n/a	n/a	n/a	n/a	2.5	n/a	
S161021648			534-22-5	2-Methylhexan	NCSS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021648			78-64-4	3-Butan-2-one	NCSS	93	<1.9	6.6	n/a	n/a	n/a	n/a	1.9	n/a	J
S161021648			105-35-4	3-Hexanone	NCSS	100	<2.7	5.5	n/a	n/a	n/a	n/a	2.7	n/a	
S161021648			109-68-3	3-Octanone	NCSS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021648			105-42-0	4-Methyl-2-hexanone	NCSS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021648			108-10-1	4-Methyl-2-Pentanone	NCSS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021648			67-64-1	Acetone	NCSS	86	<2.8	2.7E+03	n/a	n/a	n/a	n/a	2.8	n/a	EY
S161021648			75-05-8	Acetonitrile	NCSS	100	<1.6	26.0	n/a	n/a	n/a	n/a	1.6	n/a	
S161021648			98-88-2	Acetopropene	NCSS	100	<6.2	1.0	n/a	n/a	n/a	n/a	6.2	n/a	J
S161021648			107-13-1	Acrylonitrile	NCSS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021648			107-18-6	Allyl Alcohol	NCSS	90	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021648			107-05-1	Allyl Chloride	NCSS	99	<2.5	2.2	n/a	n/a	n/a	n/a	2.5	n/a	
S161021648			71-43-2	Benzene	NCSS	110	<1.5	8.4	n/a	n/a	n/a	n/a	1.5	n/a	J

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

Annex
 8/19/16

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-A1
 Customer Sample ID: 16-06172-2-A1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021648			100-47-0	Gene-strike	NCS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2		n/a
S16T021648			123-72-8	Budanal	NCS	100	<3.0	22	n/a	n/a	n/a	n/a	3.0		n/a
S16T021648			109-74-0	Butanone	NCS	110	<2.1	36	n/a	n/a	n/a	n/a	2.1		n/a
S16T021648			99-23-5	Carbon tetrachloride	NCS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5		n/a
S16T021648			108-90-7	Chlorobenzene	NCS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5		n/a
S16T021648			75-00-3	Chloroethane	NCS	110	<1.6	2.1	n/a	n/a	n/a	n/a	1.6		n/a
S16T021648			87-69-3	Chloroform	NCS	100	<1.8	7.3	n/a	n/a	n/a	n/a	1.8		n/a
S16T021648			110-82-7	Cyclohexane	NCS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4		n/a
S16T021648			124-18-5	Decane	NCS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3		n/a
S16T021648			84-17-5	Ethanol	NCS	100	3.8	230	n/a	n/a	n/a	n/a	3.7		n/a
S16T021648			141-78-6	Ethyl acetate	NCS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8		n/a
S16T021648			100-41-4	Ethylbenzene	NCS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4		n/a
S16T021648			110-00-9	Furan	NCS	99	<1.6	5.0	n/a	n/a	n/a	n/a	1.6		n/a
S16T021648			110-54-3	Hexane	NCS	96	<1.3	38	n/a	n/a	n/a	n/a	1.3		n/a
S16T021648			828-73-9	Hexachloride	NCS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6		n/a
S16T021648			126-98-7	Methacrylonitrile	NCS	110	<1.8	5.8	n/a	n/a	n/a	n/a	1.8		n/a
S16T021648			75-09-2	Methylene Chloride	NCS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1		n/a
S16T021648			91-20-3	Naphthalene	NCS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3		n/a
S16T021648			98-55-3	Nitrobenzene	NCS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7		n/a
S16T021648			110-59-8	Paracetamol	NCS	110	<2.6	12	n/a	n/a	n/a	n/a	2.6		n/a
S16T021648			107-12-0	Propargolite	NCS	100	<1.8	33	n/a	n/a	n/a	n/a	1.8		n/a
S16T021648			110-86-1	Pyridine	NCS	100	<2.8	20	n/a	n/a	n/a	n/a	2.8		n/a
S16T021648			100-42-5	Styrene	NCS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7		n/a
S16T021648			127-18-4	Tetrachloroethene	NCS	100	<1.8	44	n/a	n/a	n/a	n/a	1.8		n/a
S16T021648			108-89-3	Toluene	NCS	110	<2.2	9.8	n/a	n/a	n/a	n/a	2.2		n/a
S16T021648			79-01-8	Trichloroethane	NCS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6		n/a
S16T021648			76-69-4	Trichloroethylene	NCS	98	<1.9	450	n/a	n/a	n/a	n/a	1.9		n/a
S16T021648			10061-01-5	cis-1,3-Dichloropropene	NCS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8		n/a
S16T021648			123-86-4	n-Butyl acetate	NCS	99	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4		n/a

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - ULS Outside Range
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-A1

Customer Sample ID: 16-06172-2-A1

Sample	R	AN	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VA/COR-TDU VOA #2															
S161021648			142-82-5	n-Hexane	NCSS	110	<1.5	19	n/a	n/a	n/a	n/a	1.5	n/a	
S161021648			10061-02-6	trans-1,3-Dichloropropene	NCSS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - ILS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-A2
 Customer Sample ID: 16-06172-2-A2

Sample#	R	Alt	CAS #	Analyte	Unit	970 %	Blank	Result	Duplicate	Average	RPO %	Spct Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021649			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021649			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021649			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021649			75-35-4	1,1-Dichloroethene	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021649			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021649			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			106-69-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021649			129-91-1	1,4-Dioxane	NGS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021649			71-36-3	1-Butanol	NGS	110	<4.3	7.2	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021649			111-70-6	1-Hexanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021649			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021649			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021649			1708-29-8	2,5-Dimethylfuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021649			76-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021649			110-43-0	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021649			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021649			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021649			76-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021649			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021649			106-66-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021649			105-42-0	4-Methyl-2-pentanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021649			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021649			67-64-1	Acetone	NGS	86	<2.8	20	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021649			75-05-8	Acetonitrile	NGS	100	<1.6	97	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021649			98-96-2	Acetophenone	NGS	100	<6.2	6.6	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021649			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021649			107-14-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021649			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021649			71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - ILS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-A2
 Customer Sample ID: 16-06172-2-A2

Sample	R	AI	CAS #	Analyte	Unit	STO %	Blank	Result	Dupr. rate	Average	RPD %	Spot Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021649			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021649			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021649			100-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021649			96-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021649			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021649			75-00-3	Chloroethane	NGS	110	<1.6	2.1	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021649			87-86-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021649			124-16-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021649			94-17-5	Ethanol	NGS	100	3.8	17	n/a	n/a	n/a	n/a	3.7	n/a	BU
S16T021649			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021649			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021649			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021649			828-73-9	Hexamethide	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021649			126-98-7	Methacrylonitrile	NGS	110	<1.8	3.5	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021649			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021649			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021649			98-05-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021649			110-59-8	Pentamethine	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021649			107-12-0	Proparamide	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021649			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021649			127-18-4	Tetrachloroethene	NGS	100	<1.8	1.9	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			108-83-3	Toluene	NGS	110	<2.2	3.3	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021649			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021649			75-09-4	Trichlorofluoromethane	NGS	98	<1.9	5.7	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021649			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-A2

Customer Sample ID: 16-06172-2-A2

Sample	R	AI	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAQOR-TDU VOA #2															
S16T021649			142-82-5	n-Heptane	NGCS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021649			10061-02-6	trans-1,3-Dichloropropene	NGCS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - LLS Outside Range
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-B1
 Customer Sample ID: 16-06172-2-B1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021650			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021650			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021650			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021650			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021650			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021650			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021650			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021650			123-91-1	1,4-Dioxane	NGS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021650			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021650			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021650			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021650			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021650			1708-28-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021650			78-93-3	2-Butanone	NGS	96	<3.1	3.2	n/a	n/a	n/a	n/a	3.1	n/a	J
S16T021650			119-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021650			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021650			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021650			78-94-4	3-Buten-2-one	NGS	93	<1.9	2.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021650			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021650			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021650			105-42-0	4-Methyl-2-hexanone	NGS	99	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021650			106-10-1	4-Methyl-2-pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021650			67-64-1	Acetone	NGS	86	<2.8	7.4	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021650			75-05-8	Acetonitrile	NGS	100	<1.6	300	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021650			98-06-2	Acetophenone	NGS	100	<6.2	14	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021650			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021650			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021650			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021650			71-43-2	Benzene	NGS	110	<1.5	1.7	n/a	n/a	n/a	n/a	1.5	n/a	J

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-B1
 Customer Sample ID: 16-06172-2-B1

Sample	R	All	CAS #	Analyte	Unit	g10 %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Crat Err %	Qwr Flag
VAPOR-TOU VOA #2															
S161021650			100-47-0	Benzonitrile	NCS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S161021650			123-72-8	Butanal	NCS	100	<3.0	3.2	n/a	n/a	n/a	n/a	3.0	n/a	J
S161021650			109-74-0	Butanenitrile	NCS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021650			96-23-5	Carbon tetrachloride	NCS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021650			108-90-7	Chlorobenzene	NCS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021650			75-00-3	Chloroethane	NCS	110	<1.6	2.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021650			87-68-3	Chloroform	NCS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021650			110-82-7	Cyclohexane	NCS	96	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S161021650			124-18-5	Decane	NCS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021650			84-17-6	Ethanol	NCS	100	3.8	8.1	n/a	n/a	n/a	n/a	3.7	n/a	B
S161021650			141-78-6	Ethyl acetate	NCS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021650			100-41-4	Ethylbenzene	NCS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021650			110-00-9	Furan	NCS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021650			110-54-3	Hexane	NCS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021650			828-73-9	Hexanenitrile	NCS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021650			126-98-7	Methacrylonitrile	NCS	110	<1.8	5.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S161021650			75-09-2	Methylene Chloride	NCS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021650			91-20-3	Naphthalene	NCS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S161021650			98-55-3	Nitrobenzene	NCS	94	<4.7	11	n/a	n/a	n/a	n/a	4.7	n/a	J
S161021650			110-59-8	Pentanenitrile	NCS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021650			107-12-0	Propanenitrile	NCS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021650			110-86-1	Pyridine	NCS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S161021650			100-42-5	Styrene	NCS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S161021650			127-18-4	Tetrachloroethene	NCS	100	<1.8	100	n/a	n/a	n/a	n/a	1.8	n/a	
S161021650			108-88-3	Toluene	NCS	110	<2.2	3.2	n/a	n/a	n/a	n/a	2.2	n/a	J
S161021650			79-01-8	Trichloroethane	NCS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021650			76-69-4	Trichlorofluoromethane	NCS	98	<1.9	52	n/a	n/a	n/a	n/a	1.9	n/a	
S161021650			10061-01-5	cis-1,3-Dichloropropene	NCS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021650			123-95-4	n-Butyl acetate	NCS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Carrier
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - ILS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-B1

Customer Sample ID: 16-06172-2-B1

Sample #	R	AI	CAS #	Analyte	Unit	STD %	Blank	React	Duplicate	Average	RPD %	Spot Rec %	Det Limit	Conc Err %	Qual Flags
VAQOR-1DU VOA #2															
S16T02:650			142-82-5	n-Heptane	MGCS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T02:650			10061-02-6	trans-1,3-Dichloropropene	MGCS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - ILS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-BLANK
 Customer Sample ID: 16-06172-2-BLANK

Sample	R	Alt	CAS #	Analyte	Unit	g10 %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
S161021651			79-34-5	1,1,2,2-Tetrachloroethane	NCS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	Q
S161021651			79-00-5	1,1,2-Trichloroethane	NCS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	Q
S161021651			75-34-3	1,1-Dichloroethane	NCS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021651			75-35-4	1,1-Dichloroethene	NCS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021651			107-05-2	1,2-Dichloroethane	NCS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021651			642-75-6	1,3-Dichloropropene (Total)	NCS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021651			105-45-7	1,4-Dichlorobenzene	NCS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	Q
S161021651			123-91-1	1,4-Dioxane	NCS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S161021651			71-35-3	1-Butanol	NCS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S161021651			111-70-8	1-Hexanol	NCS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	Q
S161021651			71-23-6	1-Propanol	NCS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S161021651			108-47-4	2,4-Dimethylpyridine	NCS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	Q
S161021651			1708-29-8	2,5-Dihydrofuran	NCS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021651			78-83-3	2-Butanone	NCS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S161021651			110-43-0	2-Hexanone	NCS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S161021651			591-79-5	2-Hexanone	NCS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	Q
S161021651			534-22-5	2-Methylhexan	NCS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021651			78-84-4	3-Buten-2-one	NCS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S161021651			106-35-4	3-Hexanone	NCS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	Q
S161021651			106-69-3	3-Octanone	NCS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	Q
S161021651			105-42-0	4-Methyl-2-hexanone	NCS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S161021651			108-10-1	4-Methyl-2-Pentanone	NCS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021651			87-84-1	Acetone	NCS	86	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S161021651			76-05-8	Acetonitrile	NCS	100	<1.6	71	n/a	n/a	n/a	n/a	1.6	n/a	
S161021651			98-86-2	Acetophenone	NCS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	Q
S161021651			107-13-1	Acrylonitrile	NCS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021651			107-18-6	Allyl Alcohol	NCS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021651			107-05-1	Allyl Chloride	NCS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021651			71-43-2	Benzene	NCS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contaminants
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-BLANK
 Customer Sample ID: 16-06172-2-BLANK

Sample	R	As	CAS #	Analyte	Unit	STD %	Brnt	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flag
VIA-QR-10U VOA #2															
S161021651			100-47-0	Benzene/ene	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	Q
S161021651			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S161021651			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021651			96-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021651			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	Q
S161021651			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Q
S161021651			87-68-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021651			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S161021651			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	Q
S161021651			84-17-5	Ethanol	NGS	100	3.8	7.0	n/a	n/a	n/a	n/a	3.7	n/a	BU
S161021651			141-78-6	Ethyl acetate	NGS	99	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021651			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S161021651			118-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021651			119-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021651			628-73-9	Hexanethiol	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S161021651			128-98-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021651			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021651			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	Q
S161021651			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	Q
S161021651			110-59-8	Pentamethylnitrite	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S161021651			107-12-0	Propenethiol	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021651			110-86-1	Pyrene	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S161021651			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	Q
S161021651			127-19-4	Tetrachloroethene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	Q
S161021651			108-88-3	Toluene	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	Q
S161021651			79-01-6	Trichloroethene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021651			75-59-4	Trichlorofluoroethane	NGS	98	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S161021651			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021651			123-98-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LIS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-BLANK

Customer Sample ID: 16-06172-2-BLANK

Sample	R	At	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicates	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021651			142-82-5	n-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021651			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-C1
 Customer Sample ID: 16-06172-2-C1

Sample	R	As	CAS #	Analyte	Unit	\$10 %	Bank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021652			78-94-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021652			78-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021652			76-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021652			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021652			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021652			942-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021652			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021652			123-91-1	1,4-Dioxane	NGS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021652			71-36-3	1-B-Fenol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021652			111-70-6	1-Heptanol	NGS	98	<6.1	<6.1	n/a	n/a	n/a	n/a	6.1	n/a	
S16T021652			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021652			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021652			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021652			78-03-3	2-B-Furanone	NGS	96	<3.1	3.2	n/a	n/a	n/a	n/a	3.1	n/a	J
S16T021652			110-43-0	2-Hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021652			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021652			504-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021652			78-94-4	3-B-Fenol	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021652			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021652			106-66-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021652			105-42-0	4-Methyl-2-Pentanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021652			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021652			67-64-1	Acetone	NGS	85	<2.8	3.0	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021652			75-05-8	Acetonitrile	NGS	100	<1.6	4.30	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021652			98-96-2	Acetophenone	NGS	100	<6.2	14	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021652			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021652			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021652			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021652			71-43-2	Benzene	NGS	110	<1.5	1.9	n/a	n/a	n/a	n/a	1.5	n/a	J

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estrated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Calibration
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-C1
 Customer Sample ID: 16-06172-2-C1

Sample	R	All	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
S161021652			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S161021652			123-72-8	Butadiol	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S161021652			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021652			96-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021652			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021652			75-00-3	Chloroethane	NGS	110	<1.6	2.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021652			87-66-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021652			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S161021652			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021652			84-17-5	Ethanol	NGS	100	3.8	200	n/a	n/a	n/a	n/a	3.7	n/a	B
S161021652			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021652			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021652			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021652			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021652			828-73-9	Heptanitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021652			128-86-7	Methacrylonitrile	NGS	110	<1.8	8.0	n/a	n/a	n/a	n/a	1.8	n/a	J
S161021652			75-09-2	Methylvinyl Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021652			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S161021652			86-85-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S161021652			110-59-8	Parlanitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021652			107-12-0	Propanenitrile	NGS	100	<1.8	2.8	n/a	n/a	n/a	n/a	1.8	n/a	J
S161021652			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S161021652			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S161021652			127-16-4	Tetrahydrothiophene	NGS	100	<1.8	76	n/a	n/a	n/a	n/a	1.8	n/a	
S161021652			104-84-3	Toluene	NGS	110	<2.2	3.0	n/a	n/a	n/a	n/a	2.2	n/a	J
S161021652			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021652			75-68-4	Tetrafluoroethene	NGS	98	<1.9	390	n/a	n/a	n/a	n/a	1.9	n/a	
S161021652			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021652			123-66-4	n-butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-C1

Customer Sample ID: 16-06172-2-C1

Sample#	R	As	CAS #	Analyte	Unit	STD %	Bias	Result	Duplicate	Average	PPD %	Sp4 Rec %	Out Limit	Car Err %	Qual Flag
VAPOR-TOU VOA #2															
S161021652			142-82-5	n-Heptane	MGCS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	n/a	1.6	n/a
S161021652			10061-02-6	trans-1,3-Dichloropropene	MGCS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	n/a	2.1	n/a

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-D1
 Customer Sample ID: 16-06172-2-D1

Sample	R	Alt	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat for %	Qual Flags
VAPOR-TDU VOA #2															
S161021653			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S161021653			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021653			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021653			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021653			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021653			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021653			105-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021653			123-91-1	1,4-Dioxane	NGS	96	<2.0	2.5	n/a	n/a	n/a	n/a	2.0	n/a	J
S161021653			71-59-3	1-Benzol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S161021653			111-70-6	1-Hexanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S161021653			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S161021653			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021653			1706-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021653			78-83-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S161021653			110-43-0	2-Hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021653			991-78-6	2-Hexanone	NGS	90	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021653			534-22-5	2-Methylhexan	NGS	98	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021653			78-94-4	3-Buten-2-one	NGS	93	<1.9	6.0	n/a	n/a	n/a	n/a	1.9	n/a	J
S161021653			106-35-4	3-Hexanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S161021653			106-69-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021653			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021653			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021653			87-84-1	Acetone	NGS	86	<2.8	7.00	n/a	n/a	n/a	n/a	2.8	n/a	E
S161021653			76-05-8	Acetonitrile	NGS	100	<1.6	1.8E+03	n/a	n/a	n/a	n/a	1.6	n/a	E
S161021653			98-98-2	Acetophenone	NGS	100	<6.2	9.6	n/a	n/a	n/a	n/a	6.2	n/a	J
S161021653			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021653			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021653			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021653			71-43-2	Benzene	NGS	110	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a	J

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - LLS Outside Range
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-D1
 Customer Sample ID: 16-06172-2-D1

Sample	R	All	CAS #	Analyte	Unit	g10 %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
S161021653			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S161021653			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S161021653			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021653			96-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021653			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021653			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021653			87-68-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021653			110-82-7	Cyclohexane	NGS	96	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S161021653			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021653			64-17-5	Ethanol	NGS	100	3.8	160	n/a	n/a	n/a	n/a	3.7	n/a	
S161021653			141-78-8	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021653			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021653			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021653			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021653			828-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021653			126-98-7	Methoxybenzitrile	NGS	110	<1.8	4.5	n/a	n/a	n/a	n/a	1.8	n/a	
S161021653			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021653			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S161021653			98-05-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S161021653			110-59-8	Paracetamol	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021653			107-12-0	Propanenitrile	NGS	100	<1.8	6.0	n/a	n/a	n/a	n/a	1.8	n/a	
S161021653			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S161021653			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S161021653			127-18-4	Tetrachloroethene	NGS	100	<1.8	78	n/a	n/a	n/a	n/a	1.8	n/a	
S161021653			108-86-3	Toluene	NGS	110	<2.2	2.3	n/a	n/a	n/a	n/a	2.2	n/a	
S161021653			79-01-6	Trichloroethane	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021653			75-09-4	Trichlorofluoromethane	NGS	98	<1.8	220	n/a	n/a	n/a	n/a	1.8	n/a	
S161021653			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021653			123-66-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-D1

Customer Sample ID: 16-06172-2-D1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Chk Err %	Qual Flags
VAPOR-TDU VOA #2															
S161021653			142-82-5	n-Hexane	NCS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021653			10061-02-6	trans-1,3-Dichloropropene	NCS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-E1
 Customer Sample ID: 16-06172-2-E1

Sample	R	All CAS #	Analyte	Unit	STD %	Blank	Reprint	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Crnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S161021654		79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S161021654		79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021654		75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021654		75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021654		107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021654		542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021654		105-45-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021654		123-91-1	1,4-Dioxane	NGS	99	<2.0	5.6	n/a	n/a	n/a	n/a	2.0	n/a	J
S161021654		71-59-3	1-Branol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S161021654		111-70-6	1-Hexanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S161021654		71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S161021654		108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021654		1708-29-8	2,5-Diglyoxolan	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021654		78-63-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S161021654		110-43-0	2-Methanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021654		891-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021654		534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021654		78-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S161021654		106-35-4	3-Hexanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S161021654		106-69-3	3-Octanone	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021654		105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021654		108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021654		87-84-1	Acetone	NGS	86	<2.8	1.3E+03	n/a	n/a	n/a	n/a	2.8	n/a	E
S161021654		75-05-8	Acetaldehyde	NGS	100	<1.6	450	n/a	n/a	n/a	n/a	1.6	n/a	E
S161021654		88-86-2	Acetophenone	NGS	100	<6.2	8.2	n/a	n/a	n/a	n/a	6.2	n/a	J
S161021654		107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021654		107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021654		107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021654		71-43-2	Benzene	NGS	110	<1.0	1.7	n/a	n/a	n/a	n/a	1.5	n/a	J

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Concentration
 L - ULS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-E1
 Customer Sample ID: 16-06172-2-E1

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spot Rec %	Det Limit	Cartier %	Qual Flag
VAPOR-TDU VOA #2															
S16T021654			100-47-0	Benzotriole	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021654			123-72-8	Buzanil	NGS	100	<3.0	5.1	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021654			109-74-0	Buzantriole	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021654			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021654			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021654			75-00-3	Chloroethane	NGS	110	<1.6	1.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021654			97-99-3	Chloroform	NGS	100	<1.8	1.8	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021654			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021654			124-16-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021654			94-17-5	Ethanol	NGS	100	3.8	240	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021654			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021654			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021654			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021654			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021654			828-73-9	Hexanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021654			126-96-7	Methacrylonitrile	NGS	110	<1.8	3.2	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021654			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021654			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021654			86-05-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021654			110-59-8	Paracetamol	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021654			107-12-0	Propargolide	NGS	100	<1.8	1.5	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021654			110-86-1	Pyridine	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	L
S16T021654			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021654			127-16-4	Tetrahydrofuran	NGS	100	<1.8	4.2	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021654			108-86-3	Toluene	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021654			79-01-6	Trichloroethane	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021654			75-59-4	Trichlorofluoromethane	NGS	98	<1.9	970	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021654			10081-01-5	cis-1,2-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021654			123-66-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-E1

Customer Sample ID: 16-06172-2-E1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	PPD %	Spk Rec %	Det Limit	Car Err %	Qual Flag
VAPOR-TDU VOA #2															
S16T021654			142-82-5	n-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021654			10091-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - ILS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-EFF-BASE
 Customer Sample ID: 16-06172-2-EFF-BASE

Sample	R	Asst	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	DetLimit	Cal Err %	Qual Flags
VAPOUR-TDU VOA #2															
S16T021655			78-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021655			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021655			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021655			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021655			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021655			942-71-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021655			123-91-1	1,4-Dioxane	NGS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021655			71-36-3	1-Butanol	NGS	110	<6.1	<6.1	n/a	n/a	n/a	n/a	6.1	n/a	
S16T021655			111-70-6	1-Heptanol	NGS	98	<6.1	<6.1	n/a	n/a	n/a	n/a	6.1	n/a	
S16T021655			71-23-8	n-Propanol	NGS	100	<6.9	<6.9	n/a	n/a	n/a	n/a	6.9	n/a	
S16T021655			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021655			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021655			78-50-3	2-Pentanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021655			110-43-0	2-Hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021655			591-72-6	2-Hexanone	NGS	96	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021655			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021655			78-94-4	3-Butyl-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021655			106-35-4	3-Hexanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021655			106-61-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021655			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021655			108-10-1	4-Methyl-2-pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021655			67-64-1	Acetone	NGS	86	<2.8	17	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021655			75-05-8	Acetonitrile	NGS	100	<1.5	19	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021655			98-86-2	Acetophenone	NGS	100	<6.2	8.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021655			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021655			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021655			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021655			71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

N/A = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-EFF-BASE
 Customer Sample ID: 16-06172-2-EFF-BASE

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Bank	Retard	Duplicate	Average	RPD %	Spk Rec %	DetLimit	Chg Eff %	Qual Flags
S16T021655			100-47-0	Benzoclitib	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021655			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021655			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021655			98-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021655			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021655			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021655			67-66-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021655			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021655			84-17-5	Ethanol	NGS	100	3.9	9.6	n/a	n/a	n/a	n/a	3.7	n/a BU	
S16T021655			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021655			110-00-8	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021655			110-94-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021655			808-73-9	Hexanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021655			126-98-7	Methacrylonitrile	NGS	110	<1.8	2.1	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021655			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021655			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021655			110-59-9	Pentamethyl	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021655			107-12-0	Propantitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a L	
S16T021655			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021655			127-18-4	Tetrachloroethene	NGS	100	<1.8	1.0	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			108-88-3	Toluene	NGS	110	<2.2	3.8	n/a	n/a	n/a	n/a	2.2	n/a J	
S16T021655			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021655			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021655			10051-01-6	dic-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			123-66-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - LLS Outside Range
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-EFF-BASE

Customer Sample ID: 16-06172-2-EFF-BASE

Sample#	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021655			142-82-5	n-Heptane	NGS	110	<1.6	2.5	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021655			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Carrier

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-F1
 Customer Sample ID: 16-06172-2-F1

Sample	R	All	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Out Err %	Qual Flags
S161021656			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S161021656			79-00-5	1,1,2,2-Tetrachloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021656			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021656			75-35-4	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021656			107-09-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021656			842-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021656			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021656			123-91-1	1,4-Dioxane	NGS	96	<2.0	3.2	n/a	n/a	n/a	n/a	2.0	n/a	J
S161021656			71-35-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S161021656			111-70-6	1-Methanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S161021656			71-23-6	1-Pyridine	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S161021656			106-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021656			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021656			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S161021656			110-43-0	2-Hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021656			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021656			534-22-5	2-Methylbutan	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021656			78-94-4	3-Buten-2-one	NGS	93	<1.9	1.3	n/a	n/a	n/a	n/a	1.9	n/a	
S161021656			106-35-4	3-Hexanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S161021656			106-68-3	3-Octanone	NGS	98	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021656			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021656			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021656			67-64-1	Acetone	NGS	86	<2.8	1.8E+03	n/a	n/a	n/a	n/a	2.8	n/a	E
S161021656			76-05-8	Acetonitrile	NGS	100	<1.6	490	n/a	n/a	n/a	n/a	1.6	n/a	E
S161021656			98-96-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S161021656			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021656			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021656			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021656			71-43-2	Benzene	NGS	110	<1.5	1.6	n/a	n/a	n/a	n/a	1.5	n/a	J

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - LLS Outside Range
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-08172-2-F1
 Customer Sample ID: 16-08172-2-F1

Sample	R	Asf	CAS #	Analyte	Unit	STD %	Burst	Result	Duplicate	Average	PPD %	Spl Rec %	Out Unit	Cal Err %	Qual Flags
VAPOUR-TDU VOA #2															
S16T021656			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021656			123-72-6	Benzal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021656			108-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021656			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021656			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021656			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021656			87-96-3	Chloroform	NGS	100	<1.8	4.1	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021656			110-82-7	Cyclohexane	NGS	99	<1.4	1.5	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021656			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021656			84-17-5	Ethanol	NGS	100	3.8	200	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021656			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021656			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021656			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021656			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021656			828-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021656			126-98-7	Methacrylonitrile	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021656			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021656			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021656			88-85-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021656			110-59-8	Nonane	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021656			107-12-0	Propenenitrile	NGS	100	<1.8	22	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021656			110-85-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021656			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021656			127-19-4	Tetrachloroethene	NGS	100	<1.8	31	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021656			108-88-3	Toluene	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021656			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021656			75-69-4	Trichlorofluoromethane	NGS	96	<1.9	500	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021656			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021656			123-86-4	i-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-08172-2-F1

Customer Sample ID: 16-08172-2-F1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	PPD %	Spk Rec %	Out Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S161021656			142-82-5	p-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021656			10051-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-G1
 Customer Sample ID: 16-06172-2-G1

Sample	R	As	CAS #	Analyte	Unit	STD %	Blnd	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAQR-10U VOA #2															
S16T021657			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021657			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021657			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021657			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021657			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021657			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021657			105-49-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021657			123-91-1	1,4-Dioxane	NGS	99	<2.0	-8.0	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021657			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021657			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021657			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021657			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021657			1708-29-9	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021657			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021657			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021657			691-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021657			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021657			78-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021657			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021657			106-69-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021657			106-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021657			106-10-1	4-Methyl-2-pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021657			67-66-1	Acetone	NGS	96	<2.8	1.3E+03	n/a	n/a	n/a	n/a	2.8	n/a	E
S16T021657			75-05-8	Acetonitrile	NGS	100	<1.6	640	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021657			98-86-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021657			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021657			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021657			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021657			71-43-2	Benzene	NGS	110	<1.5	1.5	n/a	n/a	n/a	n/a	1.5	n/a	J

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Coarent
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-G1
 Customer Sample ID: 16-06172-2-G1

Sample	R	All	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Car Err %	Qual Flags
VAPOR-TDU VOA #2															
S161021657			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S161021657			123-72-8	Benzal	NGS	100	<3.0	4.9	n/a	n/a	n/a	n/a	3.0	n/a	J
S161021657			109-74-0	Butanediol	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021657			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021657			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021657			75-00-3	Chloroethane	NGS	110	<1.6	1.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021657			67-66-3	Cyclohexane	NGS	100	<1.8	4.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S161021657			110-82-7	Cyclohexane	NGS	99	<1.4	1.8	n/a	n/a	n/a	n/a	1.4	n/a	J
S161021657			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021657			64-17-5	Ethanol	NGS	100	3.8	17.0	n/a	n/a	n/a	n/a	3.7	n/a	B
S161021657			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.6	n/a	n/a	n/a	n/a	1.8	n/a	
S161021657			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021657			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021657			110-54-3	Heptane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021657			828-73-9	Hexanetriol	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021657			128-98-7	Methacrylonitrile	NGS	110	<1.8	2.2	n/a	n/a	n/a	n/a	1.8	n/a	J
S161021657			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021657			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S161021657			88-69-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S161021657			110-59-8	Pentamethine	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021657			107-12-0	Propenenitrile	NGS	100	<1.8	2.1	n/a	n/a	n/a	n/a	1.8	n/a	
S161021657			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S161021657			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S161021657			127-19-4	Tetrahydrofuran	NGS	100	<1.8	1.4	n/a	n/a	n/a	n/a	1.8	n/a	
S161021657			108-88-3	Toluene	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021657			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021657			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	4.0	n/a	n/a	n/a	n/a	1.9	n/a	
S161021657			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021657			123-85-4	n-Butyl acetate	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NA = Not Analyzed, ND = Not Detected
 N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - ILS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-G1

Customer Sample ID: 16-06172-2-G1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	PPD %	Spk Rec %	Out Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021657			142-82-5	n-Heptane	NDS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021657			10051-02-6	trans-1,3-Dichloropropene	NDS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - LLS Outside Range
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-H1
 Customer Sample ID: 16-06172-2-H1

Sample	R	All	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VADQR-TDU VQA #2															
S16T021658			P9-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021658			P9-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021658			P5-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021658			P5-35-4	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021658			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021658			642-75-8	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021658			123-91-1	1,4-Dioxane	NGS	99	<2.0	4.3	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021658			71-36-3	1-Butanol	NGS	110	<4.3	250	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021658			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021658			71-23-8	1-Propanol	NGS	100	<8.9	89	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021658			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021658			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021658			76-93-3	2-Butanone	NGS	96	<3.1	180	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021658			110-43-0	2-Hexanone	NGS	98	<2.6	5.6	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021658			991-78-6	2-Hexanone	NGS	96	<2.5	10	n/a	n/a	n/a	n/a	2.5	n/a	J
S16T021658			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021658			76-94-4	3-Dioxol-2-one	NGS	93	<1.9	7.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021658			106-35-4	3-Heptanone	NGS	100	<2.7	33	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021658			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021658			105-42-0	4-Methyl-2-hexanone	NGS	99	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021658			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021658			67-64-1	Acetone	NGS	86	<2.8	2.6E+03	n/a	n/a	n/a	n/a	2.8	n/a	EY
S16T021658			75-05-8	Acetonitrile	NGS	100	<1.6	780	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021658			98-96-2	Acetophenone	NGS	100	<6.2	6.3	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021658			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021658			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021658			107-05-1	Allyl Chloride	NGS	89	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021658			71-43-2	Benzene	NGS	110	<1.5	6.5	n/a	n/a	n/a	n/a	1.5	n/a	J

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - LLS Outside Range
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-H1
 Customer Sample ID: 16-06172-2-H1

Sample	R	As	CAS #	Analyte	Unit	STD %	Bias	Result	Duplicate	Average	RPD %	Sqa Rec %	Dat Limit	Conc %	Qual Flag
VAPOR-TDU VOA #2															
S16T021658			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021658			123-72-8	Benzal	NGS	100	<3.0	17	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021658			109-74-0	Benzotrifluoride	NGS	110	<2.1	26	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021658			96-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021658			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021658			75-09-3	Chloroethane	NGS	110	<1.6	1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021658			87-86-3	Chloroform	NGS	100	<1.8	4.7	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021658			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021658			84-17-5	Ethanol	NGS	100	3.8	210	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021658			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021658			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021658			110-54-3	Hexane	NGS	96	<1.3	26	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021658			828-73-9	Heptanitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021658			128-98-7	Methacrylonitrile	NGS	110	<1.8	3.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			75-09-2	Methylcyclohexane	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021658			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021658			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021658			110-59-8	Perfluorotriethylamine	NGS	110	<2.6	4.5	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021658			107-12-0	Propanenitrile	NGS	100	<1.8	30	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			110-86-1	Pyridine	NGS	100	<2.8	15	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021658			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021658			127-18-4	Tetrachloroethane	NGS	100	<1.8	18	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			108-86-3	Toluene	NGS	110	<2.2	4.0	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021658			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021658			75-89-4	Trichlorofluoromethane	NGS	98	<1.9	430	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021658			10061-01-5	cis-1,3-Dichloropropene	NGS	106	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			123-95-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-H1

Customer Sample ID: 16-06172-2-H1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	PP0 %	Spk Rec %	Out Limit	Cor Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021658			142-82-5	n-Heptane	NGS	110	<1.6	100	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021658			10061-02-0	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-H2
 Customer Sample ID: 16-06172-2-H2

Sample	R	As	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S161021659			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S161021659			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021659			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021659			75-36-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021659			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021659			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021659			106-45-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021659			123-91-1	1,4-Dioxane	NGS	99	<2.0	2.1	n/a	n/a	n/a	n/a	2.0	n/a	J
S161021659			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S161021659			111-70-6	1-Hepanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S161021659			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S161021659			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021659			1706-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021659			78-69-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S161021659			110-43-0	2-Hexanone	NGS	96	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021659			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021659			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021659			78-94-4	3-Buten-2-one	NGS	93	<1.9	1.4	n/a	n/a	n/a	n/a	1.9	n/a	
S161021659			105-35-4	3-Hexanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S161021659			105-68-3	3-Octanone	NGS	96	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S161021659			105-42-0	4-Methyl-2-hexanone	NGS	96	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021659			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021659			57-64-1	Acetone	NGS	86	<2.8	1.8E+03	n/a	n/a	n/a	n/a	2.8	n/a	E
S161021659			75-06-8	Acetonitrile	NGS	100	<1.6	520	n/a	n/a	n/a	n/a	1.6	n/a	E
S161021659			98-66-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S161021659			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021659			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S161021659			107-05-1	Allyl Chloride	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021659			71-43-2	Benzene	NGS	110	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a	J

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-H2
 Customer Sample ID: 16-06172-2-H2

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc %	Qual Flag
VAPOR-TDU VOA #2															
S161021659			100-47-0	Benzonitrile	NCS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S161021659			123-72-8	Butanal	NCS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S161021659			109-74-0	Butanenitrile	NCS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021659			95-23-5	Carbon tetrachloride	NCS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021659			108-90-7	Chlorobenzene	NCS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S161021659			75-00-3	Chloroethane	NCS	110	<1.6	1.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021659			87-68-3	Chloroform	NCS	100	<1.8	3.7	n/a	n/a	n/a	n/a	1.8	n/a	J
S161021659			110-82-7	Cyclohexane	NCS	95	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S161021659			126-18-5	Decane	NCS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	B
S161021659			84-17-5	Ethanol	NCS	100	3.8	180	n/a	n/a	n/a	n/a	3.7	n/a	
S161021659			141-78-5	Ethyl acetate	NCS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021659			100-41-4	Ethylbenzene	NCS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021659			110-00-9	Furan	NCS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021659			110-54-3	Hexane	NCS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S161021659			828-73-9	Hexachloroethane	NCS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021659			125-98-7	Methoxyformaldehyde	NCS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021659			75-09-2	Methylene Chloride	NCS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S161021659			91-20-3	Naphthalene	NCS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S161021659			88-55-3	Nitrobenzene	NCS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S161021659			110-59-8	Permethrin	NCS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021659			107-12-0	Propanetricis	NCS	100	<1.8	22	n/a	n/a	n/a	n/a	1.8	n/a	
S161021659			110-86-1	Pyridine	NCS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S161021659			100-42-5	Styrene	NCS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S161021659			127-18-4	Tetrachloroethene	NCS	100	<1.8	12	n/a	n/a	n/a	n/a	1.8	n/a	J
S161021659			108-88-3	Toluene	NCS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S161021659			79-01-6	Trichloroethene	NCS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021659			76-69-4	Trichlorofluoromethane	NCS	98	<1.9	440	n/a	n/a	n/a	n/a	1.9	n/a	E
S161021659			10061-01-5	vin-1,3-Dichloropropene	NCS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021659			123-98-4	n-Butyl acetate	NCS	99	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Correak
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - ILS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-H2
 Customer Sample ID: 16-06172-2-H2

Sample	R	Air	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Crit Err %	Qual Flags
VAPOR-TDU VOA #2															
S161021659			142-92-5	n-Heptane	NCS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021659			10261-02-6	trans-1,3-Dichloropropene	NCS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - LLS Outside Range
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-IN-BASE
 Customer Sample ID: 16-06172-2-IN-BASE

Sample	R	Ad	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Chk Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021660			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021660			79-09-5	1,1,2,1-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021660			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021660			75-35-4	1,1-Dichloroethene	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021660			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021660			542-75-8	1,3-Dichloropropene (Trans)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021660			123-91-1	1,4-Dioxane	NGS	99	<2.0	2.3	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021660			71-36-3	1-Butanol	NGS	110	<4.3	5.6	n/a	n/a	n/a	n/a	4.3	n/a	J
S16T021660			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021660			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021660			106-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021660			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021660			78-93-3	2-Butanone	NGS	96	<3.1	3.4	n/a	n/a	n/a	n/a	3.1	n/a	J
S16T021660			110-43-0	2-Heptanone	NGS	98	<2.6	2.8	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021660			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021660			524-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021660			76-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021660			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021660			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021660			106-42-0	4-Methyl-2-hexanone	NGS	99	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021660			104-10-1	4-Methyl-2-pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021660			67-64-1	Acetone	NGS	86	<2.8	3.7	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021660			75-05-8	Acetonitrile	NGS	100	<1.6	2.9	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021660			96-86-2	Acetophenone	NGS	100	<6.2	6.1	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021660			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021660			107-16-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021660			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021660			71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:
 Customer Sample ID: 16-06172-2-IN-BASE
 Customer Sample ID: 16-06172-2-IN-BASE

Sample #	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021660			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021660			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021660			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021660			96-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021660			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021660			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021660			97-86-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021660			124-18-5	Decane	NGS	100	<3.3	6.2	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021660			94-17-5	Ethanol	NGS	100	3.8	20	n/a	n/a	n/a	n/a	3.7	n/a	BU
S16T021660			141-76-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			100-41-4	Ethybenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021660			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021660			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021660			828-73-9	Hexanethiol	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021660			126-98-7	Methacrylonitrile	NGS	110	<1.8	2.0	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021660			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021660			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021660			98-95-3	Nitrobenzene	NGS	94	<4.7	5.6	n/a	n/a	n/a	n/a	4.7	n/a	J
S16T021660			110-56-6	Pentamethyl	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021660			107-12-0	Propenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			110-86-1	Pyridine	NGS	100	<2.8	13	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021660			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021660			127-18-4	Tetrachloroethene	NGS	100	<1.8	8.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021660			108-88-3	Toluene	NGS	110	<2.2	6.9	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021660			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021660			75-09-4	Trichlorofluoromethane	NGS	98	<1.9	6.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021660			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			123-96-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

NVA = Not Analyzed, ND = Not Detected
 N - Named TIC
 Y - Correct
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 L - ILS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-IN-BASE

Customer Sample ID: 16-06172-2-IN-BASE

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RSD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S161021660			142-82-5	n-Heptane	NGS	110	<1.6	3.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S161021660			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

N - Named TIC
 Y - Comment

Q - Quantitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-A1

Customer Sample ID: 16-06172-2-A1

Sample#	R	AI	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S161021648				Acetic acid, anhydride with to	2256-42-6	11.78	NGS	40	JNT
S161021648				1-Propan-2-ol, formate	32978-00-0	14.09	NGS	30	JNT
S161021648				Pentanal	110-62-3	14.32	NGS	40	JNT
S161021648				Nitric oxide	10102-43-9	14.77	NGS	3.6E+03	JNT
S161021648				Formamide	75-12-7	14.86	NGS	45	JNT
S161021648				Hexanal	86-26-1	16.89	NGS	60	JNT
S161021648				Cyclohexanone, octamethyl	556-67-2	20.19	NGS	260	JNT
S161021648				Dodecane	112-40-3	22.78	NGS	160	JNT
S161021648				Decane, 2,6-dimethyl-	82108-27-4	22.92	NGS	57	JNT
S161021648				2,6-Dimethyldecane	13150-81-7	23.66	NGS	120	JNT
S161021648				Octane, 4-ethyl-	15869-95-0	23.76	NGS	65	JNT
S161021648				Unknown-1		24.07	NGS	260	JT
S161021648				Undecane, 2,6-dimethyl-	17301-23-4	25.11	NGS	58	JNT
S161021648				Carbamic acid, butylmethyl-, B	54644-61-0	25.69	NGS	47	JNT
S161021648				1,2-Benzothiazole	272-16-2	26.18	NGS	38	JNT
S161021648				Undecane, 2-methyl-	7045-71-8	26.30	NGS	85	JNT
S161021648				1,2,3,4,5-Cyclopenteneperoxide	56772-25-9	26.49	NGS	74	JNT
S161021648				Decane, 2,6-dimethyl-	82108-26-3	26.88	NGS	49	JNT

Janice Long
 8/19/16

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - ULS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-A2
 Customer Sample ID: 16-06172-2-A2

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S161021649				Cyclohexanone, octamethyl	556-67-2	20.20	NGS	320	JNT
S161021649				Dodecane	112-40-3	22.78	NGS	140	JNT
S161021649				Decane, 2,4,6-trimethyl-	62108-27-4	22.92	NGS	55	JNT
S161021649				2,6-Dimethyldecane	13150-81-7	23.86	NGS	89	JNT
S161021649				Octane, 4-ethyl-	15689-89-0	23.76	NGS	90	JNT
S161021649				Undecene-1		24.05	NGS	270	JT
S161021649				Undecane, 2,6-dimethyl-	17391-23-4	25.10	NGS	63	JNT
S161021649				1,2-Benzisobiazole	272-16-2	26.16	NGS	160	JNT
S161021649				Undecane, 2-methyl-	7045-71-8	26.26	NGS	66	JNT
S161021649				Decane, 2,6,8-trimethyl-	62106-26-3	26.83	NGS	31	JNT

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-B1

Customer Sample ID: 16-06172-2-B1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VADQC-TDU VOA #2									
S161021650				Cyclohexadecane, octamethyl	356-67-2	20.21	NGS	210	JNT
S161021650				Dodecane	112-40-3	22.79	NGS	140	JNT
S161021650				Decane, 2,4,6-trimethyl-	82106-27-4	22.93	NGS	48	JNT
S161021650				2,6-Dimethyldecane	13150-81-7	23.66	NGS	99	JNT
S161021650				Octane, 4-ethyl-	15669-66-0	23.76	NGS	120	JNT
S161021650				Unknown-1		24.05	NGS	210	JT
S161021650				Undecane, 2,6-dimethyl-	17201-23-4	25.09	NGS	65	JNT
S161021650				Acetic acid, trifluoro-, 3,7-d	26745-67-5	25.23	NGS	53	JNT
S161021650				Unknown-2		25.83	NGS	48	JT
S161021650				Methanone	100-97-0	26.04	NGS	140	JNT
S161021650				1,2-Benzisothiazole	272-16-2	26.15	NGS	130	JNT
S161021650				Undecane, 2-methyl-	7045-71-8	26.25	NGS	74	JNT
S161021650				Decane, 2,6-dimethyl-	82106-26-3	26.82	NGS	36	JNT

N - Named TIC
 V - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-BLANK
 Customer Sample ID: 16-06172-2-BLANK

Sample	R	AI	QC Type	Units	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR:TCU VQA #2									
S16T021651				Unknown-1		24.05	NGS	35	JQT
S16T021651				Unknown-2		26.44	NGS	39	JQT

N - Named TIC
 Y - Comment
 Q - Qualitative
 J - Estimated
 E - Outside Calibration Range
 T - Tentatively Identified Compound
 NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - ULS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-C1

Customer Sample ID: 16-06172-2-C1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU YOA #2									
S16T021652				Formamide	75-12-7	13.99	NGS	251	JNT
S16T021652				Cyclohexisiloxane, octamethyl	556-67-2	20.20	NGS	230	JNT
S16T021652				Dodecane	112-49-3	22.78	NGS	130	JNT
S16T021652				Decane, 2,4,6-terethyl-	82108-27-4	22.92	NGS	50	JNT
S16T021652				2,6-Dimethyldecane	13150-61-7	23.65	NGS	94	JNT
S16T021652				Octane, 4-ethyl-	15689-06-0	23.75	NGS	79	JNT
S16T021652				Unknown-1		24.05	NGS	290	JT
S16T021652				Undecane, 2,6-di-methyl-	17301-23-4	25.06	NGS	94	JNT
S16T021652				Unknown-2		25.83	NGS	94	JT
S16T021652				Methanesulfinic	100-97-0	26.03	NGS	110	JNT
S16T021652				1,2-Benzothiazole	272-16-2	26.14	NGS	150	JNT
S16T021652				Undecane, 2-methyl-	7045-71-8	26.24	NGS	65	JNT
S16T021652				1,2,3,4,5-Cyclopentaneperoxide	5672-25-9	26.43	NGS	31	JNT
S16T021652				Hexadecane, 2,6,11,15-tetramethyl-	504-44-9	26.80	NGS	34	JNT

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Coeluent

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contaminant
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-D1

Customer Sample ID: 16-06172-2-D1

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TOU VOA #2									
S:161021653				Cyclotrisiloxane, octamethyl	556-67-2	20.20	NGS	140	JNT
S:161021653				Dodecane	112-40-3	22.78	NGS	110	JNT
S:161021653				Decane, 2,4,6-trimethyl-	62108-27-4	22.92	NGS	38	JNT
S:161021653				2,6-Dimethyldecane	13150-81-7	23.65	NGS	79	JNT
S:161021653				Octane, 4-ethyl-	15989-96-0	23.75	NGS	51	JNT
S:161021653				Unknown-1		24.05	NGS	98	JT
S:161021653				1,2-Benzisothiazole	272-16-2	26.15	NGS	60	JNT

NA = Not Analyzed, ND = Not Detected

N - Named TIC

Y - Comment

Q - Qualitative

J - Estimated

E - Outside Calibration Range

T - Tentatively Identified Compound

B - Blank Contamination

L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-E1
 Customer Sample ID: 16-06172-2-E1

Sample	R	M	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021654				Cyclotrisiloxane, octamethyl	656-67-2	20.21	NGS	110	JNT
S16T021654				Dodecane	112-40-3	22.79	NGS	74	JNT
S16T021654				Decane, 2,4,6-trimethyl-	82109-27-4	22.93	NGS	27	JNT
S16T021654				2,6-Dimethyldecane	13150-81-7	23.66	NGS	64	JNT
S16T021654				Octane, 4-ethyl-	15689-86-0	23.76	NGS	45	JNT
S16T021654				Unknown-1		24.06	NGS	170	JT
S16T021654				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	42	JNT
S16T021654				1,2-Benzothiazole	272-16-2	26.16	NGS	89	JNT
S16T021654				Undecane, 2-methyl-	7045-71-8	26.25	NGS	37	JNT

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - ULS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-EFF-BASE
 Customer Sample ID: 16-06172-2-EFF-BASE

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S161021655				Cyclotrisiloxane, octamethyl	555-87-2	20.21	NGS	300	JNT
S161021655				Dodecane	112-40-3	22.79	NGS	100	JNT
S161021655				Decane, 2,4,6-trimethyl-	62106-27-4	22.93	NGS	35	JNT
S161021655				2,6-Dimethyldecane	13150-81-7	23.66	NGS	53	JNT
S161021655				Undecane	112-44-7	23.78	NGS	56	JNT
S161021655				Undecane-1		24.05	NGS	220	JT
S161021655				Undecane, 2,6-dimethyl-	17201-23-4	25.09	NGS	52	JNT
S161021655				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.23	NGS	28	JNT
S161021655				1-Octanol, 3,7-dimethyl-	105-21-8	25.83	NGS	27	JNT
S161021655				1,2-Benzisothiazole	272-16-2	26.15	NGS	77	JNT
S161021655				Undecane, 2-methyl-	7045-71-8	26.25	NGS	31	JNT

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected
 B - Blank Contamination
 L - ILS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143

SDG Number:

Customer Sample ID: 16-06172-2-F1

Customer Sample ID: 16-06172-2-F1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021656				Formamide	75-12-7	14.87	NGS	47	JNT
S16T021656				Cyclohexanone, octamethyl	656-67-2	20.21	NGS	97	JNT
S16T021656				Dodecane	112-40-3	22.79	NGS	64	JNT
S16T021656				Decane, 2,4,6-trimethyl-	82108-27-4	22.93	NGS	24	JNT
S16T021656				2,5-Dimethyldecane	13150-81-7	23.66	NGS	55	JNT
S16T021656				Octane, 4-ethyl-	15669-86-0	23.76	NGS	39	JNT
S16T021656				Unknown-1		24.05	NGS	130	JT
S16T021656				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	38	JNT
S16T021656				1,2-Benzothiazole	272-16-2	26.16	NGS	60	JNT
S16T021656				Undecane, 2-methyl-	7045-71-8	26.25	NGS	30	JNT

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - ILS Outside Range

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-G1

Customer Sample ID: 16-06172-2-G1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021657				Cyclohexisiloxane, octamethyl	556-67-2	23.21	NGS	120	JNT
S16T021657				Dodecane	112-40-3	22.79	NGS	99	JNT
S16T021657				Decane, 2,4,6-trimethyl-	82706-27-4	22.93	NGS	34	JNT
S16T021657				2,6-Dimethyldecane	13150-81-7	23.66	NGS	66	JNT
S16T021657				Octane, 4-ethyl-	15899-96-0	23.76	NGS	35	JNT
S16T021657				Undecane-1		24.05	NGS	130	JT
S16T021657				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	26	JNT
S16T021657				Undecane, 2-methyl-	7045-71-8	25.25	NGS	18	JNT

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-H1

Customer Sample ID: 16-06172-2-H1

Sample	R	AI	OC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S161021656				Cyclohexane, hexaethyl-	541-05-9	16.89	NGS	26	JNT
S161021656				Cyclohexane, octamethyl	556-67-2	20.20	NGS	140	JNT
S161021656				Decane	112-40-3	22.78	NGS	69	JNT
S161021656				Decane, 2,4,8-trimethyl-	62108-27-4	22.92	NGS	24	JNT
S161021656				2,6-Dimethyldecane	13150-81-7	23.66	NGS	47	JNT
S161021656				Octane, 4-ethyl-	15609-96-0	23.75	NGS	29	JNT
S161021656				Unknown-1		24.05	NGS	140	JT
S161021656				Undecane, 2,6-dimethyl-	17301-23-4	25.08	NGS	41	JNT
S161021656				1,2-Benzothiazole	272-16-2	26.15	NGS	52	JNT
S161021656				Undecane, 2-methyl-	7045-71-8	26.24	NGS	20	JNT

N - Normal TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-H2
 Customer Sample ID: 16-06172-2-H2

Sample#	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VDA #2									
S16T021659				Ferrioxide	75-12-7	14.87	NGS	61	JNT
S16T021659				Cyclohexanone, octamethyl	555-67-2	20.21	NGS	89	JNT
S16T021659				Dodecane	112-40-3	22.79	NGS	45	JNT
S16T021659				Decane, 2,4,6-trimethyl-	82108-27-4	22.93	NGS	17	JNT
S16T021659				2,6-Dimethyldecane	13150-81-7	23.66	NGS	38	JNT
S16T021659				Hydroxyarfine, O-decyl-	29812-79-1	23.75	NGS	28	JNT
S16T021659				Undecane-1		24.05	NGS	90	JT
S16T021659				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	38	JNT
S16T021659				1,2-Benzisothiazole	272-16-2	26.16	NGS	30	JNT

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162143
 SDG Number:

Customer Sample ID: 16-06172-2-IN-BASE
 Customer Sample ID: 16-06172-2-IN-BASE

Sample	R	AI	OC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VQA #2									
S16T021690				Hexanal	86-25-1	16.70	NGS	30	JNT
S16T021690				Cyclotetrasiloxane, octamethyl	566-67-2	20.21	NGS	360	JNT
S16T021690				Dodecane	112-40-3	22.78	NGS	110	JNT
S16T021690				Decane, 2,4,6-trimethyl-	92109-27-4	22.93	NGS	39	JNT
S16T021690				2,6-Dimethyldecane	13150-61-7	23.66	NGS	77	JNT
S16T021690				Octane, 4-ethyl-	15869-66-0	23.75	NGS	68	JNT
S16T021690				Unknown-1	-	24.06	NGS	360	JT
S16T021690				Undecane, 2,6-dimethyl-	17301-23-4	25.08	NGS	48	JNT
S16T021690				Acetic acid, trifluoro-, 3,7,4	28745-67-5	25.22	NGS	41	JNT
S16T021690				Unknown-2	-	25.63	NGS	42	JT
S16T021690				1,2-Benzothiazole	272-16-2	26.14	NGS	130	JNT
S16T021690				Undecane, 2-methyl-	7045-71-8	26.24	NGS	61	JNT
S16T021690				1,2,3,4,5-Cyclopentaneperoxide	90772-25-9	26.43	NGS	44	JNT
S16T021690				Decane, 2,6,8-trimethyl-	92109-26-3	26.60	NGS	35	JNT

NA = Not Analyzed, ND = Not Detected

N - Named TIC
 Y - Comment

Q - Qualitative
 J - Estimated

E - Outside Calibration Range
 T - Tentatively Identified Compound

B - Blank Contamination
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-B1
 Customer Sample ID: 16-06173-2-B1

Sample #	R	Av	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RSD %	Spk Rec %	Det Limit	Cal Err %	Qual Flag
S16T021667			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021667			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021667			75-35-4	1,1-Dichloroethane	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021667			107-06-2	1,2-Dichloroethane	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			642-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021667			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021667			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021667			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	UY
S16T021667			11-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	UY
S16T021667			71-23-8	1-Propanol	NGS	79	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	UY
S16T021667			109-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021667			1705-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021667			78-93-3	2-Butanone	NGS	82	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			110-43-0	2-Heptanone	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			691-79-6	2-Hexanone	NGS	94	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021667			634-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			78-94-4	3-Butan-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021667			106-35-4	3-Hexanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			106-66-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021667			105-42-0	4-Methyl-2-pentanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021667			100-10-1	4-Methyl-2-pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			67-64-1	Acetone	NGS	78	4.6	93	n/a	n/a	n/a	n/a	4.3	n/a	UY
S16T021667			75-05-4	Acetonitrile	NGS	65	<1.8	590	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021667			98-86-2	Acetophenone	NGS	90	<2.6	17	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021667			107-13-1	Acetylene	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021667			107-118-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	UY
S16T021667			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021667			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

Y - Certified
 U - Less Than Detection Limit
 L - LLS Outside Range
 N - Named TIC

B - Blank Certification
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

John F. ...
8/25/16

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-B1
 Customer Sample ID: 16-06173-2-B1

Sample #	R	As	CAS #	Analyte	Unit	STD %	Bias	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
S16T021667			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			123-72-8	Benzal	NGS	94	<2.1	3.2	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021667			109-74-0	Butanenitrile	NGS	96	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021667			96-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			67-69-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			110-82-7	Cyclohexane	NGS	87	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021667			64-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	UY
S16T021667			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			110-00-9	Furan	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			110-54-3	Hexane	NGS	90	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021667			828-73-9	Hexamethylenetetramine	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			126-98-7	Methacrylonitrile	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			75-09-2	Methylene Chloride	NGS	94	6.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	UY
S16T021667			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021667			98-95-3	Nitrobenzene	NGS	91	<2.6	7.2	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021667			110-99-9	Pentameride	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			107-12-0	Propionitrile	NGS	90	<1.4	2.8	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021667			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021667			100-42-5	Styrene	NGS	93	<1.6	1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			127-18-4	Tetrachloroethene	NGS	93	<1.6	63	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			109-89-3	Toluene	NGS	91	<1.5	2.3	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			75-69-4	Trichloroethene	NGS	81	<1.6	170	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			10051-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021667			123-88-4	n-Butyl acetate	NGS	94	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

Y - Carrier
 U - Less Than Detection Limit
 L - ILS Outside Range
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 B - Blank Contamination
 J - Estimated
 a - LCS Outside Range
 T - Tentatively Identified Compound
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-B1

Customer Sample ID: 16-06173-2-B1

Sample	R	At	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	spnd %	Sph Rec %	Det Limit	Det Err %	Qual Flags
VAPOR-TOU VOA #2															
S161021697			142-82-5	n-hexane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	U/Y
S161021697			10061-02-8	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	U/Y

Y - Comment
 U - Less Than Detection Limit
 L - ILS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-BLANK
 Customer Sample ID: 16-06173-2-BLANK

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	DetLimit	Chk Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021668			79-34-5	1,1,2,2-Tetrachloroethane	NGS	95	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	Y
S16T021668			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021668			75-35-4	1,1-Dichloroethene	NGS	81	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	Y
S16T021668			107-06-2	1,2-Dichloroethane	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021668			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	QY
S16T021668			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	Y
S16T021668			71-36-3	1-Butanol	NGS	86	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021668			111-70-6	1-Hexanol	NGS	74	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LOY
S16T021668			71-23-8	1-Propanol	NGS	83	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	Y
S16T021668			109-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	Y
S16T021668			1708-29-8	2,5-Dimethylfuran	NGS	90	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	Y
S16T021668			78-60-3	2-Butanone	NGS	84	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Y
S16T021668			110-43-0	2-Hexanone	NGS	86	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			59-1-74-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021668			334-22-5	2-Methylfuran	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Y
S16T021668			78-94-4	3-Butan-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	Y
S16T021668			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			106-83-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	QY
S16T021668			105-42-0	4-Methyl-2-hexanone	NGS	89	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	Y
S16T021668			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Y
S16T021668			87-84-1	Acetone	NGS	71	5.6	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	BY
S16T021668			75-05-8	Acetonitrile	NGS	85	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	Y
S16T021668			98-86-2	Acetophenone	NGS	91	<2.6	7.7	n/a	n/a	n/a	n/a	2.6	n/a	QY
S16T021668			107-13-1	Acrylonitrile	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	Y
S16T021668			107-18-6	Allyl Alcohol	NGS	82	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LY
S16T021668			107-05-1	Allyl Chloride	NGS	85	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Y
S16T021000			71-43-2	Benzene	NGS	92	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y

NA = Not Analyzed, ND = Not Detected
 Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 B - Blank Contamination
 J - Estimated
 8 - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-BLANK
 Customer Sample ID: 16-06173-2-BLANK

Sample	R	At	CAS #	Analyte	Unit	\$10 %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Chk Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021668			100-47-0	Benzonitrile	NGS	92	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	QY
S16T021668			123-72-8	Butanal	NGS	92	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	Y
S16T021668			109-74-0	Butanenitrile	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021668			96-23-5	Carbon tetrachloride	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			75-00-3	Chloroethane	NGS	85	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Y
S16T021668			87-86-3	Chloroform	NGS	95	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			110-82-7	Cyclohexane	NGS	93	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	Y
S16T021668			124-16-5	Decane	NGS	87	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	QY
S16T021668			64-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	Y
S16T021668			41-78-6	Ethyl acetate	NGS	81	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			110-00-9	Furan	NGS	81	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			110-54-3	Hexane	NGS	85	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	Y
S16T021668			628-73-9	Hexanethiol	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			126-98-7	Methacrylonitrile	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			75-09-2	Methylsane Chloride	NGS	89	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	Y
S16T021668			91-20-3	Naphthalene	NGS	90	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	QY
S16T021668			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	QY
S16T021668			110-59-6	Permethrin	NGS	87	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			107-12-0	Propanethiol	NGS	87	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	Y
S16T021668			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	Y
S16T021668			100-42-5	Styrene	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			127-18-4	Tetrachloroethene	NGS	94	<1.6	26	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			109-88-3	Toluene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			79-01-6	Trichloroethene	NGS	91	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			10051-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	Y
S16T021668			123-00-4	n-Butyl acetate	NGS	89	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	Y

NA = Not Analyzed, ND = Not Detected

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-BLANK

Customer Sample ID: 16-06173-2-BLANK

Sample #	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	POD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR:TDU VOA #2															
S16T021668			142-82-6	n-Heptane	NGS	98	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	Y
S16T021668			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 # - LCS Outside Range
 T - Tentatively Identified Compound

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-C1
 Customer Sample ID: 16-06173-2-C1

Cartridge Evaluation
 Data Summary of All Results

Sample	R	At	CAS #	Analyte	Unit	STD %	Bunk	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR:TCU VOA #2															
S16T021669			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021669			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021669			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021669			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021669			942-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021669			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021669			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021669			71-35-3	1-Betanol	NGS	85	<6.9	<6.9	n/a	n/a	n/a	n/a	6.9	n/a	UY
S16T021669			11-70-6	1-Heptanol	NGS	83	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	UY
S16T021669			71-23-8	1-Propanol	NGS	79	<3.0	4.2	n/a	n/a	n/a	n/a	3.0	n/a	UY
S16T021669			109-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021669			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021669			78-90-3	2-Butanone	NGS	82	<1.9	3.0	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021669			110-43-0	2-Heptanone	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021669			981-78-6	2-Hexanone	NGS	94	<1.2	1.4	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021669			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021669			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021669			109-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			109-69-3	3-Octanone	NGS	86	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021669			105-42-0	4-Methyl-2-hexanone	NGS	86	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021669			108-10-1	4-Methyl-2-pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021669			87-64-1	Acetone	NGS	78	4.6	4.0	n/a	n/a	n/a	n/a	4.3	n/a	BELY
S16T021669			75-05-6	Acetonitrile	NGS	85	<1.8	8.0	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021669			98-86-2	Acetophenone	NGS	90	<2.6	2.5	n/a	n/a	n/a	n/a	2.6	n/a	Y
S16T021669			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021669			107-18-6	Allyl Alcohol	NGS	79	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	UY
S16T021669			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021669			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 J - Estimated
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-C1
 Customer Sample ID: 16-06173-2-C1

Sample	R	All	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU VOA #2															
S161021669			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021669			123-72-8	Budanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S161021669			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021669			96-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021669			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021669			75-00-3	Chloroethane	NGS	81	<1.9	2.0	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021669			87-66-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021669			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S161021669			124-18-5	Decane	NGS	92	<2.8	2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S161021669			84-17-5	Ethanol	NGS	79	<7.4	130	n/a	n/a	n/a	n/a	7.4	n/a	UY
S161021669			141-78-5	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021669			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021669			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021669			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021669			628-73-9	Hexaethylsiloxane	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021669			126-98-7	Methylacrylonitrile	NGS	88	<1.6	1.2	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021669			75-09-2	Methylene Chloride	NGS	84	6.7	4.2	n/a	n/a	n/a	n/a	2.7	n/a	UY
S161021669			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S161021669			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S161021669			110-59-8	Perfluorobenzene	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021669			107-12-0	Propanediol	NGS	90	<1.4	5.7	n/a	n/a	n/a	n/a	1.4	n/a	UY
S161021669			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S161021669			100-42-5	Styrene	NGS	93	<1.6	1.7	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021669			127-18-4	Tetrahydrofuran	NGS	93	<1.6	59	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021669			108-86-3	Toluene	NGS	91	<1.5	2.0	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021669			79-01-6	Trichloroethane	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021669			75-69-4	Trichlorofluoromethane	NGS	81	<1.8	240	n/a	n/a	n/a	n/a	1.8	n/a	UY
S161021669			10061-91-5	cis-1,2-Dichloropropene	NGS	81	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021669			123-86-4	m-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

NA = Not Analyzed, ND = Not Detected

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-C1
 Customer Sample ID: 16-06173-2-C1

Sample	R	Alt	CAS #	Acetyls	Unit	STD %	Blank	Resist	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Chk Err %	Qual Flags
VAPOR:TDU VOA #2															
S16T021669			142-92-5	n-Heptane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021669			10051-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-01
 Customer Sample ID: 16-06173-2-01

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Chk Err %	Qual Flags
S16T021670			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021670			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021670			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021670			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021670			942-76-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021670			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021670			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021670			71-35-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	UY
S16T021670			11-70-6	1-Heptanol	NGS	85	<8.6	<8.6	n/a	n/a	n/a	n/a	8.6	n/a	UY
S16T021670			71-23-8	1-Propanol	NGS	79	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	UY
S16T021670			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021670			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021670			79-93-3	2-Butanone	NGS	82	<1.9	2.1	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021670			110-43-0	2-Heptanone	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021670			591-78-6	2-Hexanone	NGS	94	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021670			534-22-5	2-Methylfuran	NGS	90	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021670			73-94-4	3-Butan-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021670			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			105-85-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021670			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021670			108-10-1	4-Methyl-2-pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021670			67-64-1	Acetone	NGS	78	4.6	190	n/a	n/a	n/a	n/a	4.3	n/a	UY
S16T021670			75-05-8	Acetonitrile	NGS	85	<1.8	1.5E+04	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021670			98-86-2	Acetophenone	NGS	90	<2.6	26	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021670			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021670			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	UY
S16T021670			109-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021670			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range
 Q - QuasiActive
 E - Outside Calibration Range
 N - Named TIC
 B - Blank Contamination
 J - Estimated
 a - LCS Outside Range
 T - Tentatively Identified Compound
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-D1
 Customer Sample ID: 16-06173-2-D1

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TOU VOA #2															
S161021670			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021670			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S161021670			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021670			96-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021670			106-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021670			75-09-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021670			87-86-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021670			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S161021670			126-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S161021670			84-17-5	Ethanol	NGS	79	<7.4	110	n/a	n/a	n/a	n/a	7.4	n/a	UY
S161021670			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021670			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021670			110-00-9	Furan	NGS	77	<1.6	<1.8	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021670			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021670			828-73-9	Hexamethylenetriamine	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021670			126-98-7	Methacrylonitrile	NGS	88	<1.6	10	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021670			75-09-2	Methylene Chloride	NGS	84	6.7	7.9	n/a	n/a	n/a	n/a	2.7	n/a	BL,Y
S161021670			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S161021670			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S161021670			110-59-8	Permethrin	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021670			107-12-0	Propenitrile	NGS	90	<1.4	7.6	n/a	n/a	n/a	n/a	1.4	n/a	UY
S161021670			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S161021670			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021670			121-16-4	Tetrachloroethene	NGS	93	<1.6	57	n/a	n/a	n/a	n/a	1.6	n/a	Y
S161021670			106-88-3	Toluene	NGS	91	<1.5	1.9	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021670			79-01-8	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021670			76-59-4	Trichlorofluoromethane	NGS	81	<1.6	120	n/a	n/a	n/a	n/a	1.6	n/a	Y
S161021670			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021670			123-80-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

Y - Correct
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calculation Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-D1
 Customer Sample ID: 16-06173-2-D1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	POD %	Spt Rec %	Det Limit	Crit Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021670			142-82-5	n-Hexadecane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021670			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 B - Blank Contamination
 J - Estimated
 NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-E1
 Customer Sample ID: 16-06173-2-E1

Sample #	R	Net	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TOU VOA #2															
S161021671			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021671			79-00-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021671			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021671			75-35-4	1,1-Dichloroethane	NGS	76	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021671			107-05-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021671			842-75-6	1,3-Dichloropropene (1 oai)	NGS	n/a	n/a	1.5	n/a	n/a	n/a	n/a	1.2	n/a	Y
S161021671			105-45-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S161021671			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021671			71-36-3	1-BuLanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	UY
S161021671			114-70-6	1-Hexanol	NGS	62	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	UY
S161021671			71-23-8	1-Propanol	NGS	79	<3.0	4.9	n/a	n/a	n/a	n/a	3.0	n/a	UY
S161021671			106-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S161021671			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S161021671			78-93-3	2-BuLanone	NGS	62	<1.9	2.2	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021671			110-43-0	2-Hexanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021671			691-76-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021671			334-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021671			78-94-4	3-BuLol-2-one	NGS	63	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021671			106-35-4	3-Hexanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021671			106-65-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S161021671			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021671			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021671			67-64-1	Acetone	NGS	78	4.6	4.0	n/a	n/a	n/a	n/a	4.3	n/a	BELV
S161021671			75-05-8	Acetonitrile	NGS	65	<1.8	5.0	n/a	n/a	n/a	n/a	1.8	n/a	EV
S161021671			98-86-2	Acetophenone	NGS	90	<2.6	12	n/a	n/a	n/a	n/a	2.6	n/a	Y
S161021671			107-13-1	Acrylonitrile	NGS	68	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021671			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	UY
S161021671			107-05-1	Allyl Chloride	NGS	61	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S161021671			71-43-2	Benzene	NGS	90	<1.2	1.4	n/a	n/a	n/a	n/a	1.2	n/a	UY

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound
 B - Blank Contamination
 J - Estimated
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-E1
 Customer Sample ID: 16-06173-2-E1

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021671			100-67-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021671			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021671			108-74-0	Butanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021671			96-23-5	Carbon Tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021671			67-66-3	Chloroform	NGS	93	<1.5	2.0	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021671			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021671			84-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	UY
S16T021671			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			110-00-9	Fluorac	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021671			628-73-9	Hexamethylenetetramine	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			128-98-7	Methacrylonitrile	NGS	88	<1.6	5.3	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			75-09-2	Methylene Chloride	NGS	84	6.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	UY
S16T021671			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021671			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021671			110-59-9	Nitroethane	NGS	89	<1.6	4.3	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			107-12-0	Propylamine	NGS	90	<1.4	1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021671			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021671			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			127-18-4	Tetrachloroethene	NGS	93	<1.6	4.2	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			108-88-3	Toluene	NGS	91	<1.5	1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			79-69-4	Trichlorofluoromethane	NGS	81	<1.6	2.0	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			10061-01-5	cis-1,3-Dichloroacetylene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021671			123-60-4	n-Butyl acetate	NGS	94	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

NA = Not Analyzed, ND = Not Detected

Y - Comment
 U - Less Than Detection Limit
 L - LCS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-E1
 Customer Sample ID: 16-06173-2-E1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	PPD %	Spk Rec %	DW Limit	Chk Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021671			142-82-5	n-Heptane	NGS	66	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UV
S16T021671			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	1.5	n/a	n/a	n/a	n/a	1.2	n/a	UV

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-EFF-BASE
 Customer Sample ID: 16-06173-2-EFF-BASE

Sample	R	At	CAS #	Analyte	Unit	\$10 %	Blank	Result	Duplicate	Average	RPD %	\$pk Rec %	Det Limit	Chk Err %	Qual Flags
VAPOR:TOU VOA #2															
S16T021672			78-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021672			78-00-5	1,1,2-Trichloroethane	NGS	80	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021672			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021672			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			642-75-6	1,3-Dichlorobenzene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021672			109-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021672			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021672			71-36-3	1-Buflanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	UY
S16T021672			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	UY
S16T021672			71-23-8	1-Propanol	NGS	79	<3.0	3.6	n/a	n/a	n/a	n/a	3.0	n/a	UY
S16T021672			109-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021672			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021672			78-93-3	2-Ethanolone	NGS	82	<1.9	2.5	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021672			110-43-0	2-Hexanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			591-78-8	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021672			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021672			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021672			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			106-86-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021672			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021672			108-10-1	4-Methyl-2-pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021672			67-64-1	Acetone	NGS	78	4.6	4.4	n/a	n/a	n/a	n/a	4.3	n/a	UY
S16T021672			75-05-8	Acetonitrile	NGS	85	<1.8	2.90	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021672			86-86-2	Acetophenone	NGS	90	<2.6	9.9	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021672			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021672			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	UY
S16T021672			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021672			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

NA = Not Analyzed, ND = Not Detected
 9 - LCS Outside Range
 T - Tentatively Identified Compound
 B - Blank Certification
 J - Estimated
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 Y - Comment
 U - Less Than Detection Limit
 L - LIS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-EFF-BASE
 Customer Sample ID: 16-06173-2-EFF-BASE

Sample	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cr. Err %	Qual Flags
VAPOR TOU VOA #2															
S16T021672			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021672			123-72-8	Benzal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021672			109-74-0	Butanenitrile	NGS	96	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021672			96-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021672			67-56-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			110-52-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021672			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021672			84-17-5	Ethanol	NGS	78	<7.4	20	n/a	n/a	n/a	n/a	7.4	n/a	UY
S16T021672			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			110-00-9	Furan	NGS	77	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021672			110-04-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021672			828-73-9	Hexanitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			128-98-7	Methacrylonitrile	NGS	89	<1.6	8.0	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			75-09-2	Methylene Chloride	NGS	84	6.7	6.1	n/a	n/a	n/a	n/a	2.7	n/a	BUY
S16T021672			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021672			98-96-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021672			110-59-8	Pentanitrile	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			107-12-0	Propenenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021672			110-85-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021672			100-42-5	Styrene	NGS	99	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			127-18-4	Tetrachloroethane	NGS	99	<1.6	54	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			108-88-3	Toluene	NGS	91	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			75-89-4	Trichloroethenitrile	NGS	81	<1.6	4.5	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021672			123-90-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range
 Q - Qualitative
 E - Outside Calibrator's Range
 N - Named TIC
 B - Blank Contamination
 J - Estimated
 a - LCS Outside Range
 T - Tentatively Identified Compound
 NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-EFF-BASE

Customer Sample ID: 16-06173-2-EFF-BASE

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	POD %	Spk Rec %	DM Limit	Chk Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021672			142-92-5	n-Heptane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021672			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-F1
 Customer Sample ID: 16-06173-2-F1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU VOA #2															
S161021673			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021673			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021673			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021673			75-35-4	1,1-Dichloroethane	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021673			107-05-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021673			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021673			108-49-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S161021673			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021673			71-29-3	1-Benzene	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	UY
S161021673			111-70-6	1-Hexane	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	UY
S161021673			71-23-8	1-Propene	NGS	79	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	UY
S161021673			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S161021673			1700-29-8	2,5-Dimethylhexan	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S161021673			78-83-3	2-Butane	NGS	82	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021673			110-43-0	2-Hexanone	NGS	84	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S161021673			591-78-6	2-Hexanone	NGS	84	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021673			534-22-5	2-Methylhexan	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021673			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021673			106-35-4	3-Hexanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021673			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S161021673			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021673			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021673			87-84-1	Acetone	NGS	78	4.6	560	n/a	n/a	n/a	n/a	4.3	n/a	BELOY
S161021673			75-05-8	Acetonitrile	NGS	85	<1.8	510	n/a	n/a	n/a	n/a	1.8	n/a	EOY
S161021673			98-88-2	Acetophenone	NGS	90	<2.6	7.7	n/a	n/a	n/a	n/a	2.6	n/a	JY
S161021673			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021673			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LOY
S161021673			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	LOY
S161021673			71-43-2	Benzene	NGS	90	<1.2	1.5	n/a	n/a	n/a	n/a	1.2	n/a	JY

NA = Not Analyzed, ND = Not Detected

V - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calculation Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-F1
 Customer Sample ID: 16-06173-2-F1

Sample	R	Air	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021673			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021673			123-72-6	Bubonal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	QUY
S16T021673			109-74-0	Bubrenthle	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	QUY
S16T021673			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	QUY
S16T021673			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	QUY
S16T021673			67-66-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	QUY
S16T021673			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	QUY
S16T021673			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021673			64-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	QUY
S16T021673			141-70-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	QUY
S16T021673			110-54-3	Heptane	NGS	82	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	QUY
S16T021673			628-73-9	Hexamethylo	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	QY
S16T021673			126-99-7	Methylcyclohexane	NGS	88	<1.6	2.3	n/a	n/a	n/a	n/a	1.6	n/a	QY
S16T021673			75-09-2	Methylene Chloride	NGS	84	6.7	2.6	n/a	n/a	n/a	n/a	2.7	n/a	BLQY
S16T021673			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021673			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021673			110-59-8	Perfluorobenzene	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021673			107-12-0	Propene	NGS	90	<1.4	1.2	n/a	n/a	n/a	n/a	1.4	n/a	QY
S16T021673			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	QY
S16T021673			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021673			127-18-4	Tetrachloroethene	NGS	93	<1.6	2.3	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021673			108-89-3	Toluene	NGS	91	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	QY
S16T021673			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	3.0	n/a	n/a	n/a	n/a	1.6	n/a	QY
S16T021673			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	QY
S16T021673			123-90-4	n-Butyl acetate	NGS	94	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

MA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound
 J - Estimated
 B - Blank Contamination
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 Y - Comment
 U - Less Than Detection Limit
 L - LCS Outside Range

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-F1

Customer Sample ID: 16-06173-2-F1

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VADQR-TDU VOA #2															
S16T021673			142-82-5	n-Heptane	MG/S	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	QUY
S16T021673			10051-02-6	Hexa-1,3-Diethynopropene	MG/S	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	QUY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Extrated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-G1
 Customer Sample ID: 16-06173-2-G1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021674			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021674			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021674			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021674			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			542-75-6	1,3-Dichloropropene [Total]	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021674			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021674			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021674			71-36-3	1-Butanediol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	UY
S16T021674			111-70-6	1-Heptanol	NGS	69	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	UY
S16T021674			71-23-8	1-Propanol	NGS	79	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	UY
S16T021674			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021674			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021674			78-93-3	2-Butanone	NGS	82	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			110-43-0	2-Heptanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			991-76-6	2-Methoxy-2-Propanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021674			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021674			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			106-88-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021674			105-42-0	4-Methyl-2-Pentanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021674			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			57-64-1	Acetone	NGS	78	4.6	5.0	n/a	n/a	n/a	n/a	4.3	n/a	BELY
S16T021674			75-05-8	Acetonitrile	NGS	85	<1.8	9.0	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021674			99-86-2	Acetophenone	NGS	96	<2.6	5.8	n/a	n/a	n/a	n/a	2.6	n/a	JY
S16T021674			107-13-1	Acrylonitrile	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021674			107-19-8	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	UY
S16T021674			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021674			71-43-2	Benzene	NGS	96	<1.2	1.3	n/a	n/a	n/a	n/a	1.2	n/a	JY

NA = Not Analyzed, ND = Not Detected
 Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 B - Blank Contamination
 J - Estimated
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-G1
 Customer Sample ID: 16-06173-2-G1

Sample	R	Ac	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	CR Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021674			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			123-72-6	Benzal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021674			109-74-0	Butyraldehyde	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021674			96-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			75-00-3	Chlorobenzene	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			87-66-3	Chloroform	NGS	93	<1.5	2.3	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021674			126-16-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021674			84-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	UY
S16T021674			141-78-8	Ethyl acetate	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			110-54-3	Hexane	NGS	90	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021674			828-73-9	Hexenonitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			126-98-7	Methacrylonitrile	NGS	88	<1.6	2.9	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			75-09-2	Methylene Chloride	NGS	84	6.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	UY
S16T021674			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021674			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021674			110-59-8	Perfluorobenzene	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			107-12-0	Phenanthrene	NGS	90	<1.4	21	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021674			110-96-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021674			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			127-18-4	Tetrachloroethene	NGS	93	<1.6	18	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			108-98-3	Toluene	NGS	91	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			79-01-8	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			75-69-4	Trichloroethene	NGS	81	<1.6	310	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			10051-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021674			123-69-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

NA = Not Analyzed, ND = Not Detected

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-G1

Customer Sample ID: 16-06173-2-G1

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VA-POR-TDU VOA #2															
S161021674			142-82-5	n-Hexane	NCS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S161021674			10061-02-6	trans-1,3-Dichloropropene	NCS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 B - Blank Contamination
 J - Estimated
 NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-H1
 Customer Sample ID: 16-06173-2-H1

Sample#	R	All	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
WAQR-TDU VOA #2															
S16T021675			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021675			79-00-5	1,1,2-Trichloroethane	NGS	83	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021675			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021675			75-36-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021675			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021675			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021675			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021675			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021675			71-36-3	1-Butanol	NGS	83	<8.9	220	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021675			111-70-6	1-Hepanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LY
S16T021675			71-23-8	1-Propanol	NGS	79	<3.0	61	n/a	n/a	n/a	n/a	3.0	n/a	LY
S16T021675			106-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021675			1799-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021675			78-99-3	2-Butanone	NGS	82	<1.9	56	n/a	n/a	n/a	n/a	1.9	n/a	LY
S16T021675			110-43-0	2-Hexanone	NGS	84	<1.6	9.4	n/a	n/a	n/a	n/a	1.6	n/a	LY
S16T021675			591-78-6	2-Methylfuran	NGS	84	<1.2	12	n/a	n/a	n/a	n/a	1.2	n/a	LY
S16T021675			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	LY
S16T021675			78-94-4	3-Butan-2-one	NGS	83	<1.7	6.6	n/a	n/a	n/a	n/a	1.7	n/a	JY
S16T021675			105-35-4	3-Hepanone	NGS	87	<1.5	49	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021675			105-69-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021675			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021675			108-10-1	4-Methyl-2-pentanone	NGS	87	<1.9	2.1	n/a	n/a	n/a	n/a	1.9	n/a	JY
S16T021675			67-64-1	Acetone	NGS	78	4.6	850	n/a	n/a	n/a	n/a	4.3	n/a	BELY
S16T021675			75-05-8	Acetonitrile	NGS	95	<1.8	590	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021675			98-88-2	Acetophenone	NGS	90	<2.6	7.7	n/a	n/a	n/a	n/a	2.6	n/a	JY
S16T021675			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021675			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	UY
S16T021675			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021675			71-43-2	Benzene	NGS	90	<1.2	6.4	n/a	n/a	n/a	n/a	1.2	n/a	JY

NA = Not Analyzed, ND = Not Detected

Y - Comment
 U - Less Than Detection Limit
 L - LIS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-H1
 Customer Sample ID: 16-06173-2-H1

Sample	R	As	CAS #	Acryls	Unit	STD %	Blank	Reult	Duplicate	Average	POD %	Spk Rec %	Det Limit	Chk Err %	Qual Flags
VAOPR-TDU VOA #2															
S161021675			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021675			123-72-8	Butanal	NGS	94	<2.1	13	n/a	n/a	n/a	n/a	2.1	n/a	Y
S161021675			109-74-0	Butanenitrile	NGS	86	<1.2	21	n/a	n/a	n/a	n/a	1.2	n/a	Y
S161021675			56-23-5	Carbon tetrachloride	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021675			109-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021675			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021675			87-88-3	Chloroform	NGS	93	<1.5	3.2	n/a	n/a	n/a	n/a	1.5	n/a	JY
S161021675			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S161021675			124-18-5	Decane	NGS	92	<2.8	2.9	n/a	n/a	n/a	n/a	2.8	n/a	JY
S161021675			84-17-5	Ethanol	NGS	79	<7.4	120	n/a	n/a	n/a	n/a	7.4	n/a	Y
S161021675			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021675			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021675			110-00-9	Furan	NGS	77	<1.6	2.1	n/a	n/a	n/a	n/a	1.6	n/a	JY
S161021675			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021675			828-73-9	Hexanenitrile	NGS	90	<1.5	1.7	n/a	n/a	n/a	n/a	1.5	n/a	JY
S161021675			128-98-7	Methacrylonitrile	NGS	88	<1.6	6.8	n/a	n/a	n/a	n/a	1.6	n/a	JY
S161021675			75-08-2	Methylene Chloride	NGS	84	6.7	6.0	n/a	n/a	n/a	n/a	2.7	n/a	BL Y
S161021675			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S161021675			98-95-3	Nitrobenzene	NGS	91	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S161021675			110-59-8	Permethrin	NGS	89	<1.6	7.5	n/a	n/a	n/a	n/a	1.6	n/a	JY
S161021675			107-12-0	Pyrene	NGS	90	<1.4	31	n/a	n/a	n/a	n/a	1.4	n/a	Y
S161021675			110-96-1	Pyrene	NGS	110	<3.8	5.3	n/a	n/a	n/a	n/a	3.8	n/a	JY
S161021675			100-42-5	Styrene	NGS	93	<1.6	1.7	n/a	n/a	n/a	n/a	1.6	n/a	JY
S161021675			127-18-4	Tetrachloroethene	NGS	93	<1.6	23	n/a	n/a	n/a	n/a	1.6	n/a	Y
S161021675			108-98-3	Toluene	NGS	91	<1.5	4.1	n/a	n/a	n/a	n/a	1.5	n/a	JY
S161021675			79-01-6	Trichloroethane	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021675			76-89-4	Trichlorofluoromethane	NGS	81	<1.6	220	n/a	n/a	n/a	n/a	1.6	n/a	Y
S161021675			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021675			123-98-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

NA = Not Analyzed, ND = Not Detected

Y - Current
 U - Less Than Detection Limit
 L - ILS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-H1
 Customer Sample ID: 16-06173-2-H1

Sample	R	All	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021675			142-82-5	n-Heptane	MG/S	85	<1.4	10	N/A	N/A	N/A	N/A	1.4	N/A	JY
S16T021675			10061-62-6	trans-1,3-Dichloropropene	MG/S	80	<1.2	<1.2	N/A	N/A	N/A	N/A	1.2	N/A	UY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range
 Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC
 B - Blank Certification
 J - Estimated
 NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-H2

Customer Sample ID: 16-06173-2-H2

Sample	R	Air CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Dkt Limit	Cnt Err %	Qual Flags
VAPOR:TDU VOA #2														
S161021676		79-34-5	1,1,2,2-Tetrachloroethane	NCS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021676		79-00-5	1,1,2-Trichloroethane	NCS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021676		75-34-3	1,1-Dichloroethane	NCS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021676		75-36-4	1,4-Dichlorobenzene	NCS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021676		107-06-2	1,2-Dichloroethane	NCS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021676		542-73-6	1,3-Dichloropropene (Total)	NCS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021676		105-46-7	1,4-Dichlorobenzene	NCS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S161021676		123-91-1	1,4-Dioxane	NCS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021676		71-39-3	1-Branol	NCS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	UY
S161021676		111-70-6	1-Propanol	NCS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	UY
S161021676		108-47-4	2,4-Dimethylpyridine	NCS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S161021676		1709-29-8	2,5-Dihydrofuran	NCS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S161021676		78-93-3	2-Butanone	NCS	82	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021676		119-43-0	2-Heptanone	NCS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021676		591-79-6	2-Hexanone	NCS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021676		534-22-5	2-Methylfuran	NCS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021676		78-94-4	3-Buten-2-one	NCS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021676		105-35-4	3-Heptanone	NCS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021676		109-68-3	3-Octanone	NCS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S161021676		105-42-0	4-Methyl-2-Pentanone	NCS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021676		108-10-1	4-Methyl-2-Pentanone	NCS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021676		67-64-1	Acetone	NCS	78	4.6	31.0	n/a	n/a	n/a	n/a	4.3	n/a	UY
S161021676		75-06-8	Acetonitrile	NCS	85	<1.8	1.1E+03	n/a	n/a	n/a	n/a	1.8	n/a	UY
S161021676		88-68-2	Acetophenone	NCS	90	<2.6	8.0	n/a	n/a	n/a	n/a	2.6	n/a	UY
S161021676		107-13-1	Acrylonitrile	NCS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021676		107-18-6	Allyl Alcohol	NCS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	UY
S161021676		107-05-1	Allyl Chloride	NCS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S161021676		71-43-2	Benzene	NCS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

NA = Not Analyzed, ND = Not Detected

Y - Comment
 U - Less Than Detection Limit
 L - LCS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-H2
 Customer Sample ID: 16-06173-2-H2

Sample	R	AE	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	DeLierr	Col Err	Qual Flgs
S161021676			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021676			123-72-8	Benzal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S161021676			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S161021676			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021676			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021676			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S161021676			87-99-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021676			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S161021676			124-18-5	Decane	NGS	92	<2.8	3.0	n/a	n/a	n/a	n/a	2.8	n/a	UY
S161021676			84-17-5	Ethanol	NGS	75	<7.4	159	n/a	n/a	n/a	n/a	7.4	n/a	UY
S161021676			141-78-5	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021676			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021676			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021676			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S161021676			828-73-9	Hexamethide	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021676			128-99-7	Methacrylonitrile	NGS	88	<1.6	3.5	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021676			75-09-2	Methylene Chloride	NGS	84	8.7	4.2	n/a	n/a	n/a	n/a	2.7	n/a	UY
S161021676			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S161021676			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S161021676			110-59-9	Permethrin	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021676			107-12-0	Propenitrile	NGS	90	<1.4	1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S161021676			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S161021676			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021676			127-16-4	Tetrachloroethene	NGS	93	<1.6	1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021676			108-88-3	Toluene	NGS	91	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021676			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S161021676			75-80-4	Trichlorofluoromethane	NGS	81	<1.5	260	n/a	n/a	n/a	n/a	1.6	n/a	UY
S161021676			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S161021676			129-90-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

NA = Not Analyzed, ND = Not Detected

Y - Comment
 U - Less Than Detection Limit
 L - LIS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-H2

Customer Sample ID: 16-06173-2-H2

Sample	R	Ad	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOUR-TOU VOA #2															
S161021676			142-82-5	n-Heptane	MCS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	JY
S161021676			10061-02-6	trans-1,3-Dichloropropene	MCS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	JY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-IN-BASE

Customer Sample ID: 16-06173-2-IN-BASE

Sample	R	All	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPOD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
WAQOR-TDU VOA #2															
S16T021677			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021677			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021677			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021677			107-05-2	1,2-Dichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021677			108-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021677			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021677			71-35-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	UY
S16T021677			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	UY
S16T021677			71-23-8	1-Propanol	NGS	78	<3.0	8.1	n/a	n/a	n/a	n/a	3.0	n/a	UY
S16T021677			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021677			1708-28-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021677			78-93-3	2-Butanone	NGS	82	<1.9	2.7	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021677			110-43-0	2-Heptanone	NGS	84	<1.6	6.2	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			991-78-6	2-Hexanone	NGS	84	<1.2	2.3	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021677			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021677			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021677			106-35-4	3-Heptanone	NGS	87	<1.5	29	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			106-69-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021677			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021677			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021677			67-64-1	Acetone	NGS	78	4.6	41	n/a	n/a	n/a	n/a	4.3	n/a	UY
S16T021677			75-05-8	Acetonitrile	NGS	85	<1.8	150	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021677			96-85-2	Acetophenone	NGS	90	<2.6	14	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021677			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021677			107-16-6	Amyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	UY
S16T021677			107-05-1	Amyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021677			71-43-2	Benzene	NGS	90	<1.2	1.9	n/a	n/a	n/a	n/a	1.2	n/a	UY

NA = Not Analyzed, ND = Not Detected

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

a - LCS Outside Range
 T - Tentatively Identified Compounds

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-IN-BASE
 Customer Sample ID: 16-06173-2-IN-BASE

Sample	R	AI	CAS #	Analyte	Unit	\$10 %	Blank	Result	Duplicates	Average	RPD %	Spk Rec %	DetLimit	Chk Err %	Qual Flags
S16T021677			100-47-0	Benzonitrile	NGS	91	<1.9	<1.5	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021677			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021677			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021677			96-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021677			67-86-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021677			124-16-5	Decane	NGS	92	<2.8	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			94-17-5	Diethyl acetal	NGS	79	<7.4	5.1	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021677			141-76-8	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			110-54-3	Hexane	NGS	80	<1.7	1.9	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021677			628-73-9	Hexamethine	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			126-98-7	Methacrylonitrile	NGS	88	<1.6	3.7	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			75-09-2	Methylene Chloride	NGS	84	6.7	5.3	n/a	n/a	n/a	n/a	2.7	n/a	UY
S16T021677			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021677			98-95-3	Nitrobenzene	NGS	91	<2.6	3.8	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021677			110-56-9	Pentamethyl	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			107-12-0	Propanediol	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021677			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021677			100-42-5	Styrene	NGS	83	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			127-18-4	Tetrachloroethene	NGS	93	<1.6	1.4	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			108-88-3	Toluene	NGS	91	<1.5	5.3	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			73-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	<1.5	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			10061-01-5	cis-1,3-Dioxolopropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021677			123-95-4	n-Butyl acetate	NGS	94	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

NA = Not Analyzed, ND = Not Detected

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-IN-BASE

Customer Sample ID: 16-06173-2-IN-BASE

Sample	R	AS	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Chk Err %	Qual Flags
VAQOR-TDU VOA #2															
S16T021677			142-82-5	n-Hexadecane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021677			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

Y - Comment
 U - Less Than Detection Limit
 L - LLS Outside Range

Q - Qualitative
 E - Outside Calibration Range
 N - Named TIC

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-B1
 Customer Sample ID: 16-06173-2-B1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOUR:TDU VQA #2									
S161021667				Methyl formate	107-31-3	4.81	NGS	48 JNTY	
S161021667				Acetic acid	64-19-7	10.13	NGS	14 JNTY	
S161021667				Formamide	75-12-7	14.28	NGS	110 JNTY	
S161021667				Cyclotrisiloxane, octamethyl	566-67-2	20.48	NGS	55 JNTY	
S161021667				Decane, 3,7-dimethyl	17312-64-8	23.01	NGS	58 JNTY	
S161021667				2,6-Dimethyldecane	13150-81-7	23.14	NGS	25 JNTY	
S161021667				Undecane	1129-21-4	23.74	NGS	31 JNTY	
S161021667				Undecane, 4,7-dimethyl	17301-32-5	23.85	NGS	58 JNTY	
S161021667				Decane, 2,4,6-trimethyl	82108-27-4	23.95	NGS	55 JNTY	
S161021667				Unknown-1		24.28	NGS	110 JTY	
S161021667				Dodecane	112-40-3	25.28	NGS	63 JNTY	
S161021667				1-Octanol, 3,7-dimethyl	106-21-8	25.41	NGS	51 JNTY	
S161021667				Unknown-2		26.01	NGS	83 JTY	
S161021667				Methanamine	100-97-0	26.20	NGS	320 JNTY	
S161021667				Benzothiazole	96-16-8	26.32	NGS	130 JNTY	
S161021667				Dodecane, 4,6-dimethyl	81141-72-8	26.45	NGS	38 JNTY	
S161021667				Dodecane, 2,6,11-trimethyl	31295-90-4	26.57	NGS	7.0 JNTY	
S161021667				Tridecane	829-50-5	26.59	NGS	6.5 JNTY	
S161021667				Tetradecane	829-59-4	27.03	NGS	19 JNTY	
S161021667				Unknown-1		8.27	NGS	50	
S161021667				Unknown-2		24.30	NGS	27	
S161021667				Mercaptosuccinic acid, butyric	8398-62-5	25.10	NGS	30	
S161021667				BLNK		25.32	NGS	52	

Handwritten signature
 8/25/16

Y - Comment
 U - Less Than Detection Limit
 Q - Qualitative
 E - Outside Calibration Range
 B - Blank Contamination
 J - Estimated
 NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-BLANK

Customer Sample ID: 16-06173-2-BLANK

Sample	R	AI	QC Type	Isotype	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR:TOU VOA #2									
S161021668				Cyclohexanone, octamethyl	566-67-2	20.49	NGS	40	JNTY
S161021668				Decane, 2,4,6-trimethyl	82108-27-4	23.01	NGS	21	JNTY
S161021668				Undecane	1120-21-4	23.15	NGS	8.5	JNTY
S161021668				Dodecane	112-40-3	23.85	NGS	16	JNTY
S161021668				Undecanal	112-44-7	23.96	NGS	36	JNTY
S161021668				Undecan-1		24.26	NGS	41	JTY
S161021668				1,2-Benzisothiazole	272-16-2	26.34	NGS	60	JNTY
S161021668				BLANK		6.26	NGS	51	

Y - Comment
 U - Less Than Detection Limit

Q - Qualitative
 E - Outside Calibration Range

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected

a - LCS Outside Range

T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:

Customer Sample ID: 16-06173-2-C1
 Customer Sample ID: 16-06173-2-C1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S161021669				Methyl formate	107-31-3	4.73	NGS	27 JNTY	
S161021669				Unknown-1		8.22	NGS	26 JTY	
S161021669				Formamide	75-12-7	14.03	NGS	33 JNTY	
S161021669				Propanoic acid, 2,2-dimethyl-	75-98-9	16.50	NGS	34 JNTY	
S161021669				Cyclohexanone, hexamethyl-	541-05-9	17.05	NGS	37 JNTY	
S161021669				Cyclohexanone, octamethyl-	556-67-2	20.48	NGS	180 JNTY	
S161021669				3-Ethyl-3-methylheptane	17302-01-1	23.01	NGS	130 JNTY	
S161021669				2,6-Dimethyldecane	131-50-81-7	23.14	NGS	54 JNTY	
S161021669				Hexanoic acid, 2-ethyl-	149-57-5	23.70	NGS	110 JNTY	
S161021669				Undecane	1120-21-4	23.74	NGS	34 JNTY	
S161021669				Undecane, 4,7-dimethyl-	17301-32-5	23.85	NGS	120 JNTY	
S161021669				Decane, 2,4,6-trimethyl-	52108-27-4	23.95	NGS	74 JNTY	
S161021669				Unknown-2		24.28	NGS	280 JTY	
S161021669				Dodecane	112-40-3	25.28	NGS	130 JNTY	
S161021669				1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS	32 JNTY	
S161021669				2-Propanoic acid, octyl ester	2499-59-4	26.01	NGS	47 JNTY	
S161021669				Methanamine	100-97-0	26.21	NGS	120 JNTY	
S161021669				Benzothiazole	95-16-9	26.33	NGS	220 JNTY	
S161021669				Dodecane,4,6-dimethyl	81141-72-8	26.45	NGS	100 JNTY	
S161021669				Dodecane, 2,6,11-trimethyl-	91295-56-4	26.58	NGS	19 JNTY	
S161021669				Tetradecane	829-50-5	26.60	NGS	38 JNTY	
S161021669				Unknown-3		26.66	NGS	48 JTY	
S161021669				Tetradecane	820-09-4	27.04	NGS	55 JNTY	
S161021669				Unknown-1		8.27	NGS	50	
S161021669				Unknown-2		24.30	NGS	27	
S161021669				Mercaptoacetic acid, butyrate	5358-62-5	26.10	NGS	30	
S161021669				BLNK	38145-59-5	25.32	NGS	52	

Y - Comment
 U - Less Than Detection Limit
 Q - Qualitative
 E - Outside Calibration Range
 B - Blank Contaminant
 J - Estimated
 NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-C1

Y - Comment
U - Less Than Detection Limit

Q - Qualitative
E - Outside Calibration Range

B - Blank Contamination
J - Estimated

NA = Not Analyzed, ND = Not Detected
a - LCS Outside Range
T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:
 Customer Sample ID: 16-06173-2-01
 Customer Sample ID: 16-06173-2-01

Sample#	R	AI	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
S161021670				Methyl formate	107-31-3	4.73	NGS	47	JNTY
S161021670				Urethane-1		8.22	NGS	25	BLTY
S161021670				Formamide	75-12-7	14.04	NGS	42	JNTY
S161021670				Propene, 2-methyl-1-nitro-	525-74-1	16.49	NGS	27	JNTY
S161021670				Cyclohexane, hexamethyl-	541-05-9	17.05	NGS	28	JNTY
S161021670				Cyclohexane, octamethyl-	556-67-2	20.49	NGS	140	JNTY
S161021670				3-Ethyl-3-methylpentane	17302-01-1	23.01	NGS	120	JNTY
S161021670				2,6-Dimethyldecane	13150-81-7	23.14	NGS	47	JNTY
S161021670				Hexanoic acid, 2-ethyl-	149-57-5	23.70	NGS	100	JNTY
S161021670				Undecane	1120-21-4	23.74	NGS	25	JNTY
S161021670				Undecane, 4,7-dimethyl-	17301-32-5	23.85	NGS	120	JNTY
S161021670				Dodecane, 2,4,6-trimethyl-	82108-27-4	23.99	NGS	64	JNTY
S161021670				2,3-Dimethyldecane	17312-44-6	24.06	NGS	31	JNTY
S161021670				Unknown-2		24.26	NGS	250	BLTY
S161021670				Dodecane	112-40-3	25.28	NGS	82	JNTY
S161021670				1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS	27	JNTY
S161021670				2-Propenoic acid, octyl ester	2459-59-4	26.02	NGS	38	JNTY
S161021670				Methanamine	100-07-0	26.22	NGS	130	JNTY
S161021670				Benzothiazole	85-16-8	26.34	NGS	210	JNTY
S161021670				Dodecane, 4,6-dimethyl	81141-72-8	26.48	NGS	120	JNTY
S161021670				Dodecane, 2,6,11-trimethyl-	31295-56-4	26.58	NGS	45	JNTY
S161021670				1,2,3,4,5-Cyclopentamethyl-	56772-25-9	26.66	NGS	69	JNTY
S161021670				Unknown-3		26.83	NGS	25	JTY
S161021670				Tetradecane	628-09-4	27.04	NGS	61	JNTY
S161021670				Unknown-1		8.27	NGS	50	
S161021670				Unknown-2		24.30	NGS	27	
S161021670				Mercaptoic acid, butyric	6398-62-5	25.10	NGS	30	

Y - Comment
 U - Less Than Detection Limit
 Q - Qualitative
 E - Outside Calibration Range
 B - Blank Contamination
 J - Extruded
 NA = Not Analyzed, NID = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:

Customer Sample ID: 16-06173-2-D1
 Customer Sample ID: 16-06173-2-D1

Sample	R	AI	QC Type	Sample	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021670			BLNK	1,1,1,3,5,5,7,7-Neosamyl-3	38146-89-5	25.32	MG/S	52	

Y - Comment
 U - Less Than Detection Limit

Q - Qualitative
 E - Outside Calibration Range

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compounds

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-E1

Customer Sample ID: 16-06173-2-E1

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR:TDU VOA #2									
S16T021671				Acetic acid	64-19-7	11.50	NGS	7.8	JNTY
S16T021671				Formamide	75-12-7	14.71	NGS	200	JNTY
S16T021671				Cyclohexanone, octamethyl	556-67-2	20.48	NGS	69	JNTY
S16T021671				2,6-Dimethyldecane	13150-81-7	23.01	NGS	55	JNTY
S16T021671				Undecane	1120-21-4	23.74	NGS	21	JNTY
S16T021671				Undecane, 5,7-dimethyl-	17312-83-3	23.85	NGS	53	JNTY
S16T021671				Decane, 2,4,8-trimethyl-	52108-27-4	23.95	NGS	32	JNTY
S16T021671				Undecane-1	112-40-3	24.28	NGS	150	JTY
S16T021671				Dodecane	100-97-0	25.28	NGS	58	JNTY
S16T021671				Methanamine	65-16-9	26.19	NGS	29	JNTY
S16T021671				Benzothiazole	81-141-72-8	26.30	NGS	130	JNTY
S16T021671				Dodecane, 4,6-dimethyl	18780-79-1	26.43	NGS	45	JNTY
S16T021671				2-Hexyl-1-octanol	58772-25-9	26.55	NGS	32	JNTY
S16T021671				1,2,3,4,5-Cyclopentadienepentol	529-59-4	26.63	NGS	31	JNTY
S16T021671				Tetradecane		27.01	NGS	23	JNTY
S16T021671				Unknown-1		8.27	NGS	50	
S16T021671				Unknown-2		24.30	NGS	27	
S16T021671				Mercaptoacetic acid, butyric	5396-62-5	25.10	NGS	30	
S16T021671				1,1,1,3,5,5,7,7-Nonamethyl-3	28146-59-5	25.32	NGS	52	

Y - Comment
 U - Less Than Detection Limit

Q - Qualitative
 E - Outside Calibration Range

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:

Customer Sample ID: 16-06173-2-EFF-BASE
 Customer Sample ID: 16-06173-2-EFF-BASE

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOC-TDU VOA #2									
S161021672				Methyl tert-butyl	107-31-3	4.72	NGS	18 JNTY	
S161021672				Unknown-1		8.22	NGS	28 BJTY	
S161021672				Cyclotrisiloxane, hexamethyl-	541-05-9	17.06	NGS	28 JNTY	
S161021672				Cyclotrisiloxane, octamethyl-	556-67-2	20.48	NGS	150 JNTY	
S161021672				3-Ethyl-3-methylheptane	17302-01-1	23.01	NGS	78 JNTY	
S161021672				2,6-Dimethyldecane	13150-81-7	23.14	NGS	33 JNTY	
S161021672				Undecane	1120-21-4	23.74	NGS	19 JNTY	
S161021672				Undecane, 5,7-dimethyl-	17312-83-3	23.85	NGS	54 JNTY	
S161021672				Decane, 2,4,6-trimethyl-	82108-27-4	23.95	NGS	50 JNTY	
S161021672				Undecane-2		24.26	NGS	180 JTY	
S161021672				Dodecane	112-40-3	25.28	NGS	47 JNTY	
S161021672				2-Propenoic acid, octyl ester	2499-59-4	25.41	NGS	29 JNTY	
S161021672				Undecane-3		26.02	NGS	31 JTY	
S161021672				Methenamine	100-97-0	26.21	NGS	79 JNTY	
S161021672				Benzothiazole	95-18-9	26.34	NGS	97 JNTY	
S161021672				Dodecane,4,6-dimethyl	81141-72-8	26.46	NGS	40 JNTY	
S161021672				Tetradecane	629-59-4	27.04	NGS	22 JNTY	
S161021672				Unknown-1		8.27	NGS	50	
S161021672				Unknown-2		24.50	NGS	27	
S161021672				Mercaptosuccinic acid, butylene	3368-62-5	25.10	NGS	30	
S161021672				BLNK		25.32	NGS	52	

Y - Comment
 U - Less Than Detection Limit

Q - Qualitative
 E - Outside Calibration Range

B - Blank Certification
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:

Customer Sample ID: 16-06173-2-F1
 Customer Sample ID: 16-06173-2-F1

Sample	R	MI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021673				Methyl formate	107-31-3	4.84	NGS	38	JNTY
S16T021673				Ethylene Glycol	107-21-1	14.36	NGS	29	JNTY
S16T021673				Formamide	75-12-7	14.55	NGS	5+0	JNTY
S16T021673				Decane, 3,7-dimethyl-	17312-54-8	23.00	NGS	25	JNTY
S16T021673				Undecane	1120-21-4	23.74	NGS	24	JNTY
S16T021673				2,6-Dimethyldecane	13150-81-7	23.85	NGS	30	JNTY
S16T021673				Decane, 2,4,6-trimethyl-	82108-27-4	23.95	NGS	24	JNTY
S16T021673				Undecan-1		24.25	NGS	68	BJTY
S16T021673				Dodecane	112-40-3	25.28	NGS	47	JNTY
S16T021673				Methanamine	100-87-0	26.22	NGS	320	JNTY
S16T021673				Benzothiazole	95-16-9	26.33	NGS	71	JNTY
S16T021673				Dodecane,4,6-dimethyl	51141-72-8	26.46	NGS	16	JNTY
S16T021673				Tetradecane	929-59-4	27.04	NGS	9.7	JNTY
S16T021673				Unknown-1		8.27	NGS	50	
S16T021673				Unknown-2		24.30	NGS	27	
S16T021673				BLNK		25.10	NGS	30	
S16T021673				BLNK		25.32	NGS	52	
S16T021673				BLNK		38146-89-5	NGS		

Y - Cement
 U - Less Than Detection Limit

Q - Qualitative
 E - Outside Calibration Range

B - Blank Contamination
 J - Extraxed

NA = Not Analyzed, NID = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:

Customer Sample ID: 16-06173-2-G1
 Customer Sample ID: 16-06173-2-G1

Sample#	R	Alt	QC Type	Analysis	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flag
VAPOR-TDU VOA #2									
S161021674				Methyl formate	107-31-3	4.82	NGS	73 JNTY	
S161021674				Ethylene Glycol	107-21-1	14.32	NGS	15 JNTY	
S161021674				Formamide	75-12-7	14.46	NGS	99 JNTY	
S161021674				Cyclohexanone, octamethyl	556-67-2	20.48	NGS	100 JNTY	
S161021674				3-Ethyl-3-oxoheptane	17302-01-1	23.01	NGS	100 JNTY	
S161021674				2,6-Dimethyldecane	13150-81-7	23.14	NGS	42 JNTY	
S161021674				Undecane	1120-21-4	23.74	NGS	21 JNTY	
S161021674				Undecane, 4,7-dimethyl-	17301-32-5	23.85	NGS	70 JNTY	
S161021674				Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	46 JNTY	
S161021674				Unknown-1		24.26	NGS	130 BTTY	
S161021674				Undecane, 3-methyl-	1092-43-3	24.90	NGS	8.0 JNTY	
S161021674				Dodecane	112-40-3	25.26	NGS	39 JNTY	
S161021674				Methanone	100-97-0	26.22	NGS	47 JNTY	
S161021674				Benzothiazole	95-16-9	26.34	NGS	27 JNTY	
S161021674				Dodecane 4,8-dimethyl	81141-72-8	26.47	NGS	27 JNTY	
S161021674				Tetradecane	820-59-4	27.04	NGS	15 JNTY	
S161021674				Unknown-1		8.27	NGS	50	
S161021674				BLNK		24.30	NGS	27	
S161021674				Mercaptoacetic acid, butyric	5398-62-5	25.10	NGS	30	
S161021674				BLNK		25.32	NGS	52	

Y - Comment
 U - Less Than Detection Limit

Q - Qualitative
 E - Outside Calibration Range

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:

Customer Sample ID: 16-06173-2-H1
 Customer Sample ID: 16-06173-2-H1

Sample	R	Adj	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S161021675				Methyl formate	107-31-3	4.71	NGS	37	JNTY
S161021675				4-Methyl-1-pentene	98398-09-9	7.15	NGS	28	JNTY
S161021675				Unknown-1		8.32	NGS	60	BJTY
S161021675				Tetrahydrofuran	109-99-9	11.96	NGS	5.8	JNTY
S161021675				Ethylene Glycol	107-21-1	14.62	NGS	160	JNTY
S161021675				Formamide	75-12-7	14.74	NGS	82	JNTY
S161021675				Neopentane	463-82-1	15.75	NGS	33	JNTY
S161021675				Acetonitrile, hydroxy-	107-16-4	16.31	NGS	31	JNTY
S161021675				Cyclohexanone, octamethyl	556-67-2	20.48	NGS	130	JNTY
S161021675				2,6-Dimethyldecane	13150-81-7	23.01	NGS	51	JNTY
S161021675				Undecane	1129-21-4	23.74	NGS	22	JNTY
S161021675				Undecane, 5,7-dimethyl-	17312-83-3	23.85	NGS	35	JNTY
S161021675				Decane, 2,4,6-trimethyl-	82109-27-4	23.95	NGS	36	JNTY
S161021675				Unknown-2		24.28	NGS	120	BJTY
S161021675				Dodecane	112-40-3	25.28	NGS	42	JNTY
S161021675				2-Propenoic acid, octyl ester	2499-59-4	26.01	NGS	29	JNTY
S161021675				Benzothiazole	95-16-9	26.33	NGS	73	JNTY
S161021675				Dodecane, 4,6-dimethyl	91141-72-8	26.45	NGS	15	JNTY
S161021675				Tetradecane	829-50-5	26.90	NGS	13	JNTY
S161021675				Tetradecane	829-59-4	27.04	NGS	6.5	JNTY
S161021675				Unknown-1		8.27	NGS	50	
S161021675				Unknown-2		24.30	NGS	27	
S161021675				Mercaptosuccinic acid, beta:gamma	5396-62-5	25.10	NGS	30	
S161021675				BLNK					
S161021675				BLNK					
S161021675				BLNK					
S161021675				1,1,1,3,5,5,7,7-Nonamethyl-3	38149-99-5	25.32	NGS	52	

Y - Comment
 U - Less Than Detection Limit

Q - Qualitative
 E - Outside Calibration Range

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:

Customer Sample ID: 16-06173-2-H2
 Customer Sample ID: 16-06173-2-H2

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021676				Methyl formate	107-31-3	4.72	NGS	53 JNTY	
S16T021676				Unknown-2		8.32	NGS	74 BJTY	
S16T021676				Formaldehyde	75-12-7	14.32	NGS	110 JNTY	
S16T021676				Cyclohexanonane, octanemethyl	556-67-2	20.48	NGS	82 JNTY	
S16T021676				3-Ethyl-3-methylheptane	17302-01-1	23.00	NGS	48 JNTY	
S16T021676				Undecane	1120-21-4	23.74	NGS	21 JNTY	
S16T021676				Decane, 3,7-dimethyl-	17312-64-8	23.86	NGS	38 JNTY	
S16T021676				Decane, 2,4,6-trimethyl-	62109-27-4	23.95	NGS	27 JNTY	
S16T021676				Unknown-1		24.26	NGS	110 JTY	
S16T021676				Dodecane	112-40-3	25.28	NGS	39 JNTY	
S16T021676				2-Propenoic acid, octyl ester	2499-59-4	26.01	NGS	39 JNTY	
S16T021676				Methanamine	100-97-0	26.20	NGS	260 JNTY	
S16T021676				Benzothiazole	95-16-9	26.32	NGS	75 JNTY	
S16T021676				Dodecane, 4,6-dimethyl	61141-72-8	26.45	NGS	22 JNTY	
S16T021676				Dodecane, 2,6,11-trimethyl-	31295-58-4	26.60	NGS	24 JNTY	
S16T021676				Tetradecane	629-59-4	27.03	NGS	11 JNTY	
S16T021676				Unknown-1		8.27	NGS	50	
S16T021676				Unknown-2		24.30	NGS	27	
S16T021676				Mercaptosuccinic acid, butyrimine	6258-62-6	25.10	NGS	30	
S16T021676				BLNK					
S16T021676				BLNK					
S16T021676				1,1,1,3,3,5,7,7,7-Nonamethyl-3	36146-99-5	25.32	NGS	52	

Y - Correct
 U - Less Than Detection Limit

Q - Qualitative
 E - Outside Calibration Range

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162144
 SDG Number:

Customer Sample ID: 16-06173-2-IN-BASE
 Customer Sample ID: 16-06173-2-IN-BASE

Sample#	RI	AI	GC Type	Analysis	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S161021677				Unknown-1		8.22	NGS	51 JTY	
S161021677				Acetic acid	64-19-7	9.48	NGS	20 JNTY	
S161021677				Ethylene Glycol	107-21-1	14.10	NGS	11E+03 JNTY	
S161021677				Cyclohexanone, hexamethyl-	541-05-9	17.05	NGS	31 JNTY	
S161021677				Cyclohexanone, octamethyl-	556-67-2	20.48	NGS	210 JNTY	
S161021677				3-Ethyl-3-methylheptane	17302-01-1	23.01	NGS	98 JNTY	
S161021677				2,6-Dimethyldecane	13150-61-7	23.14	NGS	39 JNTY	
S161021677				Hexanoic acid, 2-ethyl-	149-57-5	23.70	NGS	55 JNTY	
S161021677				Undecane	1120-21-4	23.74	NGS	21 JNTY	
S161021677				Undecane, 4,7-dimethyl-	17301-32-5	23.85	NGS	74 JNTY	
S161021677				Decane, 2,4,6-trimethyl-	92109-27-4	23.95	NGS	70 JNTY	
S161021677				Unknown-2		24.26	NGS	280 JTY	
S161021677				Dodecane	112-40-3	25.28	NGS	44 JNTY	
S161021677				1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS	43 JNTY	
S161021677				2-Propenoic acid, octyl ester	2489-59-4	26.01	NGS	50 JNTY	
S161021677				Methanone	100-97-0	26.20	NGS	150 JNTY	
S161021677				Benzothiazole	95-16-9	26.32	NGS	150 JNTY	
S161021677				Dodecane, 4,8-dimethyl	61141-72-0	26.45	NGS	60 JNTY	
S161021677				Stane, tetramethyl-	75-76-3	26.65	NGS	34 JNTY	
S161021677				Tetradecane	528-59-4	27.03	NGS	25 JNTY	
S161021677				Unknown-1		8.27	NGS	50	
S161021677				Unknown-2		24.30	NGS	27	
S161021677				Methyloctanoic acid, butyl ester	6398-62-5	25.10	NGS	30	
S161021677				BLNK		25.32	NGS	52	

Y - Comment
 U - Less Than Detection Limit

Q - Qualitative
 E - Outside Calibration Range

B - Blank Contamination
 J - Estimated

NA = Not Analyzed, ND = Not Detected
 a - LCS Outside Range
 T - Tentatively Identified Compound

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139

SDG Number:

Customer Sample ID: 16-06172-3-A1

Customer Sample ID: 16-06172-3-A1

Sample	R	Alt	CAS #	Analyte	Unit	\$10 %	Blank	Result	Duplicates	Average	RPO %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021567			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	0.46	n/a	n/a	n/a	n/a	0.18	n/a	J
S161021567			1706-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021567			626-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021567			9777-71-7	2-Hexylfuran	NGS	92	<0.27	0.44	n/a	n/a	n/a	n/a	0.27	n/a	J
S161021567			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021567			3777-69-3	2-Pentylfuran	NGS	89	<0.34	0.44	n/a	n/a	n/a	n/a	0.34	n/a	J
S161021567			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021567			110-00-9	Furan	NGS	73	<0.090	0.30	n/a	n/a	n/a	n/a	0.090	n/a	J
S161021567			109-99-9	Tetrahydrofuran	NGS	91	<0.10	12	n/a	n/a	n/a	n/a	0.10	n/a	

John Dwyer
 8/24/16

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-A2
 Customer Sample ID: 16-08172-3-A2

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spot Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021588			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021588			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021588			825-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021588			3777-71-7	2-Hexylfuran	NGS	92	<0.27	0.34	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021588			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021588			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021588			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021588			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021588			109-99-9	Tetrahydrofuran	NGS	91	<0.10	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-B1
 Customer Sample ID: 16-06172-3-B1

Sample #	R	All	CAS #	Analyte	Unit	STD %	Bunk	Result	Duplicate	Average	POD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021569			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021569			1706-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021569			625-86-6	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021569			3777-71-7	2-Hopylfuran	NGS	92	<0.27	0.36	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021569			534-22-6	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021569			3777-69-3	2-Pentylfuran	NGS	89	<0.34	0.39	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021569			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021569			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021569			109-99-9	Tetrahydrofuran	NGS	91	<0.10	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-BLANK
 Customer Sample ID: 16-06172-3-BLANK

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	POD %	Spk Rec %	Det Limit	Est Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021590			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021590			1706-29-8	2,6-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021590			825-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021590			3777-71-7	2-Hexylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021590			934-22-5	2-Aethylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021590			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021590			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021590			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021590			109-99-9	Tetrahydrofuran	NGS	91	<0.10	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-C1
 Customer Sample ID: 16-06172-3-C1

Sample#	R	Alt	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	ppm %	Spk Rec %	DW Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021591			1191-89-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	J
S16T021591			1709-29-6	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021591			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	J
S16T021591			3777-71-7	2-Hexylfuran	NGS	92	<0.27	0.29	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021591			634-23-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021591			3777-89-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021591			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	J
S16T021591			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021591			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.12	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139

SDG Number:

Customer Sample ID: 16-06172-3-D1

Customer Sample ID: 16-06172-3-D1

Sample #	R	Alt	CAS #	Aclyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021592			1191-89-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021592			1708-28-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021592			825-96-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021592			3777-71-7	2-Methylfuran	NGS	92	<0.27	0.35	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021592			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021592			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021592			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021592			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021592			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.31	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detectable Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139

SDG Number:

Customer Sample ID: 16-06172-3-E1

Customer Sample ID: 16-06172-3-E1

Sample	R	All	CAS#	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Chk Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021593			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S161021593			1709-29-8	2,5-Dihydrofuran	NGS	90	<0.23	0.26	n/a	n/a	n/a	n/a	0.23	n/a	J
S161021593			625-80-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021593			3777-71-7	2-Hydrofuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S161021593			534-22-5	2-Methylfuran	NGS	83	<0.23	0.27	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021593			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S161021593			4229-81-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021593			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S161021593			109-99-9	Tetrahydrofuran	NGS	91	<0.10	1.0	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-EFF-BAS
 Customer Sample ID: 16-06172-3-EFF-BAS

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021594			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021594			1709-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021594			625-88-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021594			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021594			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021594			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021594			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021594			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021594			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.16	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-F1
 Customer Sample ID: 16-06172-3-F1

Sample	R	At	Gas #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021595			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021595			1706-29-6	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021595			825-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021595			3777-71-7	2-Hepitylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021595			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021595			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021595			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021595			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021595			109-99-9	Tetrahydrofuran	NGS	91	<0.10	2.4	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-G1
 Customer Sample ID: 16-06172-3-G1

Sample	R	Ac	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021596			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.16	<0.16	n/a	n/a	n/a	n/a	0.16	n/a	U
S16T021596			1708-28-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021596			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021596			377-71-7	2-Isopropylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021596			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021596			377-68-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021596			4228-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021596			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021596			108-99-9	Tetrahydrofuran	NGS	91	<0.10	3.0	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-H1
 Customer Sample ID: 16-06172-3-H1

Sample	R	AS	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	POD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021597			1191-99-7	2,3-Dihydrofuran	NGS	90	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021597			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021597			625-80-5	2,5-Dimethylfuran	NGS	86	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021597			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021597			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021597			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021597			4228-91-8	2-Propylfuran	NGS	87	<0.44	0.58	n/a	n/a	n/a	n/a	0.44	n/a	J
S16T021597			110-00-9	Furan	NGS	73	<0.090	0.38	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021597			109-89-9	Tetrahydrofuran	NGS	91	<0.10	18	n/a	n/a	n/a	n/a	0.10	n/a	

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-H2
 Customer Sample ID: 16-06172-3-H2

Sample#	R	Air	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Chi Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021598			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021598			1708-29-6	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021598			825-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021598			3777-71-7	2-Hexylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021598			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021598			3777-89-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021598			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021598			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021598			109-99-9	Tetrahydrofuran	NGS	91	<0.10	3.5	n/a	n/a	n/a	n/a	0.10	n/a	

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162139
 SDG Number:
 Customer Sample ID: 16-06172-3-IN-BASE
 Customer Sample ID: 16-06172-3-IN-BASE

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021599			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021599			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021599			625-90-5	2,5-Dimethylfuran	NGS	86	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021599			3777-71-7	2-Hexylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021599			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021599			3777-69-3	2-Pentylfuran	NGS	86	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021599			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021599			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021599			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.15	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-A1
 Customer Sample ID: 16-06173-3-A1

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Crit Err %	Qual Flag
Furans in Vapor Samples by SIM															
S16T021603			1191-99-7	2,3-Dihydrofuran	NGS	90	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021603			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021603			825-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021603			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.35	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021603			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021603			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021603			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021603			110-00-9	Furan	NGS	73	<0.090	0.37	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021603			109-99-9	Tetrahydrofuran	NGS	91	<0.10	9.3	n/a	n/a	n/a	n/a	0.10	n/a	

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-A2
 Customer Sample ID: 16-06173-3-A2

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021607			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S161021607			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021607			625-89-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021607			377-71-7	2-Hexylfuran	NGS	92	<0.27	0.28	n/a	n/a	n/a	n/a	0.27	n/a	J
S161021607			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021607			377-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S161021607			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021607			110-00-9	Furan	NGS	73	<0.090	0.10	n/a	n/a	n/a	n/a	0.090	n/a	J
S161021607			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.12	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-B1
 Customer Sample ID: 16-06173-3-B1

Sample	R	AV	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021608			1191-99-7	2,3-Dihydrofuran	NGCS	90	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S161021608			1708-29-8	2,5-Dihydrofuran	NGCS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021608			825-95-5	2,5-Dimethylfuran	NGCS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021608			3777-71-7	2-Methylfuran	NGCS	92	<0.27	0.37	n/a	n/a	n/a	n/a	0.27	n/a	J
S161021608			534-22-5	2-Methylfuran	NGCS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021608			3777-69-3	2-Pentylfuran	NGCS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S161021608			4229-91-8	2-Propylfuran	NGCS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021608			110-00-9	Furan	NGCS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S161021608			109-99-9	Tetrahydrofuran	NGCS	91	<0.10	0.23	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

N/A = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140

SDG Number:

Customer Sample ID: 16-06173-3-BLANK

Customer Sample ID: 16-06173-3-BLANK

Sample #	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Det Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021609			1191-99-7	2,3-Dihydrofuran	NGS	82	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S161021609			1708-26-8	2,5-Dihydrofuran	NGS	96	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021609			625-95-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021609			377-71-7	2-Methylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S161021609			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021609			377-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S161021609			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021609			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S161021609			109-99-9	Tetrahydrofuran	NGS	91	<0.10	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-C1
 Customer Sample ID: 16-06173-3-C1

Sample	R	Alt	CAS #	Analyte	Unit	STO %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021610			1191-89-7	2,3-Dihydrofuran	NCS	90	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S161021610			1709-29-8	2,5-Dihydrofuran	NCS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021610			625-86-5	2,5-Dimethylfuran	NCS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021610			3777-71-7	2-Hexylfuran	NCS	92	<0.27	0.47	n/a	n/a	n/a	n/a	0.27	n/a	J
S161021610			534-22-5	2-Methylfuran	NCS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	J
S161021610			3777-69-3	2-Pentylfuran	NCS	89	<0.34	0.35	n/a	n/a	n/a	n/a	0.34	n/a	J
S161021610			4229-91-8	2-Propylfuran	NCS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021610			110-00-9	Furan	NCS	73	<0.090	0.090	n/a	n/a	n/a	n/a	0.090	n/a	J
S161021610			109-99-9	Tetrahydrofuran	NCS	91	<0.10	0.24	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-D1
 Customer Sample ID: 16-06173-3-D1

Sample	R	All CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Det Err %	Qual Flags
Furans in Vaper Samples by SIM														
S16T021611		1181-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021611		1708-28-8	2,5-Dihydrofuran	NGS	90	<0.23	0.39	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021611		625-96-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021611		377-71-7	2-Heptylfuran	NGS	92	<0.27	0.44	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021611		534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021611		377-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021611		4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021611		110-00-9	Furan	NGS	73	<0.090	0.10	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021611		109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.24	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-E1
 Customer Sample ID: 16-06173-3-E1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Chk Limit	Chk Err %	Qual Flags
Furans in Vaper Samples by SIM															
S16T021612			1181-99-7	2,3-Dihydrofuran	NGS	80	<0.18	0.27	n/a	n/a	n/a	n/a	0.18	n/a	J
S16T021612			1708-28-8	2,5-Dihydrofuran	NGS	96	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021612			635-98-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021612			377-71-7	2-Hydrofuran	NGS	92	<0.27	0.29	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021612			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021612			377-69-3	2-Pentylfuran	NGS	89	<0.34	0.57	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021612			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021612			110-00-9	Furan	NGS	73	<0.090	0.11	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021612			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.75	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-EFF-BASE
 Customer Sample ID: 16-06173-3-EFF-BASE

Sample	R	All	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cre Err %	Qual Flags
Furans in Vaper Samples by SIM															
S161021613			1181-98-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S161021613			1708-28-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021613			625-80-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021613			3777-71-7	2-Hepylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S161021613			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021613			3777-69-3	2-Pentylfuran	NGS	89	<0.34	0.39	n/a	n/a	n/a	n/a	0.34	n/a	U
S161021613			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021613			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S161021613			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.14	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140

SDG Number:

Customer Sample ID: 16-06173-3-F1

Customer Sample ID: 16-06173-3-F1

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021614			1181-96-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.16	n/a	U
S16T021614			1708-28-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021614			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021614			377-71-7	2-Methylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021614			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021614			377-68-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021614			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021614			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021614			109-99-9	Tetrahydrofuran	NGS	91	<0.10	1.3	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-G1
 Customer Sample ID: 16-06173-3-G1

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021615			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.16	<0.16	n/a	n/a	n/a	n/a	0.16	n/a	U
S161021615			1799-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021615			625-89-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021615			3777-71-7	2-Hexylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S161021615			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021615			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S161021615			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021615			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S161021615			109-99-9	Tetrahydrofuran	NGS	91	<0.10	1.7	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-H1
 Customer Sample ID: 16-06173-3-H1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021616			1191-99-7	2,3-Dihydrofuran	NCS	80	<0.16	0.22	n/a	n/a	n/a	n/a	0.19	n/a	J
S16T021616			1708-29-8	2,5-Dihydrofuran	NCS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021616			625-86-5	2,5-Dimethylfuran	NCS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021616			377-71-7	2-Hydrofuran	NCS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021616			534-22-5	2-Methylfuran	NCS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021616			377-69-3	2-Pentylfuran	NCS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021616			4229-91-8	2-Propylfuran	NCS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021616			110-00-9	Furan	NCS	73	<0.090	0.51	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021616			109-99-9	Tetrahydrofuran	NCS	91	<0.10	13	n/a	n/a	n/a	n/a	0.10	n/a	

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140
 SDG Number:
 Customer Sample ID: 16-06173-3-H2
 Customer Sample ID: 16-06173-3-H2

Sample	RI	Alt CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	Repd %	Spk Rec %	Dkt Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM														
S161021617		1181-98-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S161021617		1798-28-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021617		625-80-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021617		3772-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S161021617		534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021617		3772-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S161021617		4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021617		110-00-9	Furan	NGS	72	<0.090	0.14	n/a	n/a	n/a	n/a	0.090	n/a	U
S161021617		109-99-9	Tetrahydrofuran	NGS	91	<0.10	2.3	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
 Data Summary of All Results

Sample Group: 20162140

SDG Number:

Customer Sample ID: 16-06173-3-IN-BASE

Customer Sample ID: 16-06173-3-IN-BASE

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Det Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021618			1191-99-7	2,3-Dihydrofuran	MGCS	90	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S161021618			1708-29-8	2,5-Dihydrofuran	MGCS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021618			829-96-5	2,5-Dimethylfuran	MGCS	86	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S161021618			377-71-7	2-Methylfuran	MGCS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S161021618			534-22-5	2-Methylfuran	MGCS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S161021618			377-69-3	2-Pentylfuran	MGCS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S161021618			4229-91-8	2-Picoylfuran	MGCS	87	<0.44	0.50	n/a	n/a	n/a	n/a	0.44	n/a	U
S161021618			110-00-9	Furan	MGCS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S161021618			109-99-9	Tetrahydrofuran	MGCS	91	<0.10	0.24	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected



ANALYTICAL REPORT

Report Date: August 02, 2016

Robert (Buddy) Sosa
Washington River Protection So
PO Box 850, MSIN T6-02
Richland, WA 99352

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162152

Workorder: 34-1620981

Client Project ID: Washington River Protection So

Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m³), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m³), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m³), Result (ppm), RL (ug/sample). Rows include Dimethylamine and Ethylamine with results <0.10.

Results Continued on Next Page

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 266 9992
ALS GROUP USA, CORP. An ALS Limited Company



www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER



ANALYTICAL REPORT

Workorder: 34-1620981
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Row 1: Methylamine, <0.10, NA, NA, 0.10

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows: Dimethylamine, Ethylamine, Methylamine

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows: Dimethylamine, Ethylamine, Methylamine

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows: Dimethylamine, Ethylamine, Methylamine



ANALYTICAL REPORT

Workorder: 34-1620981
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.



ANALYTICAL REPORT

Workorder: 34-1620981
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with values like <0.10, 0.10, 0.36.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with values like <0.10, <0.10, <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with values like <0.10, <0.10, <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with values like <0.10, <0.10, <0.10.



ANALYTICAL REPORT

Workorder: 34-1620981
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, Methylamine with results <0.10.



ANALYTICAL REPORT

Workorder: 34-1620981
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.



ANALYTICAL REPORT

Workorder: 34-1620981
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Dimethylamine, Ethylamine, and Methylamine with results <0.10.



ANALYTICAL REPORT

Workorder: **34-1620981**
 Client Project ID: Washington River Protection
 So
 Purchase Order: 55502 Rel9
 Project Manager: Rand Potter

Report Authorization (eS/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
Amines-VOA Aliphatic VAA-1	/s/ David Teynor 08/02/2016 15:19	/s/ Thomas Bosch 08/02/2016 16:09

Laboratory Contact Information

ALS Environmental
 960 W Levo Drive
 Salt Lake City, Utah 84123

Phone: (801) 266-7700
 Email: alst.lab@ALSGlobal.com
 Web: www.alslc.com

General Lab Comments

The results provided in this report relate only to the items tested.
 Samples were received in acceptable condition unless otherwise noted.
 Samples have not been blank corrected unless otherwise noted.
 This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	AClass (DoD ELAP)	ADE-1420	http://www.aiclasscorp.com
	Utah (NELAC)	DATA 1	http://health.utah.gov/lab/bim/p/
	Nevada	UT00009	http://ndep.nv.gov/bsdvlabservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDeval/
	Iowa	IA# 376	http://www.iowadnr.gov/inside/DNR/Regulatory/Water.aspx
	Florida (TNI)	E871067	http://www.dep.state.fl.us/labs/bars/sas/qa/
	Texas (TNI)	T 104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing			
CPSC	AClass (ISO 17025, CPSC)	ADE-1420	http://www.aiclasscorp.com
Soil, Dust, Point Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	AClass (ISO 17025)	ADE-1420	http://www.aiclasscorp.com



ANALYTICAL REPORT

Workorder: **34-1620981**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
NA = Not Applicable.
* No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
() This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ALS Environmental certifies this analytical report is in compliance with the Hanford SOW, both technically and for completeness. Release of the data contained in this report has been electronically authorized by the following laboratory representative:

Rand Potter, Project Manager, ALS Environmental



Quality Control Sample Batch Report

Analysis Information

Workorder: 1620981

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: BH Aliphatic Amines
Batch: ILC/12401 (HBN: 173887)
Analyzed By: David Teynor

Blank

LMB: 510814
Analyzed: 08/01/2016 00:00
Units: ug/sample

Analyte	Result	MDL	RL
Dimethylamine	ND	NA	0.100
Ethylamine	ND	NA	0.100
Methylamine	ND	NA	0.100

LMB: 510817
Analyzed: 08/01/2016 00:00
Units: ug/sample

Analyte	Result	MDL	RL
Dimethylamine	ND	NA	0.100
Ethylamine	ND	NA	0.100
Methylamine	ND	NA	0.100

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510815 Analyzed: 08/01/2016 00:00 Dilution: 1 Units: ug/sample					LCSD: 510816 Analyzed: 08/01/2016 00:00 Dilution: 1 Units: ug/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Dimethylamine	1.38	2.00	69.0	60.4 134.6	1.47	73.5	6.32	0.0 20.0	
Ethylamine	1.63	2.00	81.5	40.0 160.0	1.42	71.0	13.8	0.0 20.0	
Methylamine	1.60	2.00	80.0	40.0 160.0	1.63	81.5	1.86	0.0 20.0	

LCS: 510818 Analyzed: 08/01/2016 00:00 Dilution: 1 Units: ug/sample					LCSD: 510819 Analyzed: 08/01/2016 00:00 Dilution: 1 Units: ug/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Dimethylamine	1.51	2.00	75.5	60.4 134.6	1.47	73.5	2.68	0.0 20.0	
Ethylamine	1.76	2.00	88.0	40.0 160.0	1.58	79.0	10.8	0.0 20.0	
Methylamine	1.61	2.00	80.5	40.0 160.0	1.66	83.0	3.06	0.0 20.0	

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ David Teynor 08/02/2016 15:18	/S/ Thomas Bosch 08/02/2016 16:09

Symbols and Definitions

- * - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- - Sample and Matrix Duplicate less than 5 times the reporting limit
- - Result is above the calibration range
- RPD - Relative % Difference (Spike / Spike Duplicate)
- ND - Not Detected (U - Qualifier also flags analyte as not detected)
- NA - Not Applicable
- QC results are not adjusted for moisture correction, where applicable

1620981 3613-45



CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: N/A
 C.D.C. No.: 20162152
 Page 1 of 3
 Telephone No.: 773-6861
 MSN: 36-62
 FAX: 312-1878
 Container/Seal: CARL HOWARD TV
 SAFETY: OPEN
 CHARGE EVALUATION: 2020010820
 Project Title: WTS-013 Temp. ON ICE
 CHARGE EVALUATION: 2768 4438 5296
 Shipped To (Lab): Bill of Lading/IR Bill No. 41071
 Method of Shipment: Pallets and Return No.
 Date Turnaround: 10 days

Sample No.	Lab ID	Date	Time	Mat/Type Container	Sample Analysis	Preservative
	8167022010	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-A1	N/A
	8167022011	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-A2	N/A
	8167022012	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-B1	N/A
	8167022013	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-B2AUX	N/A
	8167022014	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-C1	N/A
	8167022015	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-21	N/A
	8167022016	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-E1	N/A
	8167022017	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-EFF-0A3S	N/A
	8167022018	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-PL	N/A
	8167022019	VA	7/22/16	XAD-7-080	MSSES 16-06172-4-S1	N/A

POSSIBLE SAMPLE HAZARDOUS REMARKS (LHM at known wastes): MSDS Yes No
 SPECIAL INSTRUCTIONS: Send Results to Carl Howarth TV & Greg Moore
 Carl M Howarth: 202-361-307 and Greg Moore: 306-060821.
 gov tok sov for email
 CONTRACT: 33502
 RELEASE: 3

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
Steven Weller	8167022010	Carl Howarth	7/26/16 0900	Scott Hecker	8167022010	Scott Hecker	7-26-16/0900
Relinquished by	WRPS	8167022016	7-26-16/1400	Relinquished by	FEDEX		
Relinquished by		8167022017	7-26-16/1400	Relinquished by			
Relinquished by				Relinquished by			

Disposal Method (e.g., return to customer, per lab procedure, used in process):
 Disposed By: **CONSUMED**
 Date/Time: 08/01/16 12:00

All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.

Assembler		C.O.C. No. 20162152				
N/A		Page 2 of 3				
CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						
Collector JONES		Telephone No. 713-4861				
Contract/Requestor CALI SOLIDS IV		MISH 16-02 FAX 372-1878				
Sample Origin CARTER OCE EVALUATION		Shipping Order/Change Code				
SAF No. N/A		20000/CARD				
Project Title CARTER OCE EVALUATION		Ice Chest No. WTS-013 Temp. 0 U ICE				
Shipped To (Lab) ALS		Bill of Lading/Air Bill No. 7768 4438 5296				
Method of Shipment		Parts and Return No. 41071				
Data Turnaround 10 DAYS						
Sample No.	Lab ID	Date	Time	Qty/Type Container	Matrix	Preservative
	8167022020	VA	7/22/16	3AD-7-HEB	MTRES 16-06172-4-01	N/A
	8167022021	VA	7/22/16	3AD-7-HEB	MTRES 16-06172-4-02	N/A
	8167022022	VA	7/22/16	3AD-7-HEB	MTRES 16-06172-4-TR-BASE	N/A
	8167022023	VA	7/23/16	3AD-7-HEB	MTRES 16-06173-4-A1	N/A
	8167022024	VA	7/23/16	3AD-7-HEB	MTRES 16-06173-4-A2	N/A
	8167022025	VA	7/23/16	3AD-7-HEB	MTRES 16-06173-4-B1	N/A
	8167022026	VA	7/23/16	3AD-7-HEB	MTRES 16-06173-4-BLANK	N/A
	8167022027	VA	7/23/16	3AD-7-HEB	MTRES 16-06173-4-C1	N/A
	8167022028	VA	7/23/16	3AD-7-HEB	MTRES 16-06173-4-D1	N/A
	8167022029	VA	7/23/16	3AD-7-HEB	MTRES 16-06173-4-E1	N/A
POSSIBLE SAMPLE MISLABORS/REMARKS (List all known wastes) MSDS Yes <input checked="" type="radio"/> No <input type="radio"/> SPECIAL INSTRUCTIONS Send results to Carl Revald IV & Greg Moore Carl Revald IV and Gregory Moore 937 868 504 8811 CONTRACT 55502 RELEASE						
Requisitioned by Shawanda Holder	Sign M. Holder	Date/Time 7-26-16 09:00	Received by Scott Harder	Sign S. Harder	Date/Time 7-26-16/09:00	Matrix* S = Soil DL = Drum Liquids SE = Sediment T = Tissue SO = Solids WM = Waste SL = Sludge L = Liquid V = Vegetation W = Water VA = Vapor AI = Air X = Other DS = Drum Solids
Requisitioned by WRIPS	Sign S. Harder	Date/Time 7-26-16/14:00	Received by FEDEx	Sign FEDEx	Date/Time 7-26-16/14:00	
Requisitioned by	Sign FEDEx	Date/Time	Received by	Sign	Date/Time	
Disposal Method (e.g., Return to customer, per lab procedure, land in process) Consumed						
Disposed by Consumed						
Date/Time 08/01/16 12:00						

A-6603-952 (03/08)

Assembler		C.O.C. No. 20162152				
N/A		Page 3 of 3				
CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						
Collector	Telephone No.	MISHN	372-1978			
JONES	372-4161	14-02	FAX 372-1978			
SAF No.	Sample Origin	Purchase Order/Change Code				
N/A	CARTRIDGE EVALUATOR	202001CAR				
Project Title	Logbook/Work Package No.	Temp.	OV ICE			
CARTRIDGE EVALUATION	N/A	Bill of Lading/air Bill No.	7768 4438 5296			
Shipped To (Lab)	Method of Shipment	Parts and Return No.	41071			
JLS						
Protocol	Date Turnaround					
N/A	10 DAYS					
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
	8167022030	0A	7/23/16	XAD-7-HBD	ANALYSES 14-06173-4-EFP-BASE	N/A
	8167022031	0A	7/23/16	XAD-7-HBD	ANALYSES 14-06173-4-FL	N/A
	8167022032	0A	7/23/16	XAD-7-HBD	ANALYSES 14-06173-4-GL	N/A
	8167022033	0A	7/23/16	XAD-7-HBD	ANALYSES 14-06173-4-RL	N/A
	8167022034	0A	7/23/16	XAD-7-HBD	ANALYSES 14-06173-4-R2	N/A
	8167022035	0A	7/23/16	XAD-7-HBD	ANALYSES 14-06173-4-SP-0A3B	N/A
POSSIBLE SAMPLE HAZARD/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No						
SPECIAL INSTRUCTIONS Send results to: Carl Howell IV & Scott Meier 999 5th St. SE, Box 88811 CONTRACT 53502 RELEASE \$						
Requisitioned by	Print	Sign	Received By	Print	Sign	Date/Time
Sharon Holden	Sharon Holden	Richard	Scott Harder	Scott Harder	Scott	7-26-16/0900
Requisitioned by	Print	Sign	Received By	Print	Sign	Date/Time
JW Harder	JW Harder	Scott	Scott	Scott	Scott	7-26-16/1400
Requisitioned by	Print	Sign	Received By	Print	Sign	Date/Time
WRPS	WRPS	Scott	Scott	Scott	Scott	7-26-16/1400
Requisitioned by	Print	Sign	Received By	Print	Sign	Date/Time
Material S = Soil DL = Drum Liquids SE = Sediment T = Tissue SO = Solid WM = Waste SL = Sludge L = Liquid WF = Water V = Vegetation O = Oil VA = Vapor A = Air X = Other = Drum Solids						
Final Sample Disposition	Disposal Method (e.g., Return to customer, per lab procedure, used in process)					Date/Time
	CONSUMED					08/01/16 12:00

A-6008-662 (03/08)



ANALYTICAL REPORT

Report Date: July 29, 2016

Robert (Buddy) Sosa
Washington River Protection So
PO Box 850, MSIN T6-02
Richland, WA 99352

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162151

Workorder: 34-1620932

Client Project ID: Washington River Protection So

Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021945 and lab ID 1620932001.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021946 and lab ID 1620932002.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021947 and lab ID 1620932003.

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 266 9992
ALS GROUP USA, CORP. An ALS Limited Company



www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNERS



ANALYTICAL REPORT

Workorder: **34-1620932**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021948		Collected: 07/22/2016		
Lab ID: 1620932004		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/28/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021949		Collected: 07/22/2016		
Lab ID: 1620932005		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/28/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021950		Collected: 07/22/2016		
Lab ID: 1620932006		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/28/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021951		Collected: 07/22/2016		
Lab ID: 1620932007		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/28/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010



ANALYTICAL REPORT

Workorder: 34-1620932
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021952 and Lab ID 1620932008.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021953 and Lab ID 1620932009.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021954 and Lab ID 1620932010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021955 and Lab ID 1620932011.



ANALYTICAL REPORT

Workorder: 34-1620932
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021956 and Lab ID 1620932012.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021957 and Lab ID 1620932013.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021958 and Lab ID 1620932014.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: Acetonitrile, <0.010, NA, NA, 0.010. Includes sample ID S16T021959 and Lab ID 1620932015.



ANALYTICAL REPORT

Workorder: **34-1620932**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021960		Collected: 07/23/2016		
Lab ID: 1620932016		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021961		Collected: 07/23/2016		
Lab ID: 1620932017		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021962		Collected: 07/23/2016		
Lab ID: 1620932018		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021963		Collected: 07/23/2016		
Lab ID: 1620932019		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010



ANALYTICAL REPORT

Workorder: **34-1620932**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021964		Collected: 07/23/2016		
Lab ID: 1620932020		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021965		Collected: 07/23/2016		
Lab ID: 1620932021		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021966		Collected: 07/23/2016		
Lab ID: 1620932022		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021967		Collected: 07/23/2016		
Lab ID: 1620932023		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010



ANALYTICAL REPORT

Workorder: **34-1620932**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021968		Collected: 07/23/2016		
Lab ID: 1620932024		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021969		Collected: 07/23/2016		
Lab ID: 1620932025		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021970		Collected: 07/23/2016		
Lab ID: 1620932026		Received: 07/27/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
NIOSH 1606	/S/ Young Hee Yoon 07/29/2016 10:52	/S/ Steven J. Sagers 07/29/2016 11:29

Laboratory Contact Information

ALS Environmental
960 W Levoe Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alsst.lab@ALSGlobal.com
Web: www.alsinc.com



ANALYTICAL REPORT

Workorder: **34-1620932**
 Client Project ID: Washington River Protection
 So
 Purchase Order: 55502 Rel9
 Project Manager: Rand Potter

General Lab Comments

The results provided in this report relate only to the items tested.
 Samples were received in acceptable condition unless otherwise noted.
 Samples have not been blank corrected unless otherwise noted.
 This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	AClass (DoD ELAP)	ADE-1420	http://www.aclasscorp.com
	Utah (NELAC)	DATA 1	http://health.utah.gov/lab/abimp/
	Nevada	UT00009	http://ndep.nv.gov/bd/dw/lab/service.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/inside/CNR/Regulatory/Water.aspx
	Florida (TNI)	E971067	http://www.dep.state.fl.us/labs/bars/las/qal/
	Texas (TNI)	T 104704456-11.1	http://www.tceq.texas.gov/field/qalab_accred_certf.html
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing			
CPSC	AClass (ISO 17025, CPSC)	ADE-1420	http://www.aclasscorp.com
Soil, Dust, Paint, Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	AClass (ISO 17025)	ADE-1420	http://www.aclasscorp.com

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
 LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
 ND = Not Detected, Testing result not detected above the LOD or LOQ.
 NA = Not Applicable.
 ** No result could be reported, see sample comments for details.
 < This testing result is less than the numerical value.
 () This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ALS Environmental certifies this analytical report is in compliance with the Hanford SOW, both technically and for completeness. Release of the data contained in this report has been electronically authorized by the following laboratory representative:

Rand Potter, Project Manager, ALS Environmental



Quality Control Sample Batch Report

Analysis Information

Workorder: 1620932

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: BH GC-FID QC
Batch: IFID/7630 (HBN: 173706)
Analyzed By: Young Hee Yoon

Blank

MB: 510328 Analyzed: 07/28/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100

MB: 510331 Analyzed: 07/28/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510329 Analyzed: 07/28/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 510330 Analyzed: 07/28/2016 00:00 Dilution: 1 Units: mg/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Acetonitrile	0.307	0.312	98.4	96.6 115.3	0.316	101	2.99	0.0 20.0	

LCS: 510332 Analyzed: 07/28/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 510333 Analyzed: 07/28/2016 00:00 Dilution: 1 Units: mg/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Acetonitrile	0.264	0.250	106	86.6 115.3	0.248	99.4	6.25	0.0 20.0	

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Young Hee Yoon 07/29/2016 10:52	/S/ Steven J. Sagers 07/29/2016 11:29

Symbols and Definitions

- ★ - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- - Sample and Matrix Duplicate less than 5 times the reporting limit
- - Result is above the calibration range
- RPD - Relative % Difference (Spike / Spike Duplicate)
- ND - Not Detected (U - Qualifier also flags analyte as not detected)
- NA - Not Applicable
- QC results are not adjusted for moisture correction, where applicable



1620932

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Assembler: N/A
 Collector: JOES
 SAP No.: N/A
 Project Title: CHEMTRONIC EVALUATION
 Shipped To (Lab): AUC
 Protocol: N/A

Contract/Requestor: CAMP, HENOLD 17
 Sample Origin: CHEMTRONIC
 Logbook/Work Package No.: N/A
 Method of Shipment: N/A
 Date Turnaround: 10 BUS

Telephone No: 373-4881
 Purozone Origin/Change Code: 222503/CAMP
 Ice Chest No.: WTS-013
 DB of Lading/AV Bill No.: 7768 4438 5296
 Pallet and Return No.: 41071

MSIN: 16-02
 FAX: 372-1876
 Temp.: ON ICE

Page 1 of 3

Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
	5167021945	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-A1	S/A
	5167021946	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-A2	S/A
	5167021947	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-A3	S/A
	5167021948	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-02A/B/C	S/A
	5167021949	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-C1	S/A
	5167021950	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-01	S/A
	5167021951	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-01	S/A
	5167021952	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-EFF-BASE	S/A
	5167021953	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-F1	S/A
	5167021954	VA	7/22/16	CHARCOAL TUBE	Acetonitrile 16-06171-5-G1	S/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS Yes No
 SPECIAL INSTRUCTIONS: See Report to Carl Howald IV & Greg Koppes for details on EPA 8161-937 and Gregory's footprint. RELEASE & REFERENCE CONTACT # 55502

Requisitioned By	Print	Sign	Received By	Print	Sign	Date/Time	Date/Time	Metric*
Sharon V. Kelly	Sharon Kelly	7-26-16	Scott Hader	Scott Hader	7-26-16	10:50	10:50	S = Soil DL = Drum Liquids SE = Sediment T = Tissue SO = Solid WA = Waste SL = Sludge L = Liquid V = Vapor VA = Vegetation R = Air X = Other DS = Drum Solids
Requisitioned By	WRPS	Scott Hader	Received By	REDEX				
Requisitioned By	Scott Hader	7-26-16/1400	Received By	Paul W. Pessier	Tamilan	7-29-16	10:30	
Requisitioned By	Scott Hader	7-26-16/1400	Received By	Paul W. Pessier	Tamilan	7-29-16	10:30	

Disposal Method (e.g., Return to customer, per site procedure, used in process):
 Disposed by: Scott Hader 4000 July 29, 2016 10:30 AM

FINAL SAMPLE DISPOSITION

All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.

A-6003-602 (03/05)

Assembler		C.O.C. No.							
N/A		20162151							
Collector		Page							
JONES		2 of 3							
Contact/Requestor		Telephone No.							
GAIL HANCOCK IV		973-6861							
Sample Origin		MISIN							
CANTLEDOE CHLORINATE		16-02							
Logbook/Work Package No.		FAX 372-1876							
N/A									
Project Title		Temp.							
CANTLEDOE CHLORINATE		N/A							
Shipped To (Lab)		Ice Chest No.							
ACS		WTS-013							
		Bill of Lading/IR Bill No.							
		7768 4438 5286							
Protocol		Parts and Return No.							
N/A		41071							
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative			
	S16T021955	VA	7/22/16		Acetonitrile 16-06172-5-A1	N/A			
	S16T021956	VA	7/22/16		Acetonitrile 16-06172-5-A2	N/A			
	S16T021957	VA	7/22/16		Acetonitrile 16-06172-5-2A-30.85	N/A			
	S16T021958	VA	7/22/16		Acetonitrile 16-06173-5-A1	N/A			
	S16T021959	VA	7/22/16		Acetonitrile 16-06173-5-A2	N/A			
	S16T021960	VA	7/22/16		Acetonitrile 16-06173-5-B1	N/A			
	S16T021961	VA	7/22/16		Acetonitrile 16-06173-5-BLANK 4	N/A			
	S16T021962	VA	7/22/16		Acetonitrile 16-06173-5-C1	N/A			
	S16T021963	VA	7/22/16		Acetonitrile 16-06173-5-O1	N/A			
	S16T021964	VA	7/22/16		Acetonitrile 16-06173-5-E1	N/A			
POSSIBLE SAMPLE HAZARD/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No HSM Time									
SPECIAL INSTRUCTIONS Send results to Carl Howlid IV & Greg Moore Cor. # 9041811.957 and Gregory_5_joseph@... RELEASE 9 Reference Contract # 55502									
Requisitioned By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Used/Time	Items*
Sharon Walker	Sharon Walker	Sharon Walker	7/26/16 09:00	Scott Harber	Scott Harber	Scott Harber	7-26-16 / 10:00		S = Soil DL = Drum Liquids SE = Sediment T = Tissue SO = Solid WI = Wipe SL = Sludge L = Liquid V = Vegetation VA = Vapor W = Water O = Oil X = Air C = Drum Solids
Requisitioned By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Used/Time	Items*
SW Harber	SW Harber	SW Harber	7-26-16/14:00	FEDEX	FEDEX	FEDEX			
Requisitioned By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Used/Time	Items*
Jones	Jones	Jones		Tamara Tassell	Tamara Tassell	Tamara Tassell	7-27-16		
Requisitioned By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Used/Time	Items*
FINAL SAMPLE DISPOSITION Disposal Method (e.g., Return to customer, per lab procedure used in process)							Deposited By Gary N. Gm		Date/Time July 28, 2016 10:30 AM

A-6003-062 (03/06)

Assembler		C.O.C. No. 20162151				
N/A		Page 3 of 3				
Collector Jones		Telephone No. 373-4841 MSRN 14-02 FAX 372-1878				
Sample Origin		Purchase Order/Change Code				
N/A		3029030210				
Project Title		Ice Chest No. 675-013 Temp. ON ICE				
Cabinet Manufacturer		Bill of Lading/Air Bill No. 7768 4438 5296				
Shipped To (Lab)		Parts and Return No. 41071				
Protocol ALS						
Method of Shipment						
Data Turnaround						
10 Days						
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16721963	VA	7/23/16	CHARCOAL TUBE	Acetonitrile 16-66173-5-877-848 \	N/A
	S16721966	VA	7/23/16	CHARCOAL TUBE	Acetonitrile 16-66173-5-871 \	N/A
	S16721967	VA	7/23/16	CHARCOAL TUBE	Acetonitrile 16-66173-5-81 \	N/A
	S16721968	VA	7/23/16	CHARCOAL TUBE	Acetonitrile 16-66173-5-81 \	N/A
	S16721969	VA	7/23/16	CHARCOAL TUBE	Acetonitrile 16-66173-5-82 \	N/A
	S16721970	VA	7/23/16	CHARCOAL TUBE	Acetonitrile 16-66173-5-73-848 \	N/A
POSSIBLE SAMPLE HAZARD/BIOMARKERS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No						
SPECIAL INSTRUCTIONS Send Results to Carl Rowland IV & Greg Moore crowland@epa.gov and gmoore@epa.gov RELEASE 5 Reference Contract # 53502						
Relinquished By	Print	Sign	Received By	Print	Sign	Date/Time
Sharon Holder	Sharon Holder	MSH	Scott Harder	Scott Harder	SHH	7-26-16/0900
Relinquished By	Print	Sign	Received By	Print	Sign	Date/Time
WRPS	WRPS	SHH	REUSEX	REUSEX		
Relinquished By	Print	Sign	Received By	Print	Sign	Date/Time
Reed	Reed		Paul J. Tassell	Paul J. Tassell		7-27-16
Relinquished By	Print	Sign	Received By	Print	Sign	Date/Time
			Yanyan Gao	Yanyan Gao		7-29-16
FINAL SAMPLE DISPOSITION Disposal Method (e.g., Return to customer, per lab procedure used in process)						
Returned to parent container and returned to parent container or site of origin.						

All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.

A-6003-993 (03/06)

**FINAL REPORT ON MERCURY VAPOR TUBES
FOR CARTRIDGE EVALUATION
COLLECTED JULY 22 – 23, 2016**

Document No.: 20162164 Rev. 0

Michael A. Purcell
WAI Hanford Laboratory

Date Published
August 24, 2016



LAB # 184777

Prepared for:



Joyce A. Caldwell
Washington River Protection
Solutions, Inc.
P.O. Box 850
Richland, WA 99352
509-376-0737

Prepared by:



WAI Hanford Laboratory
1955 Jadwin Ave, Suite 330
Richland, WA 99354
509-373-3240


August 24, 2016
Michael A. Purcell, WHL Project Coordinator

NARRATIVE

**FINAL REPORT ON MERCURY VAPOR TUBES
FOR CARTRIDGE EVALUATION
COLLECTED JULY 22 – 23, 2016**

This final report presents the results of twenty-six mercury vapor tubes received at the 222-S Laboratory from on July 25, 2016, in good condition and with adequate paperwork. The mercury vapor tubes were logged into sample delivery group 20162164.

DISCLAIMERS

- The information contained in this report is intended only for the use of the addressee and should be considered confidential.
- This report shall not be reproduced, except in full, without written approval of the laboratory.
- The results shown in this report pertain only to the actual samples tested.
- These results conform to the requirements specified in the referenced methods/procedures and specifications provided verbally or electronically by the customer. Any deviations or modifications are discussed in the following narrative.
- This report only addresses laboratory activities related to the listed surveys. Requirements or anomalies concerning field sampling are not addressed in this report.

PROCEDURES

Method	Preparation Procedure	Analysis Procedure
Mercury by OSHA ID-140	LA-325-109, Rev. C-3	LA-325-109, Rev. C-3

ANALYTICAL SUMMARY

The vapor tubes were tested for mercury, as specified on the chain of custody. Standard laboratory procedures for digestions and cold vapor atomic absorption for mercury were followed as well as the requirements in WHL-MP-1029, *WHL Industrial Hygiene Quality Assurance Project Plan for 222-S Laboratory* (QAPP). Program specific work authorization instructions have been provided for WRPS IH sample analysis through verbal and electronic communication with the customer point of contact, and are kept as a record by the laboratory. When applicable, any client communication specific to the samples in this report will be included herein. All quality control criteria in the QAPP were met.

The measurement uncertainty was estimated based on the historical behavior of laboratory control standards (LCS). For mercury, the results of 178 LCS determinations indicate a mean recovery of 98% with a standard deviation of 6%. Statistical process control limits for the LCS are 81 – 115%, with no significant bias. The overall estimate of uncertainty is 12%, with coverage factor (k) = 2.

Background levels of mercury or interfering compounds can be present in the sorbent tube media used for collecting vapor samples. OSHA ID-140 recommends that the laboratory determine the average background for each lot of media and subtract it from the sample results prior to reporting. However, per agreement with the client, this background is being determined by the client using blank media submitted as blind samples to the laboratory. Any blank subtraction from the sample results will be performed by the client. The laboratory is using the same media

for QC samples. These QC samples may not match the lot numbers of the samples being submitted and the background for this QC sample media has not been determined. Over the past several years the results from preparation blanks, field blanks, and the vast majority of samples have been below the laboratory's method detection limit, which is an order of magnitude below the reporting limit. In general, the laboratory believes there is no need for background subtraction using the current sample media (Hydrar, SKC 226-17-1A).

For the mercury analysis, the blank results for tube lot numbers 9473 and 10187 were below the detection limit; therefore, no blank correction was required. All mercury results for this sample group were below the reporting limit of 0.05 µg/sample, except for samples 16-06172-6-A1, 16-06172-6-H1, 16-06173-6-A1, and 16-06173-6-H1. For these samples, the total result includes the contribution from the glass wool portion even though the glass wool portion result is lower than the reporting limit (see Attachment 1).

20162164 Rev. 0

Attachment 1

DATA SUMMARY REPORT

4 of 17

C.209

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162164

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-06172-6-A1	Total	S16T022211	Mercury	µg/sample	n/a	<0.0500	0.223	0.0500
16-06172-6-A1	Resin	S16T022214	Mercury	µg/sample	89.0	<0.0500	0.218	0.0500
16-06172-6-A1	Glass Wool	S16T022215	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-A2	Total	S16T022217	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-A2	Resin	S16T022218	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-A2	Glass Wool	S16T022221	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-B1	Total	S16T022228	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-B1	Resin	S16T022231	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-B1	Glass Wool	S16T022232	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-BLANK	Total	S16T022234	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-BLANK	Resin	S16T022235	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-BLANK	Glass Wool	S16T022236	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-C1	Total	S16T022238	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-C1	Resin	S16T022241	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-C1	Glass Wool	S16T022242	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-D1	Total	S16T022243	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-D1	Resin	S16T022245	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-D1	Glass Wool	S16T022246	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-E1	Total	S16T022247	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-E1	Resin	S16T022250	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-E1	Glass Wool	S16T022251	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-EFF-BASE	Total	S16T022252	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-EFF-BASE	Resin	S16T022253	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-EFF-BASE	Glass Wool	S16T022254	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-F1	Total	S16T022255	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-F1	Resin	S16T022256	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-F1	Glass Wool	S16T022257	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-G1	Total	S16T022258	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-G1	Resin	S16T022259	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-G1	Glass Wool	S16T022260	Mercury	µg/sample	89.0	<0.0500	<0.0500	0.0500
16-06172-6-H1	Total	S16T022261	Mercury	µg/sample	n/a	<0.0500	0.210	0.0500
16-06172-6-H1	Resin	S16T022263	Mercury	µg/sample	92.4	<0.0500	0.205	0.0500
16-06172-6-H1	Glass Wool	S16T022264	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06172-6-H2	Total	S16T022267	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-H2	Resin	S16T022269	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06172-6-H2	Glass Wool	S16T022270	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06172-6-IN-BASE	Total	S16T022273	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06172-6-IN-BASE	Resin	S16T022274	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06172-6-IN-BASE	Glass Wool	S16T022275	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-A1	Total	S16T022282	Mercury	µg/sample	n/a	<0.0500	0.225	0.0500
16-06173-6-A1	Resin	S16T022283	Mercury	µg/sample	92.4	<0.0500	0.220	0.0500
16-06173-6-A1	Glass Wool	S16T022284	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-A2	Total	S16T022285	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-A2	Resin	S16T022286	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-A2	Glass Wool	S16T022287	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-B1	Total	S16T022288	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-B1	Resin	S16T022289	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-B1	Glass Wool	S16T022290	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162164

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-06173-6-BLANK	Total	S16T022491	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-BLANK	Resin	S16T022492	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-BLANK	Glass Wool	S16T022493	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-C1	Total	S16T022494	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-C1	Resin	S16T022495	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-C1	Glass Wool	S16T022496	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-D1	Total	S16T022497	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-D1	Resin	S16T022498	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-D1	Glass Wool	S16T022499	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-E1	Total	S16T022500	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-E1	Resin	S16T022501	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-E1	Glass Wool	S16T022502	Mercury	µg/sample	92.4	<0.0500	<0.0500	0.0500
16-06173-6-EFF-BASE	Total	S16T022503	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-EFF-BASE	Resin	S16T022504	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-EFF-BASE	Glass Wool	S16T022505	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-F1	Total	S16T022506	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-F1	Resin	S16T022507	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-F1	Glass Wool	S16T022508	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-G1	Total	S16T022520	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-G1	Resin	S16T022524	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-G1	Glass Wool	S16T022525	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-H1	Total	S16T022528	Mercury	µg/sample	n/a	<0.0500	0.237	0.0500
16-06173-6-H1	Resin	S16T022529	Mercury	µg/sample	94.4	<0.0500	0.232	0.0500
16-06173-6-H1	Glass Wool	S16T022530	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-H2	Total	S16T022531	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-H2	Resin	S16T022532	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-H2	Glass Wool	S16T022533	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-IN-BASE	Total	S16T022535	Mercury	µg/sample	n/a	<0.0500	<0.0500	0.0500
16-06173-6-IN-BASE	Resin	S16T022538	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500
16-06173-6-IN-BASE	Glass Wool	S16T022539	Mercury	µg/sample	94.4	<0.0500	<0.0500	0.0500

20162164 Rev. 0

Attachment 2

ANALYSIS DATE REPORT

7 of 17

C.212

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162164

Laboratory Sample ID	Customer Sample ID	Method	Preparation Date	Analysis Date
S16T022214	16-06172-6-A1	Mercury	07/28/2016 17:00	07/28/2016 19:07
S16T022215	16-06172-6-A1	Mercury	07/28/2016 17:00	07/28/2016 19:09
S16T022218	16-06172-6-A2	Mercury	07/28/2016 17:00	07/28/2016 19:11
S16T022221	16-06172-6-A2	Mercury	07/28/2016 17:00	07/28/2016 19:13
S16T022231	16-06172-6-B1	Mercury	07/28/2016 17:00	07/28/2016 19:14
S16T022232	16-06172-6-B1	Mercury	07/28/2016 17:00	07/28/2016 19:16
S16T022235	16-06172-6-BLANK	Mercury	07/28/2016 17:00	07/28/2016 19:21
S16T022236	16-06172-6-BLANK	Mercury	07/28/2016 17:00	07/28/2016 19:23
S16T022241	16-06172-6-C1	Mercury	07/28/2016 17:00	07/28/2016 19:24
S16T022242	16-06172-6-C1	Mercury	07/28/2016 17:00	07/28/2016 19:26
S16T022245	16-06172-6-D1	Mercury	07/28/2016 17:00	07/28/2016 19:28
S16T022246	16-06172-6-D1	Mercury	07/28/2016 17:00	07/28/2016 19:30
S16T022250	16-06172-6-E1	Mercury	07/28/2016 17:00	07/28/2016 19:31
S16T022251	16-06172-6-E1	Mercury	07/28/2016 17:00	07/28/2016 19:33
S16T022253	16-06172-6-EFF-BASE	Mercury	07/28/2016 17:00	07/28/2016 19:35
S16T022254	16-06172-6-EFF-BASE	Mercury	07/28/2016 17:00	07/28/2016 19:36
S16T022256	16-06172-6-F1	Mercury	07/28/2016 17:00	07/28/2016 19:41
S16T022257	16-06172-6-F1	Mercury	07/28/2016 17:00	07/28/2016 19:43
S16T022259	16-06172-6-G1	Mercury	07/28/2016 17:00	07/28/2016 19:44
S16T022260	16-06172-6-G1	Mercury	07/28/2016 17:00	07/28/2016 19:46
S16T022263	16-06172-6-H1	Mercury	07/28/2016 17:00	07/28/2016 19:53
S16T022264	16-06172-6-H1	Mercury	07/28/2016 17:00	07/28/2016 19:55
S16T022269	16-06172-6-H2	Mercury	07/28/2016 17:00	07/28/2016 20:04
S16T022270	16-06172-6-H2	Mercury	07/28/2016 17:00	07/28/2016 20:06
S16T022274	16-06172-6-IN-BASE	Mercury	07/28/2016 17:00	07/28/2016 20:08
S16T022275	16-06172-6-IN-BASE	Mercury	07/28/2016 17:00	07/28/2016 20:10
S16T022283	16-06173-6-A1	Mercury	07/28/2016 17:00	07/28/2016 20:11
S16T022284	16-06173-6-A1	Mercury	07/28/2016 17:00	07/28/2016 20:13
S16T022286	16-06173-6-A2	Mercury	07/28/2016 17:00	07/28/2016 20:15
S16T022287	16-06173-6-A2	Mercury	07/28/2016 17:00	07/28/2016 20:17
S16T022289	16-06173-6-B1	Mercury	07/28/2016 17:00	07/28/2016 20:18
S16T022290	16-06173-6-B1	Mercury	07/28/2016 17:00	07/28/2016 20:20
S16T022492	16-06173-6-BLANK	Mercury	07/28/2016 17:00	07/28/2016 20:25
S16T022493	16-06173-6-BLANK	Mercury	07/28/2016 17:00	07/28/2016 20:27
S16T022495	16-06173-6-C1	Mercury	07/28/2016 17:00	07/28/2016 20:29
S16T022496	16-06173-6-C1	Mercury	07/28/2016 17:00	07/28/2016 20:30
S16T022498	16-06173-6-D1	Mercury	07/28/2016 17:00	07/28/2016 20:32
S16T022499	16-06173-6-D1	Mercury	07/28/2016 17:00	07/28/2016 20:34
S16T022501	16-06173-6-E1	Mercury	07/28/2016 17:00	07/28/2016 20:35
S16T022502	16-06173-6-E1	Mercury	07/28/2016 17:00	07/28/2016 20:37
S16T022504	16-06173-6-EFF-BASE	Mercury	08/08/2016 07:30	08/08/2016 11:56
S16T022505	16-06173-6-EFF-BASE	Mercury	08/08/2016 07:30	08/08/2016 11:58
S16T022507	16-06173-6-F1	Mercury	08/08/2016 07:30	08/08/2016 11:59
S16T022508	16-06173-6-F1	Mercury	08/08/2016 07:30	08/08/2016 12:01
S16T022524	16-06173-6-G1	Mercury	08/08/2016 07:30	08/08/2016 12:03
S16T022525	16-06173-6-G1	Mercury	08/08/2016 07:30	08/08/2016 12:05

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162164

Laboratory Sample ID	Customer Sample ID	Method	Preparation Date	Analysis Date
S16T022529	16-06173-6-H1	Mercury	08/08/2016 07:30	08/08/2016 12:10
S16T022530	16-06173-6-H1	Mercury	08/08/2016 07:30	08/08/2016 12:12
S16T022532	16-06173-6-H2	Mercury	08/08/2016 07:30	08/08/2016 12:13
S16T022533	16-06173-6-H2	Mercury	08/08/2016 07:30	08/08/2016 12:15
S16T022538	16-06173-6-IN-BASE	Mercury	08/08/2016 07:30	08/08/2016 12:16
S16T022539	16-06173-6-IN-BASE	Mercury	08/08/2016 07:30	08/08/2016 12:18

Attachment 3

RECEIPT PAPERWORK

222-S		SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST			ATS-LO-090-101 Rev <u>DG-1</u>
Date Samples Received: <u>7-25-16</u> Total Number of Samples: <u>312</u> Group #: <u>20162164-Hg</u>					
Sample Custodian: <u>TERESA FRAZIER</u> IH Technician: <u>[Signature]</u>					
Sample Custodian to Complete: <u>[Signature]</u>					
Action	Yes	No	N/A	Comments	
RSR provided?		<u>7</u>	<u>7</u>		
Verify GKI is complete			<u>7</u>	<input type="checkbox"/> In Project File	
Received from an alpha facility?		<u>7</u>		<input type="checkbox"/> Contact PC for approval to release	
Check that outer custody seal is intact, if present			<u>7</u>		
Record cooler temperature in centigrade, as appropriate	<u>4.0</u>			<input type="checkbox"/> Check if no cooler and/or no ice	
Samples are intact and in good condition	<u>7</u>			If No, provide comments below	
RSA/COC provided and complete containing the following information?					
• Client name and client sample number	<u>7</u>				
• Date and time of sampling	<u>7</u>				
• Sampling location or origin	<u>7</u>				
• Container type, size, and number	<u>7</u>				
• Preservatives (if used) noted on the COCRSA and sample bottles		<u>7</u>			
• Analysis request is clear	<u>7</u>				
• Signature of persons relinquishing and receiving samples	<u>7</u>				
• Date and/or time of sample custody exchange	<u>7</u>				
Verify that sample numbers on containers match the COC and/or RSA	<u>7</u>				
Samples stored properly (e.g., refrigeration)	<u>7</u>				
Notify the PC immediately if any problems are noted. Any "No" checked boxes require PC resolution. For WRPS samples, the initials block below is completed by the responsible WRPS PC.					
Samples acceptable for release? <u>Yes</u> PC/SC Initials <u>BLM</u> Date <u>7-25-16</u>					
If No, comment on communication and resolution: <u>CW7</u> <u>7/25/16</u>					
<u>225</u> <u>Watte WRPS - Ship - 182</u>					
<u>Run - 78</u>					
<u>WHL - NH₃ - 26</u>					
<u>Hg - 26</u>					
Number of IH Samples Received: <u>Acetonitrile 26</u>					
Aldehyde Screen: <u>26</u>	Amines: <u>26</u>	Ammonia: <u>26</u>	Aromatic HC: _____	Asbestos: _____	
Beryllium: _____	Be-Bulk: _____	Be-Filter: _____	Be-Wipe: _____	1,3-Butadiene: <u>52</u>	
Formaldehyde: _____	Furans: <u>26</u>	Mercury: <u>26</u>	Methanol: _____	Nitrosamines: <u>26</u>	
Nitrous Oxide: _____	Pyridines: <u>26</u>	SVOA: <u>26</u>	VOA: <u>26</u>	Other-IH: _____	

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/22/2016	
CACN: 202367	COA: CB20	Survey No.: 16-06172 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	Phone: (509)373-4968	Turnaround: N/A	
Return Report To: Caldwell, Joyce A		MSIN: R1-08	Phone: (509)376-0737

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
 	16-06172-3-EFF-BASE / TDU (Tenax)	Furans
 	16-06172-3-F1 / TDU (Tenax)	Furans
 	16-06172-3-G1 / TDU (Tenax)	Furans
 	16-06172-3-H1 / TDU (Tenax)	Furans
 	16-06172-3-H2 / TDU (Tenax)	Furans
 	16-06172-3-IN-BASE / TDU (Tenax)	Furans
5167022211	16-06172-6-A1 / Hydrar (SKC 226-17-1A) 5167022214	✓ Hg-Elemental
	5167022215	
5167022217	16-06172-6-A2 / Hydrar (SKC 226-17-1A) 5167022216	✓ Hg-Elemental
	5167022221	

Special Instructions: N/A

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	<i>[Signature]</i>	Josh Wilhelm	2704HV - H104	7/23/16	0700
Retrieved from Storage:	<i>[Signature]</i>	Dell Spaulding		7-25-16	0715

	Signature	Printed Name	Date	Time
Relinquished By:	<i>[Signature]</i>	Dell Spaulding	7-25-16	1100
Received By:	<i>[Signature]</i>	TERESA FORRESTER	7-25-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

20162164 Rev. 0
INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			Date Sampled: 07/22/2016		
CACN: <u>202367</u> 202009		COA: CB20	Survey No.: 16-06172 - Respirator Cartridge Testing A Farm		
Contact Name: Jones, Parker <i>with FESIL</i>		Phone: (509)373-4966	Turnaround: N/A		
Return Report To: Caldwell, Joyce A			MSIN: R1-06	Phone: (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
<i>516T02223</i>	16-06172-6-B1 / Hydrar (SKC 226-17-1A) · <i>516T022231</i>  <i>516T022232</i>	Hg-Elemental ✓
<i>516T022234</i>	16-06172-6-BLANK / Hydrar (SKC 226-17-1A) · <i>516T022235</i>  <i>516T022236</i>	Hg-Elemental ✓
<i>516T022238</i>	16-06172-6-C1 / Hydrar (SKC 226-17-1A) · <i>516T022241</i>  <i>516T022242</i>	Hg-Elemental ✓
<i>516T022243</i>	16-06172-6-D1 / Hydrar (SKC 226-17-1A) · <i>516T022245</i>  <i>516T022246</i>	Hg-Elemental ✓
<i>516T022247</i>	16-06172-6-E1 / Hydrar (SKC 226-17-1A) · <i>516T022250</i>  <i>516T022251</i>	Hg-Elemental ✓
<i>516T022252</i>	16-06172-6-EFF-BASE / Hydrar (SKC 226-17-1A) · <i>516T022253</i>  <i>516T022254</i>	Hg-Elemental ✓
<i>516T022255</i>	16-06172-6-F1 / Hydrar (SKC 226-17-1A) · <i>516T022256</i>  <i>516T022257</i>	Hg-Elemental ✓
<i>516T022258</i>	16-06172-6-G1 / Hydrar (SKC 226-17-1A) · <i>516T022259</i>  <i>516T022260</i>	Hg-Elemental ✓

Special Instructions: *N/A*

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	<i>[Signature]</i>	Josh Wilhelm	2704 HW - H104	7/23/16	0700
Retrieved from Storage:	<i>[Signature]</i>	Dell Spaulding		7-25-16	0715

	Signature	Printed Name	Date	Time
Relinquished By:	<i>[Signature]</i>	Dell Spaulding	7-25-16	1100
Received By:	<i>[Signature]</i>	TERESA F. DIRECTOR	7-25-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

20162164 Rev. 0
INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			Date Sampled: 07/22/2016		
CACN: 202367		COA: CB20	Survey No.: 16-06172 - Respirator Cartridge Testing A Farm		
Contact Name: Jones, Parker		Phone: (509)373-4966	Turnaround: N/A		
Return Report To: Caldwell, Joyce A			MSIN: R1-06	Phone: (509)376-0737	
Laboratory Log No.	Sample ID/Type/Description	Required Analysis			
516T022261	16-06172-6-H1 / Hydrar (SKC 226-17-1A) · 516T022263 516T022264	Hg-Elemental			
516T022267	16-06172-6-H2 / Hydrar (SKC 226-17-1A) · 516T022269 516T022270	Hg-Elemental			
516T022273	16-06172-6-IN-BASE / Hydrar (SKC 226-17-1A) · 516T0222674 516T022275	Hg-Elemental			
16-06172-7-A1 / CISA (SKC 226-29)					
16-06172-7-A2 / CISA (SKC 226-29)					
16-06172-7-B1 / CISA (SKC 226-29)					
16-06172-7-BLANK / CISA (SKC 226-29)					
16-06172-7-C1 / CISA (SKC 226-29)					
Special Instructions: N/A					
	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	<i>[Signature]</i>	Josh Wilhelm	2704MV-H104	7/23/16	0700
Retrieved from Storage:	<i>[Signature]</i>	Dell Spaulding		7-25-16	0715
	Signature	Printed Name	Date	Time	
Relinquished By:	<i>[Signature]</i>	Dell Spaulding	7-25-16	1100	
Received By:	<i>[Signature]</i>	TERESA FORRESTER	7-25-16	1100	
Relinquished By:					
Received By:					
Relinquished By:					
Received By:					
Additional Comments:					

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/23/2016	
CACN: 000067 202003	COA: CR20	Survey No.: 16-06173 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	Phone: (509)373-4966	Turnaround: N/A	
Return Report To: Caldwell, Joyce A		MSIN: R1-06	Phone: (509)376-0737

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
	16-06173-3-EFF-BASE / TDU (Tenax) 	Furans
	16-06173-3-F17-TDU (Tenax) 	Furans
	16-06173-3-G1 / TDU (Tenax) 	Furans
	16-06173-3-H1 / TDU (Tenax) 	Furans
	16-06173-3-H2 / TDU (Tenax) 	Furans
	16-06173-3-IN-BASE / TDU (Tenax) 	Furans
	16-06173-6-A1 / Hydrar (SKC 226-17-1A) <i>516T022283</i>  <i>'516T022284</i>	Hg-Elemental
	16-06173-6-A2 / Hydrar (SKC 226-17-1A) <i>516T0222856</i>  <i>'516T022287</i>	Hg-Elemental

7-25-16
SKT022282
82

7-25-16
SKT022285

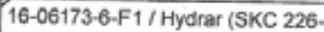
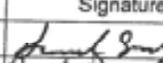
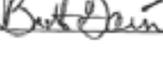
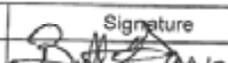
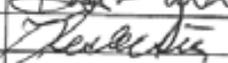
7-25-16

Special Instructions:					
	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Gerrade Saenz	2704 HV/H104	7-23-16	2359
Retrieved from Storage:		BRETT GARNER		7-25-16	0742

	Signature	Printed Name	Date	Time
Relinquished By:		BRETT GARNER	7/25/16	11:00
Received By:		Leslie DIAZ	7/25/16	11:00
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

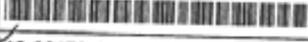
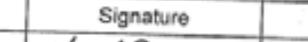
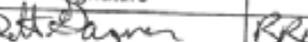
Additional Comments:

20162164 Rev. 0
INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

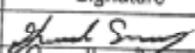
Contractor: Washington River Protection Solutions			Date Sampled: 07/23/2016		
CACN: 202362 202008		COA: CB20	Survey No.: 16-06173 - Respirator Cartridge Testing A Farm		
Contact Name: Jones, Parker L		Phone: (509)373-4968	Turnaround: N/A		
Return Report To: Caldwell, Joyce A			MSIN: R1-06	Phone: (509)376-0737	
Laboratory Log No.	Sample ID/Type/Description	Barcode	Sample ID	Required Analysis	
S16T022288	16-06173-6-B1 / Hydrar (SKC 226-17-1A)		S16T022289	Hg-Elemental	
			S16T022290		
S16T022490	16-06173-6-BLANK / Hydrar (SKC 226-17-1A)		S16T022492	Hg-Elemental	
			S16T022493		
S16T022494	16-06173-6-C1 / Hydrar (SKC 226-17-1A)		S16T022495	Hg-Elemental	
			S16T022496		
S16T022497	16-06173-6-D1 / Hydrar (SKC 226-17-1A)		S16T022498	Hg-Elemental	
			S16T022499		
S16T022500	16-06173-6-E1 / Hydrar (SKC 226-17-1A)		S16T022501	Hg-Elemental	
			S16T022502		
S16T022503	16-06173-6-EFF-BASE / Hydrar (SKC 226-17-1A)		S16T022504	Hg-Elemental	
			S16T022505		
S16T022506	16-06173-6-F1 / Hydrar (SKC 226-17-1A)		S16T022507	Hg-Elemental	
			S16T022508		
S16T022520	16-06173-6-G1 / Hydrar (SKC 226-17-1A)		S16T022524	Hg-Elemental	
			S16T022525		
Special Instructions:					
	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Gerardo Sanchez	2704 HU / H 104	7-23-16	2359
Retrieved from Storage:		BRETT GARNER		7-25-16	0742
	Signature	Printed Name	Date	Time	
Relinquished By:		BRETT GARNER	7/25/16	11:00	
Received By:		Leslie DIAZ	7/25/16	11:00	
Relinquished By:					
Received By:					
Relinquished By:					
Received By:					
Additional Comments:					

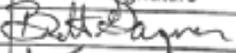
20162164 Rev. 0
INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/23/2016	
CACN: 202007 202003	COA: CB20	Survey No.: 16-06173 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	Phone: (509)373-4966	Turnaround: N/A	
Return Report To: Caldwell, Joyce A	MSIN: R1-06	Phone: (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
516T022528	16-06173-6-H1 / Hydrar (SKC 226-17-1A)  516T022529	Hg-Elemental
516T022531	16-06173-6-H2 / Hydrar (SKC 226-17-1A)  516T022530	Hg-Elemental
516T022535	16-06173-6-IN-BASE / Hydrar (SKC 226-17-1A)  516T022532	Hg-Elemental
	16-06173-6-IN-BASE / Hydrar (SKC 226-17-1A)  516T022533	Hg-Elemental
	16-06173-6-IN-BASE / Hydrar (SKC 226-17-1A)  516T022538	Hg-Elemental
	16-06173-6-IN-BASE / Hydrar (SKC 226-17-1A)  516T022539	Hg-Elemental
	16-06173-7-A1 / CISA (SKC 226-29) 	NH3
	16-06173-7-A2 / CISA (SKC 226-29) 	NH3
	16-06173-7-B1 / CISA (SKC 226-29) 	NH3
	16-06173-7-BLANK / CISA (SKC 226-29) 	NH3
	16-06173-7-C1 / CISA (SKC 226-29) 	NH3

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Gerrardo Saenz	2704 HU / H104	7-23-16	2359
Retrieved from Storage:		BRETT GARNER		7-25-16	0742

	Signature	Printed Name	Date	Time
Relinquished By:		BRETT GARNER	7/25/16	11:00
Received By:		Leslie Diaz	7/25/16	11:00
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

**FINAL REPORT ON AMMONIA VAPOR TUBES
FOR CARTRIDGE EVALUATION
COLLECTED JULY 22 – 23, 2016**

Document No.: 20162135 Rev. 0

Michael A. Purcell
WAI Hanford Laboratory

Date Published
August 18, 2016



LAB # 184777

Prepared for:

Prepared by:



Joyce A. Caldwell
Washington River Protection
Solutions, Inc.
P.O. Box 850
Richland, WA 99352
509-376-0737

WAI Hanford Laboratory
1955 Jadwin Ave, Suite 330
Richland, WA 99354
509-373-3240


August 18, 2016
Michael A. Purcell, WHL Project Coordinator

NARRATIVE

**FINAL REPORT ON AMMONIA VAPOR TUBES
FOR CARTRIDGE EVALUATION
COLLECTED JULY 22 – 23, 2016**

This final report presents the results of twenty-six ammonia vapor tubes received at the 222-S Laboratory on July 25, 2016, in good condition and with adequate paperwork. The samples were logged into sample delivery group 20162135.

DISCLAIMERS

- The information contained in this report is intended only for the use of the addressee and should be considered confidential.
- This report shall not be reproduced, except in full, without written approval of the laboratory.
- The results shown in this report pertain only to the actual samples tested.
- These results conform to the requirements specified in the referenced methods/procedures and specifications provided verbally or electronically by the customer. Any deviations or modifications are discussed in the following narrative.
- This report only addresses laboratory activities related to the listed surveys. Requirements or anomalies concerning field sampling are not addressed in this report.

PROCEDURES

Method	Preparation Procedure	Analysis Procedure
Ammonia by OSHA ID-188	LA-533-117, Rev. 3-1	LA-503-157, Rev. 2-5

ANALYTICAL SUMMARY

The vapor tubes were tested for ammonia, as specified on the chain of custody. Standard laboratory procedures for ion chromatography were followed as well as the requirements in WHL-MP-1029, *WHL Industrial Hygiene Quality Assurance Project Plan for 222-S Laboratory (QAPP)*. Program specific work authorization instructions have been provided for WRPS IH sample analysis through verbal and electronic communication with the customer point of contact, and are kept as a record by the laboratory. When applicable, any client communication specific to the samples in this report will be included herein. All quality control criteria in the QAPP were met.

The measurement uncertainty was estimated based on the historical behavior of laboratory control samples (LCS). The results of 373 LCS determinations indicate a mean recovery of 98% with a standard deviation of 3.3%. Statistical process control limits for the LCS are 88 - 107%, with no significant bias. The overall estimate of uncertainty is 6.7%, with coverage factor (k) = 2.

Due to background levels of ammonium (or interfering compounds) that are typically present in the media used in the sorbent tubes for collecting the vapor samples, positive results are obtained for the preparation blank. Laboratories typically correct the LCS and all field samples for these background levels, when detected. However, per agreement with the customer, no blank subtraction was performed. The client-requested reporting limit is 10 µg per sample, which makes the analysis of additional blanks and subsequent blank subtraction unnecessary. It is the

laboratory's opinion that including the media contribution, which is well below the client's requested reporting limit, provides results that are more conservative than when blank subtractions are performed. Fifteen of the twenty-six ammonia results for sample group 20162135 were above the reporting limit of 10 µg per sample. For these samples, the total result includes the contribution from the back resin portion even though the back resin portion result is lower than the reporting limit (see Attachment 1). For sample 16-06173-7-D1, the back resin portion result was greater than the front resin portion result. The laboratory was unable to determine whether this anomaly occurred during sampling or labeling.

20162135 Rev. 0

Attachment 1

DATA SUMMARY REPORT

4 of 15

C.226

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162135

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-06172-7-A1	Total	S16T021581	Ammonia	µg/sample	n/a	<10.0	1.97E+03	500
16-06172-7-A1	Front Resin	S16T021582	Ammonia	µg/sample	93.0	<10.0	1.97E+03	500
16-06172-7-A1	Back Resin	S16T021583	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-06172-7-A2	Total	S16T021584	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06172-7-A2	Front Resin	S16T021585	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-06172-7-A2	Back Resin	S16T021586	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-06172-7-B1	Total	S16T021619	Ammonia	µg/sample	n/a	<10.0	120	50.0
16-06172-7-B1	Front Resin	S16T021646	Ammonia	µg/sample	93.0	<10.0	120	50.0
16-06172-7-B1	Back Resin	S16T021647	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-06172-7-BLANK	Total	S16T021661	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06172-7-BLANK	Front Resin	S16T021663	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-BLANK	Back Resin	S16T021664	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-C1	Total	S16T021665	Ammonia	µg/sample	n/a	<10.0	1.05E+03	500
16-06172-7-C1	Front Resin	S16T021678	Ammonia	µg/sample	95.1	<10.0	1.05E+03	500
16-06172-7-C1	Back Resin	S16T021679	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-D1	Total	S16T021684	Ammonia	µg/sample	n/a	<10.0	174	50.0
16-06172-7-D1	Front Resin	S16T021687	Ammonia	µg/sample	95.1	<10.0	173	50.0
16-06172-7-D1	Back Resin	S16T021688	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-E1	Total	S16T021692	Ammonia	µg/sample	n/a	<10.0	1.16E+03	500
16-06172-7-E1	Front Resin	S16T021693	Ammonia	µg/sample	95.1	<10.0	1.16E+03	500
16-06172-7-E1	Back Resin	S16T021694	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-EFF-BASE	Total	S16T021698	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06172-7-EFF-BASE	Front Resin	S16T021700	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-EFF-BASE	Back Resin	S16T021701	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-F1	Total	S16T021741	Ammonia	µg/sample	n/a	<10.0	1.35E+03	500
16-06172-7-F1	Front Resin	S16T021742	Ammonia	µg/sample	95.1	<10.0	1.35E+03	500
16-06172-7-F1	Back Resin	S16T021743	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-G1	Total	S16T021750	Ammonia	µg/sample	n/a	<10.0	297	100
16-06172-7-G1	Front Resin	S16T021754	Ammonia	µg/sample	95.1	<10.0	296	100
16-06172-7-G1	Back Resin	S16T021755	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-H1	Total	S16T021981	Ammonia	µg/sample	n/a	<10.0	1.94E+03	500
16-06172-7-H1	Front Resin	S16T021984	Ammonia	µg/sample	95.1	<10.0	1.94E+03	500
16-06172-7-H1	Back Resin	S16T021985	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-H2	Total	S16T021986	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06172-7-H2	Front Resin	S16T021987	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-H2	Back Resin	S16T021988	Ammonia	µg/sample	95.1	<10.0	<10.0	10.0
16-06172-7-IN-BASE	Total	S16T021992	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06172-7-IN-BASE	Front Resin	S16T021993	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06172-7-IN-BASE	Back Resin	S16T021994	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-A1	Total	S16T022039	Ammonia	µg/sample	n/a	<10.0	1.86E+03	200
16-06173-7-A1	Front Resin	S16T022040	Ammonia	µg/sample	95.9	<10.0	1.86E+03	200
16-06173-7-A1	Back Resin	S16T022041	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-A2	Total	S16T022046	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06173-7-A2	Front Resin	S16T022049	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-A2	Back Resin	S16T022050	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-B1	Total	S16T022051	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06173-7-B1	Front Resin	S16T022054	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-B1	Back Resin	S16T022056	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162135

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-06173-7-BLANK	Total	S16T022087	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06173-7-BLANK	Front Resin	S16T022089	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-BLANK	Back Resin	S16T022090	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-C1	Total	S16T022091	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06173-7-C1	Front Resin	S16T022092	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-C1	Back Resin	S16T022093	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-D1	Total	S16T022102	Ammonia	µg/sample	n/a	<10.0	30.6	10.0
16-06173-7-D1	Front Resin	S16T022105	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-D1	Back Resin	S16T022106	Ammonia	µg/sample	95.9	<10.0	29.7	10.0
16-06173-7-E1	Total	S16T022107	Ammonia	µg/sample	n/a	<10.0	52.7	10.0
16-06173-7-E1	Front Resin	S16T022108	Ammonia	µg/sample	95.9	<10.0	52.1	10.0
16-06173-7-E1	Back Resin	S16T022109	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-EFF-BASE	Total	S16T022112	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06173-7-EFF-BASE	Front Resin	S16T022113	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-EFF-BASE	Back Resin	S16T022114	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-F1	Total	S16T022143	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-06173-7-F1	Front Resin	S16T022144	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-F1	Back Resin	S16T022145	Ammonia	µg/sample	95.9	<10.0	<10.0	10.0
16-06173-7-G1	Total	S16T022146	Ammonia	µg/sample	n/a	<10.0	1.25E+03	200
16-06173-7-G1	Front Resin	S16T022147	Ammonia	µg/sample	95.3	<10.0	1.25E+03	200
16-06173-7-G1	Back Resin	S16T022148	Ammonia	µg/sample	95.3	<10.0	<10.0	10.0
16-06173-7-H1	Total	S16T022149	Ammonia	µg/sample	n/a	<10.0	771	200
16-06173-7-H1	Front Resin	S16T022151	Ammonia	µg/sample	95.3	<10.0	770	200
16-06173-7-H1	Back Resin	S16T022152	Ammonia	µg/sample	95.3	<10.0	<10.0	10.0
16-06173-7-H2	Total	S16T022156	Ammonia	µg/sample	n/a	<10.0	82.4	10.0
16-06173-7-H2	Front Resin	S16T022159	Ammonia	µg/sample	95.3	<10.0	81.6	10.0
16-06173-7-H2	Back Resin	S16T022160	Ammonia	µg/sample	95.3	<10.0	<10.0	10.0
16-06173-7-IN-BASE	Total	S16T022161	Ammonia	µg/sample	n/a	<10.0	12.7	10.0
16-06173-7-IN-BASE	Front Resin	S16T022162	Ammonia	µg/sample	95.3	<10.0	12.0	10.0
16-06173-7-IN-BASE	Back Resin	S16T022163	Ammonia	µg/sample	95.3	<10.0	<10.0	10.0

20162135 Rev. 0

Attachment 2

ANALYSIS DATE REPORT

7 of 15

C.229

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162135

Laboratory Sample ID	Customer Sample ID	Method	Preparation Date	Analysis Date
S16T021582	16-06172-7-A1	Ammonia	08/03/2016 08:00	08/04/2016 11:37
S16T021583	16-06172-7-A1	Ammonia	08/03/2016 08:00	08/03/2016 22:58
S16T021585	16-06172-7-A2	Ammonia	08/03/2016 08:00	08/04/2016 00:05
S16T021586	16-06172-7-A2	Ammonia	08/03/2016 08:00	08/04/2016 00:22
S16T021646	16-06172-7-B1	Ammonia	08/03/2016 08:00	08/04/2016 11:54
S16T021647	16-06172-7-B1	Ammonia	08/03/2016 08:00	08/04/2016 00:56
S16T021663	16-06172-7-BLANK	Ammonia	08/03/2016 08:00	08/04/2016 03:11
S16T021664	16-06172-7-BLANK	Ammonia	08/03/2016 08:00	08/04/2016 03:28
S16T021678	16-06172-7-C1	Ammonia	08/03/2016 08:00	08/04/2016 13:02
S16T021679	16-06172-7-C1	Ammonia	08/03/2016 08:00	08/04/2016 04:01
S16T021687	16-06172-7-D1	Ammonia	08/03/2016 08:00	08/04/2016 13:19
S16T021688	16-06172-7-D1	Ammonia	08/03/2016 08:00	08/04/2016 04:35
S16T021693	16-06172-7-E1	Ammonia	08/03/2016 08:00	08/04/2016 13:35
S16T021694	16-06172-7-E1	Ammonia	08/03/2016 08:00	08/04/2016 06:00
S16T021700	16-06172-7-EFF-BASE	Ammonia	08/03/2016 08:00	08/04/2016 06:17
S16T021701	16-06172-7-EFF-BASE	Ammonia	08/03/2016 08:00	08/04/2016 06:33
S16T021742	16-06172-7-F1	Ammonia	08/03/2016 08:00	08/04/2016 13:52
S16T021743	16-06172-7-F1	Ammonia	08/03/2016 08:00	08/04/2016 07:07
S16T021754	16-06172-7-G1	Ammonia	08/03/2016 08:00	08/04/2016 14:09
S16T021755	16-06172-7-G1	Ammonia	08/03/2016 08:00	08/04/2016 07:41
S16T021984	16-06172-7-H1	Ammonia	08/03/2016 08:00	08/04/2016 14:26
S16T021985	16-06172-7-H1	Ammonia	08/03/2016 08:00	08/04/2016 08:15
S16T021987	16-06172-7-H2	Ammonia	08/03/2016 08:00	08/04/2016 09:39
S16T021988	16-06172-7-H2	Ammonia	08/03/2016 08:00	08/04/2016 09:56
S16T021993	16-06172-7-IN-BASE	Ammonia	08/04/2016 08:00	08/04/2016 18:39
S16T021994	16-06172-7-IN-BASE	Ammonia	08/04/2016 08:00	08/04/2016 19:02
S16T022040	16-06173-7-A1	Ammonia	08/04/2016 08:00	08/05/2016 16:38
S16T022041	16-06173-7-A1	Ammonia	08/04/2016 08:00	08/04/2016 19:48
S16T022049	16-06173-7-A2	Ammonia	08/04/2016 08:00	08/04/2016 20:11
S16T022050	16-06173-7-A2	Ammonia	08/04/2016 08:00	08/04/2016 20:35
S16T022054	16-06173-7-B1	Ammonia	08/04/2016 08:00	08/04/2016 22:07
S16T022056	16-06173-7-B1	Ammonia	08/04/2016 08:00	08/04/2016 22:30
S16T022089	16-06173-7-BLANK	Ammonia	08/04/2016 08:00	08/04/2016 22:53
S16T022090	16-06173-7-BLANK	Ammonia	08/04/2016 08:00	08/04/2016 23:17
S16T022092	16-06173-7-C1	Ammonia	08/04/2016 08:00	08/04/2016 23:40
S16T022093	16-06173-7-C1	Ammonia	08/04/2016 08:00	08/05/2016 00:03
S16T022105	16-06173-7-D1	Ammonia	08/04/2016 08:00	08/05/2016 00:26
S16T022106	16-06173-7-D1	Ammonia	08/04/2016 08:00	08/05/2016 00:49
S16T022108	16-06173-7-E1	Ammonia	08/04/2016 08:00	08/05/2016 01:12
S16T022109	16-06173-7-E1	Ammonia	08/04/2016 08:00	08/05/2016 01:35
S16T022113	16-06173-7-EFF-BASE	Ammonia	08/04/2016 08:00	08/05/2016 03:08
S16T022114	16-06173-7-EFF-BASE	Ammonia	08/04/2016 08:00	08/05/2016 03:31
S16T022144	16-06173-7-F1	Ammonia	08/04/2016 08:00	08/05/2016 03:54
S16T022145	16-06173-7-F1	Ammonia	08/04/2016 08:00	08/05/2016 04:18
S16T022147	16-06173-7-G1	Ammonia	08/04/2016 08:00	08/05/2016 17:24
S16T022148	16-06173-7-G1	Ammonia	08/04/2016 08:00	08/05/2016 07:46

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162135

Laboratory Sample ID	Customer Sample ID	Method	Preparation Date	Analysis Date
S16T022151	16-06173-7-H1	Ammoria	08/04/2016 08:00	08/05/2016 17:01
S16T022152	16-06173-7-H1	Ammoria	08/04/2016 08:00	08/05/2016 08:32
S16T022159	16-06173-7-H2	Ammoria	08/04/2016 08:00	08/05/2016 08:55
S16T022160	16-06173-7-H2	Ammoria	08/04/2016 08:00	08/05/2016 09:18
S16T022162	16-06173-7-IN-BASE	Ammoria	08/04/2016 08:00	08/05/2016 10:51
S16T022163	16-06173-7-IN-BASE	Ammoria	08/04/2016 08:00	08/05/2016 11:14

20162135 Rev. 0

Attachment 3

RECEIPT PAPERWORK

10 of 15

C.232

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST			ATS-LO-090-101 Rev <u>DG-1</u>
Date Samples Received: <u>7-25-16</u> Total Number of Samples: <u>312</u> Group #: <u>20162135-NH3</u>				
Sample Custodian: <u>TERESA FRAZIER</u> IH Technician: <u>[Signature]</u>				
Sample Custodian to Complete: <u>[Signature]</u>				
Action	Yes	No	N/A	Comments
RSR provided?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Verify GKI is complete	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> In Project File
Received from an alpha facility?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Contact PC for approval to release
Check that outer custody seal is intact, if present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Record cooler temperature in centigrade, as appropriate	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Check if no cooler and/or no ice
Samples are intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If No, provide comments below
RSA/COC provided and complete containing the following information?				
• Client name and client sample number	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Date and time of sampling	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Sampling location or origin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Container type, size, and number	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Preservatives (if used) noted on the COC/RSA and sample bottles	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
• Analysis request is clear	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Signature of persons relinquishing and receiving samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Date and/or time of sample custody exchange	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Verify that sample numbers on containers match the COG and/or RSA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Samples stored properly (e.g., refrigeration)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Notify the PC immediately if any problems are noted. Any "No" checked boxes require PC resolution. For WRPS samples, the initials block below is completed by the responsible WRPS PC.				
Samples acceptable for release? <u>Yes</u> PC/SC Initials <u>RLM</u> Date <u>7-25-16</u>				
If No, comment on communication and resolution: <u>WRPS</u> <u>7/25/16</u>				
<u>225016</u> <u>WRPS - Ship - 182</u>				
<u>Run - 78</u>				
<u>WHL - NH₃ - 26</u>				
<u>Hg - 26</u>				
Number of IH Samples Received: <u>Acetonitrile 26</u>				
Aldehyde Screen: <u>26</u>	Amines: <u>26</u>	Ammonia: <u>26</u>	Aromatic HC: _____	Asbestos: _____
Beryllium: _____	Be-Bulk: _____	Be-Filter: _____	Be-Wipe: _____	1,3-Butadiene: <u>52</u>
Formaldehyde: _____	Furans: <u>26</u>	Mercury: <u>26</u>	Methanol: _____	Nitrosamines: <u>26</u>
Nitrous Oxide: _____	Pyridines: <u>26</u>	SVOA: <u>26</u>	VOA: <u>26</u>	Other-IH: _____

A-6005-302 (REV 4)

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/22/2016	
CACN: 702367 ²⁰¹⁰⁰⁷ COA: CB20		Survey No.: 16-06172 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L		Phone: (509)373-4966	Turnaround: N/A
Return Report To: Caldwell, Joyce A		MSIN: R1-06	Phone: (509)376-0737
Laboratory Log No.	Sample ID/Type/Description	Required Analysis	
 	16-06172-6-H1 / Hydrar (SKC 226-17-1A)	Hg-Elemental <i>cm</i>	
 	16-06172-6-H2 / Hydrar (SKC 226-17-1A)	Hg-Elemental	
 	16-06172-6-IN-BASE / Hydrar (SKC 226-17-1A)	Hg-Elemental	
<i>SKT021581</i>	16-06172-7-A1 / CISA (SKC 226-29) <i>SKT021582</i>	NH3	
<i>SKT021584</i>	16-06172-7-A2 / CISA (SKC 226-29) <i>SKT021583</i>	NH3	
<i>SKT021619</i>	16-06172-7-B1 / CISA (SKC 226-29) <i>SKT021585</i>	NH3	
<i>SKT021661</i>	16-06172-7-BLANK / CISA (SKC 226-29) <i>SKT021586</i>	NH3	
<i>SKT021665</i>	16-06172-7-C1 / CISA (SKC 226-29) <i>SKT021646</i>	NH3	
	<i>SKT021647</i>	NH3	
	<i>SKT021663</i>	NH3	
	<i>SKT021664</i>	NH3	
	<i>SKT021678</i>	NH3	
	<i>SKT021679</i>	NH3	
Special Instructions: <i>N/A</i>			
	Signature	Printed Name	Location
Delivered to Storage:	<i>[Signature]</i>	<i>Josh Wilhelm</i>	<i>2704 HV-H104</i>
Retrieved from Storage:	<i>[Signature]</i>	<i>Dell Spaulding</i>	<i>7-25-16</i>
	Signature	Printed Name	Date
Relinquished By:	<i>[Signature]</i>	<i>Dell Spaulding</i>	<i>7-25-16</i>
Received By:	<i>[Signature]</i>	<i>TERESA FORRESTEN</i>	<i>1100</i>
Relinquished By:			
Received By:			
Relinquished By:			
Received By:			
Additional Comments:			

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/22/2016	
CACN: 202-767-202009	COA: CB20	Survey No.: 16-06172 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	Phone: (509)373-4966	Turnaround: N/A	
Return Report To: Caldwell, Joyce A		MSIN: R1-06	Phone: (509)376-0737

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
SI6T021684	16-06172-7-D1 / CISA (SKC 226-29) SI6T021687 SI6T021688	NH3
SI6T021692	16-06172-7-E1 / CISA (SKC 226-29) SI6T021693 SI6T021694	NH3
SI6T021698	16-06172-7-EFF-BASE / CISA (SKC 226-29) SI6T021700 SI6T021701	NH3
SI6T021741	16-06172-7-F1 / CISA (SKC 226-29) SI6T021742 SI6T021743	NH3
SI6T021750	16-06172-7-G1 / CISA (SKC 226-29) SI6T021754 SI6T021755	NH3
SI6T021981	16-06172-7-H1 / CISA (SKC 226-29) SI6T021984 SI6T021985	NH3
SI6T021986	16-06172-7-H2 / CISA (SKC 226-29) SI6T021987 SI6T021988	NH3
SI6T021993	16-06172-7-IN-BASE / CISA (SKC 226-29) SI6T021993 SI6T021994	NH3

Special Instructions: N/A

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	<i>[Signature]</i>	Josh Wilhelm	2704 HV - H104	7/25/16	0700
Retrieved from Storage:	<i>[Signature]</i>	Dell Spaulding		7-25-16	0720

	Signature	Printed Name	Date	Time
Relinquished By:	<i>[Signature]</i>	Dell Spaulding	7-25-16	1100
Received By:	<i>[Signature]</i>	TERESA FORESTER	7-25-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST



Contractor: Washington River Protection Solutions		Date Sampled: 07/23/2016	
CACN: 262397 202003	COA: CB20	Survey No.: 16-06173 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	Phone: (509)373-4988	Turnaround: N/A	
Return Report To: Caldwell, Joyce A		MSIN: R1-06	Phone: (509)376-0737

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
 	16-06173-6-H1 / Hydrar (SKC 226-17-1A)	Hg-Elemental
 	16-06173-6-H2 / Hydrar (SKC 226-17-1A)	Hg-Elemental
 	16-06173-6-IN-BASE / Hydrar (SKC 226-17-1A)	Hg-Elemental
S16T022039	16-06173-7-A1 / CISA (SKC 226-29) S16T022040 S16T022041	NH3
S16T022046	16-06173-7-A2 / CISA (SKC 226-29) S16T022049 S16T022050	NH3
S16T022051	16-06173-7-B1 / CISA (SKC 226-29) S16T022054 S16T022056	NH3
S16T022057	16-06173-7-BLANK / CISA (SKC 226-29) S16T022089 S16T022090	NH3
S16T022091	16-06173-7-C1 / CISA (SKC 226-29) S16T022092 S16T022093	NH3

Special Instructions:

Signature	Printed Name	Location	Date	Time
<i>[Signature]</i>	Gerardo Saenz	2704 HV/H104	7-23-16	2359
<i>[Signature]</i>	PRETT GARNER		7-25-16	0734

Signature	Printed Name	Date	Time
<i>[Signature]</i>	PRETT GARNER	7/25/16	11:00
<i>[Signature]</i>	Leske Diaz	7/25/16	11:00
Relinquished By:			
Received By:			
Relinquished By:			
Received By:			
Relinquished By:			
Received By:			

Additional Comments:

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/23/2016	
CACN: 202997 202003	COA: CB20	Survey No.: 16-06173 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	Phone: (509)373-4966	Turnaround: N/A	
Return Report To: Caldwell, Joyce A		MSIN: R1-08	Phone: (509)376-0737

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
516T022102	16-06173-7-D1 / CISA (SKC 226-29) 516T022105 516T022106	NH3
516T022107	16-06173-7-E1 / CISA (SKC 226-29) 516T022108 516T022109	NH3
516T022112	16-06173-7-EFF-BASE / CISA (SKC 226-29) 516T022113 516T022114	NH3
516T022144	16-06173-7-F1 / CISA (SKC 226-29) 516T022144 516T022145	NH3
516T022146	16-06173-7-G1 / CISA (SKC 226-29) 516T022147 516T022148	NH3
516T022149	16-06173-7-H1 / CISA (SKC 226-29) 516T022151 516T022152	NH3
516T022156	16-06173-7-H2 / CISA (SKC 226-29) 516T022159 516T022160	NH3
516T022161	16-06173-7-IN-BASE / CISA (SKC 226-29) 516T022162 516T022163	NH3

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	<i>[Signature]</i>	Gerrald Saene	2704 HU/H104	7-23-16	2359
Retrieved from Storage:	<i>[Signature]</i>	BRETT GARNER		7-25-16	0734

	Signature	Printed Name	Date	Time
Relinquished By:	<i>[Signature]</i>	BRETT GARNER	7/25/16	11:00
Received By:	<i>[Signature]</i>	LESLIE DITZ	7/25/16	11:00
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:



ANALYTICAL REPORT

Report Date: August 03, 2016

Robert (Buddy) Sosa
Washington River Protection So
PO Box 850, MSIN T6-02
Richland, WA 99352

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov
20162150

Workorder: 34-1620930
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m³), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m³), Result (ppm), RL (ug/sample). Rows include Formaldehyde and Acetaldehyde.

Results Continued on Next Page

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 268 9992
ALS GROUP USA, CORP. An ALS Limited Company



RIGHT SOLUTIONS RIGHT PARTNER



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde.

Results Continued on Next Page



ANALYTICAL REPORT

Workorder: **34-1620930**
 Client Project ID: Washington River Protection
 So
 Purchase Order: 55502 Rel9
 Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021905		Collected: 07/22/2016		
Lab ID: 1620930005		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/28/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021906		Collected: 07/22/2016		
Lab ID: 1620930006		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/28/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Formaldehyde	0.053	NA	NA	0.050
Acetaldehyde	1.3	NA	NA	0.050
Acetone	3.2	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	0.088	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021907		Collected: 07/22/2016		
Lab ID: 1620930007		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/28/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	1.1	NA	NA	0.050
Acetone	6.2	NA	NA	0.050

Results Continued on Next Page



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, and o-Tolualdehyde.

Results Continued on Next Page



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Hexanal and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, and Acetone.

Results Continued on Next Page



ANALYTICAL REPORT

Workorder: **34-1620930**
 Client Project ID: Washington River Protection
 So
 Purchase Order: 55502 Rel9
 Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021912		Collected: 07/22/2016		
Lab ID: 1620930012		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/28/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	0.16	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021913		Collected: 07/22/2016		
Lab ID: 1620930013		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/28/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Formaldehyde	0.25	NA	NA	0.050
Acetaldehyde	0.091	NA	NA	0.050
Acetone	0.29	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	0.16	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde.

Results Continued on Next Page



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Hexanal and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, and Acetone.

Results Continued on Next Page



ANALYTICAL REPORT

Workorder: **34-1620930**
 Client Project ID: Washington River Protection
 So
 Purchase Order: 55502 Rel9
 Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021917		Collected: 07/23/2016		
Lab ID: 1620930017		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021918		Collected: 07/23/2016		
Lab ID: 1620930018		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	0.96	NA	NA	0.050
Acetone	4.1	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, and o-Tolualdehyde.

Results Continued on Next Page



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Hexanal and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, and Acetone.

Results Continued on Next Page



ANALYTICAL REPORT

Workorder: 34-1620930
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Formaldehyde, Acetaldehyde, Acetone, Acrolein, Propionaldehyde, Crotonaldehyde, Butyraldehyde, Benzaldehyde, Isovaleraldehyde, Valeraldehyde, m-Tolualdehyde, p-Tolualdehyde, o-Tolualdehyde, Hexanal, and 2,5-Dimethylbenzaldehyde.



ANALYTICAL REPORT

Workorder: **34-1620930**
 Client Project ID: Washington River Protection
 So
 Purchase Order: 55502 Rel9
 Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021924		Collected: 07/23/2016		
Lab ID: 1620930024		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Formaldehyde	0.21	NA	NA	0.050
Acetaldehyde	2.0	NA	NA	0.050
Acetone	14	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	0.89	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	0.72	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021925		Collected: 07/23/2016		
Lab ID: 1620930025		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	1.2	NA	NA	0.050
Acetone	8.7	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	0.13	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050

Results Continued on Next Page



ANALYTICAL REPORT

Workorder: **34-1620930**
 Client Project ID: Washington River Protection
 So
 Purchase Order: 55502 Rel9
 Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021925		Collected: 07/23/2016		
Lab ID: 1620930025		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021926		Collected: 07/23/2016		
Lab ID: 1620930026		Received: 07/27/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/29/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Formaldehyde	0.31	NA	NA	0.050
Acetaldehyde	0.12	NA	NA	0.050
Acetone	0.45	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Comments

- Quality Control: EPA TO-11A - (HBN: 173721)
LMB used to media correct LCS/LCSD and field samples for Acetone only.
- Quality Control: EPA TO-11A - (HBN: 173791)
LMB used to media correct LCS/LCSD and field samples for Acetone only.

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA TO-11A	/S/ David Teynor 08/02/2016 15:53	/S/ Christopher Winter 08/03/2016 10:00



ANALYTICAL REPORT

Workorder: **34-1620930**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA TO-11A	/S/ David Teynor 08/02/2016 17:05	/S/ Lyle Edwards 08/03/2016 09:31

Laboratory Contact Information

ALS Environmental
980 W Levoq Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alstf.lab@ALSGlobal.com
Web: www.alsllc.com

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	AClass (DoD ELAP)	ADE-1420	http://www.aclasscorp.com
	Utah (NELAC)	DATA 1	http://health.utah.gov/lab/bim/p/
	Nevada	UT00009	http://ndep.nv.gov/bsd/vilabservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CS/new/
	Iowa	IA# 376	http://www.iowadnr.gov/inside/DNR/Regulatory/Water.aspx
	Florida (TNI)	ES71067	http://www.dep.state.fl.us/labs/bars/sas/qa/
	Texas (TNI)	T 104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing			
CPSC	AClass (ISO 17025, CPSC)	ADE-1420	http://www.aclasscorp.com
Soil, Dust, Point Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	AClass (ISO 17025)	ADE-1420	http://www.aclasscorp.com



ANALYTICAL REPORT

Workorder: **34-1620930**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
NA = Not Applicable.
* No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
() This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ALS Environmental certifies this analytical report is in compliance with the Hanford SOW, both technically and for completeness. Release of the data contained in this report has been electronically authorized by the following laboratory representative:

Rand Potter, Project Manager, ALS Environmental



Quality Control Sample Batch Report

Analysis Information

Workorder: 1620930

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: EPA TO-11A
Batch: ILC/12388 (HBN: 173721)
Analyzed By: David Teynor

Blank

LMB: 510378			
Analyzed: 07/28/2016 00:00			
Units: ug/sample			
Analyte	Result	MDL	RL
Formaldehyde	ND	NA	0.0500
Acetaldehyde	ND	NA	0.0500
Acetone	0.326	NA	0.0500
Acrolein	ND	NA	0.0500
Propionaldehyde	ND	NA	0.0500
Crotonaldehyde	ND	NA	0.0500
Butyraldehyde	ND	NA	0.0500
Benzaldehyde	ND	NA	0.0500
Isovaleraldehyde	ND	NA	0.0500
Valeraldehyde	ND	NA	0.0500
m-Tolualdehyde	ND	NA	0.0500
p-Tolualdehyde	ND	NA	0.0500
o-Tolualdehyde	ND	NA	0.0500
Hexanal	ND	NA	0.0500
2,5-Dimethylbenzaldehyde	ND	NA	0.0500

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510379					LCSD: 510380				
Analyzed: 07/28/2016 00:00					Analyzed: 07/28/2016 00:00				
Dilution: 1					Dilution: 1				
Units: ug/sample					Units: ug/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Formaldehyde	3.09	3.00	103	87.8 116.8	3.02	101	2.29	0.0 20.0	
Acetaldehyde	3.06	3.00	102	94.7 110.5	3.03	101	0.985	0.0 20.0	
Acetone	2.67	3.00	89.1	89.2 119.9	2.64	88.1	1.13	0.0 20.0	
Acrolein	2.91	3.00	97.0	83.5 120.2	2.92	97.3	0.343	0.0 20.0	
Propionaldehyde	3.16	3.00	105	92.2 117.2	3.15	105	0.317	0.0 20.0	
Crotonaldehyde	3.05	3.00	102	83.1 114.8	3.02	101	0.988	0.0 20.0	
Butyraldehyde	3.05	3.00	102	88.6 120.8	3.05	102	0.00	0.0 20.0	
Benzaldehyde	3.06	3.00	102	96.0 112.3	3.07	102	0.326	0.0 20.0	
Isovaleraldehyde	3.10	3.00	103	95.4 121.6	3.10	103	0.00	0.0 20.0	
Valeraldehyde	3.06	3.00	102	85.3 120.4	3.06	102	0.00	0.0 20.0	
m-Tolualdehyde	3.22	3.00	107	80.9 118.8	3.09	103	4.12	0.0 20.0	
p-Tolualdehyde	2.76	3.00	92.0	83.5 122.2	2.83	94.3	2.50	0.0 20.0	
o-Tolualdehyde	2.92	3.00	97.3	91.6 111.4	2.91	97.0	0.343	0.0 20.0	
Hexanal	3.28	3.00	109	85.4 127.6	3.06	102	6.94	0.0 20.0	
2,5-Dimethylbenzaldehyde	3.23	3.00	108	99.8 118.7	3.21	107	0.621	0.0 20.0	



Quality Control Sample Batch Report

Analysis Information

Workorder: **1620930**

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: EPA TO-11A
Batch: ILC/12366 (HBN: 173721)
Analyzed By: David Teynor

Comments

LMB used to media correct LCS/LCSD and field samples for Acetone only.

QC Report Authorization (iS/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
iS/ David Teynor 08/02/2016 15:53	iS/ Christopher Winter 08/03/2016 10:00

Symbols and Definitions

- - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- ⊕ - Sample and Matrix Duplicate less than 5 times the reporting limit
- - Result is above the calibration range
- RPD - Relative % Difference (Spike / Spike Duplicate)
- ND - Not Detected (U - Qualifier also flags analyte as not detected)
- NA - Not Applicable
- QC results are not adjusted for moisture correction, where applicable



Quality Control Sample Batch Report

Analysis Information

Workorder: 1620930

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: EPA TO-11A
Batch: ILC/12393 (HBN: 173791)
Analyzed By: David Teynor

Blank

LMB: 510613			
Analyzed: 07/29/2016 00:00			
Units: ug/sample			
Analyte	Result	MDL	RL
Formaldehyde	ND	NA	0.0500
Acetaldehyde	ND	NA	0.0500
Acetone	0.222	NA	0.0500
Acrolein	ND	NA	0.0500
Propionaldehyde	ND	NA	0.0500
Crotonaldehyde	ND	NA	0.0500
Butyraldehyde	ND	NA	0.0500
Benzaldehyde	ND	NA	0.0500
Isovaleraldehyde	ND	NA	0.0500
Valeraldehyde	ND	NA	0.0500
m-Tolualdehyde	ND	NA	0.0500
p-Tolualdehyde	ND	NA	0.0500
o-Tolualdehyde	ND	NA	0.0500
Hexanal	ND	NA	0.0500
2,5-Dimethylbenzaldehyde	ND	NA	0.0500

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510614					LCSD: 510615				
Analyzed: 07/29/2016 00:00					Analyzed: 07/29/2016 00:00				
Dilution: 1					Dilution: 1				
Units: ug/sample					Units: ug/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Formaldehyde	3.03	3.00	101	87.8 116.8	3.09	103	1.96	0.0 20.0	
Acetaldehyde	3.05	3.00	102	94.7 110.5	3.07	102	0.654	0.0 20.0	
Acetone	2.94	3.00	98.0	89.2 119.9	2.98	99.3	0.702	0.0 20.0	
Acrolein	2.92	3.00	97.3	83.5 120.2	2.98	99.3	1.36	0.0 20.0	
Propionaldehyde	3.14	3.00	105	92.2 117.2	3.19	106	1.58	0.0 20.0	
Crotonaldehyde	2.99	3.00	99.7	83.1 114.8	3.00	100	0.334	0.0 20.0	
Butyraldehyde	3.12	3.00	104	88.6 120.8	3.12	104	0.00	0.0 20.0	
Benzaldehyde	3.06	3.00	102	96.0 112.3	3.12	104	1.94	0.0 20.0	
Isovaleraldehyde	3.18	3.00	106	95.4 121.6	3.20	107	0.627	0.0 20.0	
Valeraldehyde	3.12	3.00	104	85.3 120.4	3.09	103	0.966	0.0 20.0	
m-Tolualdehyde	3.04	3.00	101	80.9 118.6	3.11	104	2.28	0.0 20.0	
p-Tolualdehyde	2.88	3.00	96.0	83.5 122.2	2.88	96.0	0.00	0.0 20.0	
o-Tolualdehyde	3.02	3.00	101	91.6 111.4	2.98	99.3	1.33	0.0 20.0	
Hexanal	3.26	3.00	109	85.4 127.6	3.33	111	2.12	0.0 20.0	
2,5-Dimethylbenzaldehyde	3.25	3.00	108	99.8 118.7	3.28	109	0.919	0.0 20.0	



Quality Control Sample Batch Report

Analysis Information

Workorder: **1620930**

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: EPA TO-11A
Batch: ILC/12393 (HBN: 173791)
Analyzed By: David Teynor

Comments

LMB used to media correct LCS/LCSD and field samples for Acetone only.

QC Report Authorization (iS/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
iS/ David Teynor 08/02/2016 17:05	iS/ Lyle Edwards 08/03/2016 08:31

Symbols and Definitions

- * - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- ⊕ - Sample and Matrix Duplicate less than 5 times the reporting limit
- ⊖ - Result is above the calibration range
- RPD - Relative % Difference (Spike / Spike Duplicate)
- ND - Not Detected (U - Qualifier also flags analyte as not detected)
- NA - Not Applicable
- QC results are not adjusted for moisture correction, where applicable

1620930

		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C. No. 20162150 Page 1 of 3		
Collector JONES	Contract/Requestor CAL HOWARD IV	Telephone No. 773-6863 MSN 16-05 FAX 372-3878	Shipping Origin CONTINUED EVALUATION			
SAF No. N/A	Sample Origin CONTINUED EVALUATION	Shipping Origin CONTINUED EVALUATION	Package Origin/Change Code 201037080			
Project Title CONTINUED EVALUATION	Logbook Work Package No. 874	Ice Chest No. NTS-013	Temp. ON ICE			
Shipped To (Lab) ALS	Method of Shipment Data Turnaround 10 DAYS	Bill of Lading/air Bill No. 7768 4438 5296	Pallet and Return No. 41071			
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
	S165021991	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-A1	25C or Low
	S165021992	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-A2	25C or Low
	S165021993	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-A1	25C or Low
	S165021994	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-A1AUK	25C or Low
	S165021995	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-C1	25C or Low
	S165021996	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-01	25C or Low
	S165021997	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-01	25C or Low
	S165021998	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-EFF-BASE1	25C or Low
	S165021999	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-01	25C or Low
	S165021910	VA 7/22/16		ALDEHYDE GEL	ALDEHYDE 16-06172-8-01	25C or Low
POSSIBLE SAMPLE HAZARD/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No						
SPECIAL INSTRUCTIONS Send Results to Carl Howald IV and Greg Carl's Howald@elsi.gov and Gregory_S_Howald@elsi.gov see SCW for email. Release 3 Contract # 55502 8/2016 3016 3002						
Requisitioned By Howard Date/Time 7-26-16/0900	Print Sign SW Harder Date/Time 7-26-16/1400	Received By Sign Scott Harder Date/Time 7-26-16/0900	Received By Sign [Signature] Date/Time 7-26-16/1400	Received By Sign [Signature] Date/Time 7-26-16/1400	Received By Sign [Signature] Date/Time 7-26-16/1400	Matrix S = Soil SE = Sediment SO = Solid SL = Sludge LW = Water LWV = Vegetation LWV = Oil LWV = Air LWV = Drum Solids DL = Drum Liquids T = Tissue WI = Wire L = Liquid V = Vapor X = Other
Disposal Method (e.g., Return to customer, per lab procedure, left in place) (DOT)	Consumed by CONSUMED					
Date/Time 07/26/16 13:00	Date/Time 07/26/16 13:00					



ANALYTICAL REPORT

Report Date: August 03, 2016

Robert (Buddy) Sosa
Washington River Protection So
PO Box 850, MSIN T6-02
Richland, WA 99352

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov
20162149

Workorder: 34-1620934

Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, 0.0012, NA, NA, 0.0010.

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 266 9992
ALS GROUP USA, CORP. An ALS Limited Company



www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER



ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021846		Collected: 07/22/2016		
Lab ID: 1620934004		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021847		Collected: 07/22/2016		
Lab ID: 1620934005		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.0010	NA	NA	0.0010

Sample ID: S16T021848		Collected: 07/22/2016		
Lab ID: 1620934006		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.0012	NA	NA	0.0010

Sample ID: S16T021849		Collected: 07/22/2016		
Lab ID: 1620934007		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021850		Collected: 07/22/2016		
Lab ID: 1620934008		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010



ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.



ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021856		Collected: 07/22/2016		
Lab ID: 1620934014		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021857		Collected: 07/22/2016		
Lab ID: 1620934015		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021858		Collected: 07/22/2016		
Lab ID: 1620934016		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021859		Collected: 07/22/2016		
Lab ID: 1620934017		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021860		Collected: 07/22/2016		
Lab ID: 1620934018		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010



ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021861		Collected: 07/22/2016		
Lab ID: 1620934019		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021862		Collected: 07/22/2016		
Lab ID: 1620934020		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021863		Collected: 07/22/2016		
Lab ID: 1620934021		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021864		Collected: 07/22/2016		
Lab ID: 1620934022		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021865		Collected: 07/22/2016		
Lab ID: 1620934023		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010



ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.



ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.



ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.



ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021881		Collected: 07/23/2016		
Lab ID: 1620934039		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021882		Collected: 07/23/2016		
Lab ID: 1620934040		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021883		Collected: 07/23/2016		
Lab ID: 1620934041		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021884		Collected: 07/23/2016		
Lab ID: 1620934042		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021885		Collected: 07/23/2016		
Lab ID: 1620934043		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010



ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.

Table with 5 columns: Analyte, Result (mg/sample), Result (mg/m³), Result (ppm), RL (mg/sample). Row 1: 1,3-Butadiene, <0.0010, NA, NA, 0.0010.



ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021891		Collected: 07/23/2016		
Lab ID: 1620934049		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021892		Collected: 07/23/2016		
Lab ID: 1620934050		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021893		Collected: 07/23/2016		
Lab ID: 1620934051		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021894		Collected: 07/23/2016		
Lab ID: 1620934052		Received: 07/27/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
NIOSH 1024	/S/ Fred Rejali 08/03/2016 04:57	/S/ Thomas J. Masoian 08/03/2016 07:59

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alsllab@ALSGlobal.com
Web: www.alsllc.com



ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and
assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS
conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing
sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project
manager for the current scope of accreditation that applies to your analytical testing.

Table with 4 columns: Testing Sector, Accreditation Body (Standard), Certificate Number, Website. Rows include Environmental, Industrial Hygiene, Lead Testing (CPSC, Soil, Dust, Paint, Air), and Dietary Supplements.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
NA = Not Applicable.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
() This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ALS Environmental certifies this analytical report is in compliance with the Hanford SOW, both
technically and for completeness. Release of the data contained in this report has been electronically
authorized by the following laboratory representative:

Rand Potter, Project Manager, ALS Environmental



Quality Control Sample Batch Report

Analysis Information

Workorder: 1620934

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: NIOSH 1024
Batch: IFID/7635 (HBN: 174019)
Analyzed By: Fred Rejali

Blank

MB: 511195 Analyzed: 08/02/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

MB: 511198 Analyzed: 08/02/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

MB: 511201 Analyzed: 08/02/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 511196 Analyzed: 08/02/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 511197 Analyzed: 08/02/2016 00:00 Dilution: 1 Units: mg/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0305	0.0308	99.2	78.0 117.6	0.0308	99.5	0.392	0.0 20.0	

LCS: 511199 Analyzed: 08/02/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 511200 Analyzed: 08/02/2016 00:00 Dilution: 1 Units: mg/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0345	0.0342	101	78.0 117.6	0.0351	103	1.72	0.0 20.0	

LCS: 511202 Analyzed: 08/02/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 511203 Analyzed: 08/02/2016 00:00 Dilution: 1 Units: mg/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0347	0.0342	101	78.0 117.6	0.0346	101	0.289	0.0 20.0	



Quality Control Sample Batch Report

Analysis Information

Workorder: **1620934**

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: NIOSH 1024
Batch: IFID/7635 (HBN: 174019)
Analyzed By: Fred Rejali

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Fred Rejali 08/03/2016 04:57	/S/ Thomas J. Masoian 08/03/2016 07:59

Symbols and Definitions

- * - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- - Sample and Matrix Duplicate less than 5 times the reporting limit
- - Result is above the calibration range

- RPD - Relative % Difference (Spike / Spike Duplicate)
- ND - Not Detected (U - Qualifier also flags analyte as not detected)
- NA - Not Applicable
- QC results are not adjusted for moisture correction, where applicable

1620934



1620934

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: Jones
 SAP No.: N/A
 Project Title: CATHODE EVALUATION
 Shipped To (Lab): ALS
 Protocol: N/A

Telephone No: 373-6861
 MSHN: 16-05
 FAX: 372-1878

Sample Origin: CATHODE EVALUATION
 Logbook/Work Package No.: N/A
 Method of Shipment: N/A
 Date/Timestamp: 16 JUL 2008

Ice Chest No: 4075-013 Temp: ON ICE
 Bill of Lading/Bill No: 7768 4438 5296
 Parts and Return No: 41071

Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
	516T021843	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A1 . 1	CELLS -4C
	516T021844	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A2 . 1	CELLS -4C
	516T021845	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A1 . 1	CELLS -4C
	516T021846	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A2 . 1	CELLS -4C
	516T021847	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A1 . 1	CELLS -4C
	516T021848	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A2 . 1	CELLS -4C
	516T021849	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A1 . 1	CELLS -4C
	516T021850	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A2 . 1	CELLS -4C
	516T021851	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A1 . 1	CELLS -4C
	516T021852	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A2 . 1	CELLS -4C

POSSIBLE SAMPLE HAZARD/REMARKS (List all known waste) MSDS Yes No

SPECIAL INSTRUCTIONS
 Send Results to Carl M Rowald IV, Carl Y Rowald@rl.gov, and Craig Moore, Gregory_S_Moore@rl.gov see DOB for email
 Reference Contract # 55592
 RELEASE 3
 BECOS 1924 CELLS BELOW -4 C

Requisitioned By: PHH Sign: [Signature] Date/Time: 7-26-16 0900
 Received By: Scott Harder Sign: [Signature] Date/Time: 7-26-16/0900
 Requisitioned By: SW Harder Sign: [Signature] Date/Time: 7-26-16/1400
 Received By: [Signature] Sign: [Signature] Date/Time: 08/02/16
 Requisitioned By: [Signature] Sign: [Signature] Date/Time: 08/02/16

Disposal Method (e.g., Return to customer, per lab procedure, used in process):
 Disposed by: Fred R. Job. Date/Time: 08/02/16 2300

Assembler		C.O.C. No. 20162149	
N/A		Page 2 of 6	
Collector		Telephone No 773-4861 MSN 16-43 FAX 372-1978	
JONES		Purchase Order/Change Code	
SAF No.		20203/020	
N/A		Ice Chest No. 473-013 Temp. 0U ICE	
Project Title		Bil of Lading/BI No. 7768 4438 S296	
CARTRIDGE EVALUATION		Pats and Retain No. 41071	
Shipped To (Lab)			
ALS			
Protocol		Data Turnaround 10 DAYS	
N/A			

Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
8167021853	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-A-82 *	CHILL -4C
8167021854	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-B-81 *	CHILL -4C
8167021855	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-B-82 *	CHILL -4C
8167021856	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-B-81 *	CHILL -4C
8167021857	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-B-RELAK *	CHILL -4C
8167021858	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-B-C1 *	CHILL -4C
8167021859	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-B-01 *	CHILL -4C
8167021860	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-B-81 *	CHILL -4C
8167021861	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-B-01 *	CHILL -4C
8167021862	VA	7/22/16		CRACKOAL TUBE	1,3-B-ETADIENE 16-06172-3-B-01 *	CHILL -4C

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS Yes No

SPECIAL INSTRUCTIONS
 Send Results to Carl W Rowald IV,
 Carl W Rowald@fci.gov, and Greg Moore,
 Gregory_S_Moore@fci.gov see PDR for email
 Reference Contact 4 55502
 RELEASE \$
 BROWN 1124 CHILL BELOW -4 C

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Major*
Sharon Wolder		Mr Wold	7-26-16 0900	Scott Harder		Scott	7-26-16/0900	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air MS = Drum Solids
Relinquished by	WRPS	SW Harder	7-26-16/1400	Received by				DL = Drum Liquids T = Tissue WM = Waste L = Liquid V = Vegetation VA = Vapor X = Other
Relinquished by		SW Harder	7-26-16/1400	Received by				
Relinquished by		SW Harder	7-26-16/1400	Received by				

Disposal Method (r.s. - Return to customer, per lab procedure, used in process)

Disposal Method (r.s. - Return to customer, per lab procedure, used in process)

Disposal Date/Time: 08/02/16 2300

Disposed By: Fred Rejali

ALL samples containing hazardous materials shall be picked up by requestor and returned to parent container or file of origin.

A-6003-602 (03/03)

Assembler		C.O.C. No. 20162149				
N/A		Page 3 of 6				
Collector		Telephone No. 773-6841				
SAF No.		MISHN 14-05 FAX 372-1878				
Project Title		Purchase Order/Charge Code				
SHIPPED TO (Lab)		Ice Chest No. <i>WTS-013</i> Temp. <i>ON ICE</i>				
Method of Shipment		Bill of Lading/Air Bill No. <i>7768 4438 5296</i>				
Data Turnaround		Part and Return No. <i>41071</i>				
16 DAYS						
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
	5167021863	VA	7/22/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06172-9-B-81 . . .	CHILL -4C
	5167021864	VA	7/22/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06172-9-B-82 . . .	CHILL -4C
	5167021865	VA	7/22/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06172-9-BET-A-BASE . . .	CHILL -4C
	5167021866	VA	7/22/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06172-9-BET-B-BASE . . .	CHILL -4C
	5167021867	VA	7/22/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06172-9-2P-A-BASE . . .	CHILL -4C
	5167021868	VA	7/22/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06172-9-2P-B-BASE . . .	CHILL -4C
	5167021869	VA	7/23/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06173-9-A-A1 . . .	CHILL -4C
	5167021870	VA	7/23/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06173-9-A-A2 . . .	CHILL -4C
	5167021871	VA	7/23/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06173-9-A-A1 . . .	CHILL -4C
	5167021872	VA	7/23/16	CHARCOAL TUBE	1,3-Bisatadiene 16-06173-9-A-3LANK . . .	CHILL -4C
POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No						
SPECIAL INSTRUCTIONS Send Results to Carl W Rowald IV, Carl W Rowald@epa.gov, and Greg Moore, Gregory_M_Moore@epa.gov see SOB for email Reference Contract # 55562 RELEASE 3 NIOSH 1024 CHILL BELOW -4 C						
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign
Sharon Walker	<i>Sharon Walker</i>	<i>SW</i>	7-26-16/0930	Scott Harder	<i>Scott Harder</i>	<i>SH</i>
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign
WRPS	<i>WRPS</i>	<i>SW</i>	7-26-16/1400	REDCX	<i>REDCX</i>	<i>REDCX</i>
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign
<i>Reddy</i>	<i>Reddy</i>	<i>Reddy</i>	<i>Reddy</i>	<i>Reddy</i>	<i>Reddy</i>	<i>Reddy</i>
Matrix* S = Soil DL = Drum Liquids SE = Sediment T = Tissue SO = Solid VA = Vape SL = Sludge L = Liquid W = Water V = Vegetation O = Oil VA = Vapor A = Air X = Other DS = Deam Solids						
FINAL SAMPLE DISPOSITION Disposal Method (e.g., Return to customer, per lab procedure used in process)				Date/Time		
Fred R. Jahn				08/02/16 2300		
All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.						

Assembler S/A		C.O.C. No. 20162149				
Collector JONES		Page 4 of 6				
Contact/Requestor GAIL HORTON, IV		Telephone No. 773-6841				
Sample Origin CAROLINE, INDIANATOR		MUN. 14-93				
SMP No. S/A		Purchase Order/Change Code 201601-040				
Project Title CARTRIDGE EVALUATION		Ice Chest No. WTS-013 Temp. ON ICE				
Shipped To (Lab) ALS		Bill of Lading/Air Bill No. 7768 4438 5276				
Protocol S/A		Parts and Return No. 41071				
Method of Shipment DATA Turnaround 15 DAYS						
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
	8167021873	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-A-C1 *	CHILL -4C
	8167021874	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-A-01 -	CHILL -4C
	8167021875	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-A-01 * *	CHILL -4C
	8167021876	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-A-01 * *	CHILL -4C
	8167021877	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-A-01 *	CHILL -4C
	8167021878	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-A-01 *	CHILL -4C
	8167021879	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-A-02 *	CHILL -4C
	8167021880	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-B-A1 * *	CHILL -4C
	8167021881	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-B-A2 *	CHILL -4C
	8167021882	VA 7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-05173-9-B-01 * *	CHILL -4C
POSSIBLE SAMPLE HAZARD/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No Hold Time						
SPECIAL INSTRUCTIONS Send Results to Carl W Rowald, IV, Carl W Rowald, IV, and Greg Moore, Gregory_J_Moore@epi.gov see 308 for email Reference Contract # 55562 RELEASE 5 BROWN 1026 CHILL BELOW -1 C						
Rolling/Used By <i>Sharon Liles</i>	Sign <i>SW Harder</i>	Date/Time 7-26-16 0900	Received By <i>Scott Harder</i>	Sign <i>Scott Harder</i>	Date/Time 7-26-16 0900	Matrix* S = Sol DL = Drum Liquids SE = Sediment T = Tissue SO = Solid WM = Waste SL = Sludge L = Liquid W = Water V = Vegetation O = Oil VA = Vapor X = Other DS = Drum Solids
Rolling/Used By <i>SW Harder</i>	Sign <i>SW Harder</i>	Date/Time 7-26-16 1400	Received By <i>SW Harder</i>	Sign <i>SW Harder</i>	Date/Time 7-26-16 1400	
Rolling/Used By <i>SW Harder</i>	Sign <i>SW Harder</i>	Date/Time 7-26-16 1400	Received By <i>SW Harder</i>	Sign <i>SW Harder</i>	Date/Time 7-26-16 1400	
Rolling/Used By <i>SW Harder</i>	Sign <i>SW Harder</i>	Date/Time 7-26-16 1400	Received By <i>SW Harder</i>	Sign <i>SW Harder</i>	Date/Time 7-26-16 1400	
Disposal Method (e.g., Return to customer, per its procedure, used in process)		Disposed By <i>Fred Rejab</i>		Date/Time 08/02/16 2300		

All samples containing hazardous materials shall be picked up by requestor and returned to parent container or file of origin. A-6003-902 (03/05)

Assembler		C.O.C. No. 20162149				
Collector		Page 5 of 6				
S/A		Telephone No. 713-6861 MSN 16-01 FAX 372-1978				
Contact/Requestor CARL RONALD IV		Purchase Order/Change Code				
Sample Origin CHARITIZO EVALUATOR		Ice Chest No. WTS-013 Temp. ON ICE				
Project Title CHARITIZO EVALUATIONS		Site of Landfill/Bill No. 7768 4438 5296				
Shipped To (Lab) ALS		Pallet and Return No. 41071				
Method of Shipment						
Data Turnaround 30 DAYS						
Protocol N/A						
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
	816T021883	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-BLANK *	CHILL -4C
	816T021884	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-C1 *	CHILL -4C
	816T021885	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-01 *	CHILL -4C
	816T021886	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-81 *	CHILL -4C
	816T021887	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-21 *	CHILL -4C
	816T021888	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-61 *	CHILL -4C
	816T021889	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-81 *	CHILL -4C
	816T021890	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-82 *	CHILL -4C
	816T021891	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-82 *	CHILL -4C
	816T021892	VA	7/23/16	CHARCOAL TUBE	1,3-Betadiene 16-06172-3-B-82 *	CHILL -4C
POSSIBLE SAMPLE HAZARDOUS/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No Hold Time						
SPECIAL INSTRUCTIONS Send Results to Carl W Ronald IV, Carl W Ronald IV, and Greg Moore, Gregory_M_Ronald@rl.gov ask for email Reference Contract # 35562 RELEASE 9 BIONE 1024 CHILL BELOW -4 C						
Retransmitted By	Sign	Date/Time	Received By	Sign	Date/Time	Maint*
Sharon M. Hildebrand	SW Harder	7-26-16/0800	Scott Harder	SW Harder	7-26-16/0900	S = Soil DL = Crude Liquids SE = Sediment T = Tissue SO = Solid VM = Vape SL = Sludge L = Liquid W = Water V = Vegetation O = Oil VA = Vapor A = Air X = Other DUM = DUM Solids
Retransmitted By	Sign	Date/Time	Received By	Sign	Date/Time	
	SW Harder	7-26-16/1400	SW Harder	SW Harder	7-26-16/1400	
Retransmitted By	Sign	Date/Time	Received By	Sign	Date/Time	
	SW Harder	7-26-16/1400	SW Harder	SW Harder	7-26-16/1400	
Retransmitted By	Sign	Date/Time	Received By	Sign	Date/Time	
	SW Harder	7-26-16/1400	SW Harder	SW Harder	7-26-16/1400	
FINAL SAMPLE DEPOSITION Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Fred Rejab. Date/Time 08/02/16 2300						
All samples containing hazardous materials shall be picked up by requestor and returned to parent container site of origin. A-6003-662 (03/05)						



ANALYTICAL REPORT

Report Date: August 03, 2016

Robert (Buddy) Sosa
Washington River Protection So
PO Box 850, MSIN T6-02
Richland, WA 99352

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162147

Workorder: 34-1620929

Client Project ID: Washington River Protection So

Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Sample ID: S16T021785, Method: NIOSH 1613 Mod., and results for Pyridine and 2,4-Dimethylpyridine.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Sample ID: S16T021786, Method: NIOSH 1613 Mod., and results for Pyridine and 2,4-Dimethylpyridine.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Sample ID: S16T021787, Method: NIOSH 1613 Mod., and results for Pyridine and 2,4-Dimethylpyridine.

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 268 9992
ALS GROUP USA, CORP. An ALS Limited Company

Environmental logo

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER



ANALYTICAL REPORT

Workorder: **34-1620929**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021788		Collected: 07/22/2016		
Lab ID: 1620929004		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021789		Collected: 07/22/2016		
Lab ID: 1620929005		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021790		Collected: 07/22/2016		
Lab ID: 1620929006		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021791		Collected: 07/22/2016		
Lab ID: 1620929007		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50



ANALYTICAL REPORT

Workorder: **34-1620929**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021792		Collected: 07/22/2016		
Lab ID: 1620929008		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021793		Collected: 07/22/2016		
Lab ID: 1620929009		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021794		Collected: 07/22/2016		
Lab ID: 1620929010		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021795		Collected: 07/22/2016		
Lab ID: 1620929011		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50



ANALYTICAL REPORT

Workorder: **34-1620929**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021796		Collected: 07/22/2016		
Lab ID: 1620929012		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021797		Collected: 07/22/2016		
Lab ID: 1620929013		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021798		Collected: 07/23/2016		
Lab ID: 1620929014		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021799		Collected: 07/23/2016		
Lab ID: 1620929015		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50



ANALYTICAL REPORT

Workorder: **34-1620929**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021800		Collected: 07/23/2016		
Lab ID: 1620929016		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021801		Collected: 07/23/2016		
Lab ID: 1620929017		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/02/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021802		Collected: 07/23/2016		
Lab ID: 1620929018		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/03/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021803		Collected: 07/23/2016		
Lab ID: 1620929019		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/03/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50



ANALYTICAL REPORT

Workorder: 34-1620929
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Sample ID: S16T021804, Method: NIOSH 1613 Mod., Media: SKC 226-01, Charcoal Tube 100/50mg, and results for Pyridine and 2,4-Dimethylpyridine.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Sample ID: S16T021805, Method: NIOSH 1613 Mod., Media: SKC 226-01, Charcoal Tube 100/50mg, and results for Pyridine and 2,4-Dimethylpyridine.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Sample ID: S16T021806, Method: NIOSH 1613 Mod., Media: SKC 226-01, Charcoal Tube 100/50mg, and results for Pyridine and 2,4-Dimethylpyridine.

Table with 5 columns: Analyte, Result (ug/sample), Result (mg/m^3), Result (ppm), RL (ug/sample). Rows include Sample ID: S16T021807, Method: NIOSH 1613 Mod., Media: SKC 226-01, Charcoal Tube 100/50mg, and results for Pyridine and 2,4-Dimethylpyridine.



ANALYTICAL REPORT

Workorder: **34-1620929**
Client Project ID: Washington River Protection
So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021808		Collected: 07/23/2016		
Lab ID: 1620929024		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/03/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021809		Collected: 07/23/2016		
Lab ID: 1620929025		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/03/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021810		Collected: 07/23/2016		
Lab ID: 1620929026		Received: 07/27/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 08/03/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Comments

Quality Control: NIOSH 1613 Mod. - (HBN: 173960)

The referenced method has not been validated for 2,4-dimethylpyridine. Additionally, studies regarding media collection efficiency, sample storage stability, analyte retention capability, and/or analyte desorption efficiency have not been performed. LCSD 511002 fails RPD for 2,4-dimethylpyridine but passes percent recovery.

Report Authorization (/s/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
NIOSH 1613 Mod.	/s/ Steven Yourstone 08/03/2016 10:04	/s/ Thomas J. Masoian 08/03/2016 12:45



ANALYTICAL REPORT

Workorder: **34-1620929**
 Client Project ID: Washington River Protection
 So
 Purchase Order: 55502 Rel9
 Project Manager: Rand Potter

Laboratory Contact Information

ALS Environmental
 960 W Levoy Drive
 Salt Lake City, Utah 84123

Phone: (801) 266-7700
 Email: alsll.lab@ALSGlobal.com
 Web: www.alsllc.com

General Lab Comments

The results provided in this report relate only to the items tested.
 Samples were received in acceptable condition unless otherwise noted.
 Samples have not been blank corrected unless otherwise noted.
 This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	AClass (DoD ELAP)	ADE-1420	http://www.aclasscorp.com
	Utah (NELAC)	DATA 1	http://health.utah.gov/lab/labimpl/
	Nevada	UT00009	http://ndep.nv.gov/bsd/wlab/service.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/inside/CNR/Regulatory/Water.aspx
	Florida (TNI)	E871067	http://www.dep.state.fl.us/labs/bars/sas/qaf/
Texas (TNI)	T 104704456-11-1	http://www.tceq.texas.gov/field/qalab_accred_certif.html	
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing			
CPSC	AClass (ISO 17025, CPSC)	ADE-1420	http://www.aclasscorp.com
Soil, Dust, Paint, Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and ILLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	AClass (ISO 17025)	ADE-1420	http://www.aclasscorp.com

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
 LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
 ND = Not Detected, Testing result not detected above the LOD or LOQ.
 NA = Not Applicable.
 ** No result could be reported, see sample comments for details.
 < This testing result is less than the numerical value.
 () This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.



ANALYTICAL REPORT

Workorder: **34-1620929**

Client Project ID: Washington River Protection
So

Purchase Order: 55502 Rel9
Project Manager: Rand Potter

ALS Environmental certifies this analytical report is in compliance with the Hanford SOW, both technically and for completeness. Release of the data contained in this report has been electronically authorized by the following laboratory representative:

Rand Potter, Project Manager, ALS Environmental



Quality Control Sample Batch Report

Analysis Information

Workorder: 1620929

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: NIOSH 1613 Mod.
Batch: ISVO/3081 (HBN: 173660)
Analyzed By: Steven Yourstone

Blank

LMB: 510997 Analyzed: 08/02/2016 12:20 Units: ug/sample			
Analyte	Result	MDL	RL
Pyridine	ND	NA	0.500
2,4-Dimethylpyridine	ND	NA	0.500

LMB: 511000 Analyzed: 08/03/2016 02:41 Units: ug/sample			
Analyte	Result	MDL	RL
Pyridine	ND	NA	0.500
2,4-Dimethylpyridine	ND	NA	0.500

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510998 Analyzed: 08/02/2016 12:40 Dilution: 1 Units: ug/sample					LCSD: 510999 Analyzed: 08/02/2016 12:59 Dilution: 1 Units: ug/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Pyridine	1.54	2.00	77.1	61.8 141.1	1.90	95.0	20.8	0.0 22.1	
2,4-Dimethylpyridine	1.20	2.00	59.8	51.7 130.6	1.47	73.3	20.4	0.0 22.2	

LCS: 511001 Analyzed: 08/03/2016 03:00 Dilution: 1 Units: ug/sample					LCSD: 511002 Analyzed: 08/03/2016 03:20 Dilution: 1 Units: ug/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Pyridine	1.85	2.00	92.5	61.8 141.1	2.14	107	14.8	0.0 22.1	
2,4-Dimethylpyridine	1.14	2.00	57.1	51.7 130.6	1.51	75.7*	28.0	0.0 22.2	

Comments

The referenced method has not been validated for 2,4-dimethylpyridine. Additionally, studies regarding media collection efficiency, sample storage stability, analyte retention capability, and/or analyte desorption efficiency have not been performed.
LCSD 511002 fails RPD for 2,4-dimethylpyridine but passes percent recovery.

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Steven Yourstone 08/03/2016 10:04	/S/ Thomas J. Masolan 08/03/2016 12:45

Symbols and Definitions

- * - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- - Sample and Matrix Duplicate less than 5 times the reporting limit
- ⊙ - Result is above the calibration range
- RPD - Relative % Difference (Spike / Spike Duplicate)
- ND - Not Detected (U - Qualifier also flags analyte as not detected)
- NA - Not Applicable
- QC results are not adjusted for moisture correction, where applicable

Assembled		C.O.C. No. 20162167				
N/A		Page 2 of 3				
Collector	Contract/Manufacturer	Telephone No.	MSIN			
JOE	COAL BOWLING 17	313-6841	FAX 312-1818			
SHIP NO.	SERIAL ORDER	Purchase Order/Charge Code	16-05			
N/A	CHARTER	320007020				
Project Name	Logbook Work Package No.	Ion Count No.	Temp.			
HAZARDOUS QUANTITIES	N/A	435-013	0.0 USE			
Shipped to (LAB)	Method of Shipment	Bill of Lading/air Bill No.	7768 4938 5296			
AS		Parts and Return No.	41071			
Preload	Date Turnaround					
N/A	10 DAYS					
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021795	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-01 f	N/A
	S16T021796	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-02 f	N/A
	S16T021797	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-03-BASE A	N/A
	S16T021798	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-04 f	N/A
	S16T021799	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-02 f	N/A
	S16T021800	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-01 A	N/A
	S16T021801	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-02A0E.	N/A
	S16T021802	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-01 f	N/A
	S16T021803	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-01 A	N/A
	S16T021804	VA	7/22/16	CEARCOAL TUBE	Pyridines 16-06172-10-01 A	N/A
POSSIBLE SAMPLE HAZARDOUS REMARKS (List all brown weights) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No						
SPECIAL INSTRUCTIONS						
Send Results to Carl Rowald TV and Geeg						
Carl W Rowald@epa.gov and						
Geeg@epa.gov see 304 for email						
RELEASE 9						
Reference Contract # 55592						
Print	Sign	Received by	Date/Time	Print	Sign	Date/Time
Sharon Wolcott	M. Muhl	Scott Header	7-26-16 0900	Scott Header	S. Muhl	7-26-16/0900
Print	Sign	Received by	Date/Time	Print	Sign	Date/Time
SW Header	WRPS	FEDEX	7-26-16 / 1400	FEDEX	Carl W Rowald	7-26-16/0900
Print	Sign	Received by	Date/Time	Print	Sign	Date/Time
Carl W Rowald	Geeg	Carl W Rowald	7-26-16/0900	Carl W Rowald	Geeg	7-26-16/0900
Print	Sign	Received by	Date/Time	Print	Sign	Date/Time
Carl W Rowald	Geeg	Carl W Rowald	7-26-16/0900	Carl W Rowald	Geeg	7-26-16/0900
Disposal Method (e.g., return to customer, per lab procedure (used in process))						
Returned by						
Carl W Rowald						
Color/Time						
8046 1.075						

Assembler		I.C.O.C. No. 20162147				
N/A		Page 3 of 3				
CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						
Collector	Contractor	Telephone No.	MISSION FAX			
None	Carl Rowald TV	373-4881	372-1878			
SAP No.	Source Origin	Purchase Order/Charge Code				
N/A	Charleston	505237030				
Project Title	Logbook/Visit Package No.	Box Count	Temp.			
Charleston Encouragement	N/A	WTS-013	00 ICE			
Shipped To (Lab)	Method of Shipment	Bill of Lading/Air Bill No.	7768 4438 5296			
ACS		Parts and Return No.	41071			
Protocol	ES&H Turnaround					
N/A	14 days					
Sample No.	Lab ID	Date	Time	Net/Type Container	Sample Analysis	Preservative
	S167021805	VA	7/23/16	CHARCOAL TUBE	Pyridines 16-04173-10-BASE	N/A
	S167021806	VA	7/23/16	CHARCOAL TUBE	Pyridines 16-04173-10-PI	N/A
	S167021807	VA	7/23/16	CHARCOAL TUBE	Pyridines 16-04173-10-CI	N/A
	S167021808	VA	7/23/16	CHARCOAL TUBE	Pyridines 16-04173-10-SI	N/A
	S167021809	VA	7/23/16	CHARCOAL TUBE	Pyridines 16-04173-10-SE	N/A
	S167021810	VA	7/23/16	CHARCOAL TUBE	Pyridines 16-04173-10-IB-BASE	N/A
<p>POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No</p> <p>SPECIAL INSTRUCTIONS Send Results to Carl Rowald TV and Greg Moore Carl X Rowald@tvi.com gregory_s_rowald@tvi.com for see box for email</p>						
Relinquished By	Print	Sign	Date/Time	Received By	Date/Time	Method*
James M. Melton	SW Harder	WRPS	7-26-16/14:00	Scott Harder	7-26-16/09:00	S = Soil SE = Sediment SO = Solid SL = Sludge VW = Vial V = Vegetation OI = Oil AR = Air CS = Drum Solids
Relinquished By	Print	Sign	Date/Time	Received By	Date/Time	Method*
						DL = Drum Liquids T = Tissue VB = Vial L = Liquid V = Vegetation VA = Vapor X = Other
Relinquished By	Print	Sign	Date/Time	Received By	Date/Time	Method*
						DL = Drum Liquids T = Tissue VB = Vial L = Liquid V = Vegetation VA = Vapor X = Other
Final Sample Disposition	Disposal Method (e.g., Return to customer, per lab procedure used in process)					Date/Time
	SW Harder					8/2/16 10:35

A-6000-982 (03/09)



RJ LeeGroup, Inc. | Columbia Basin Analytical Laboratories
 2710 North 20th Avenue, Pasco WA 99301
 Tel: (509) 545-4989 | Fax: (509) 544-0310

Carl Howald IV

08/18/16

Washington River Protection Solutions, LLC
 P.O. Box 850 MSIN 116-16
 Richland, WA 99352

Contract No.: 55503 R5

Project: Cartridge Evaluation

Subject: Nitrosamines Analysis Report, Group Number 20162148

Enclosed is the final report for group 20162148 number analyzed for Nitrosamines using NIOSH 2522-Modified. This group number 20162148 has been assigned a Columbia Basin Analytical Laboratories login order number of W607075. This report consists of a summary report of the samples, a laboratory report of each nitrosamine, a single quality control report for the analysis batch, and a copy of the chain of custody.

General Set Comments

Columbia Basin Analytical Laboratories received 26 samples on 07/26/16 to be tested for Nitrosamines. The samples were analyzed in accordance with NIOSH 2522-Modified for N-Nitrosodimethylamine, N-Nitrosomethylethylamine, N-Nitrosodiethylamine, N-Nitrosodi-n-propylamine, N-Nitrosodi-n-butylamine, N-Nitrosopiperidine, N-Nitrosopyrrolidine, and N-Nitrosomorpholine. All results have been corrected for desorption efficiency and measurable levels in the blanks.

Positive Results

There were detectable nitrosamines concentrations above the reporting limit in the samples.

16-06172-11-A1	W607075-01	N-Nitrosodimethylamine	0.416	µg/tube	
16-06172-11-A1	W607075-01	N-Nitrosodi-n-butylamine	0.024	µg/tube	
16-06172-11-A1	W607075-01	N-Nitrosodi-n-propylamine	0.052	µg/tube	
16-06172-11-A1	W607075-01	N-Nitrosopyrrolidine	0.024	µg/tube	
16-06172-11-A1	W607075-01	N-Nitrosodimethylamine	0.043	µg/tube	
16-06172-11-H1	W607075-11	N-Nitrosodiethylamine	0.050	µg/tube	
16-06172-11-H1	W607075-11	N-Nitrosodimethylamine	0.359	µg/tube	
16-06172-11-H1	W607075-11	N-Nitrosodi-n-butylamine	0.031	µg/tube	
16-06172-11-H1	W607075-11	N-Nitrosopiperidine	0.039	µg/tube	
16-06173-11-A1	W607075-14	N-Nitrosodiethylamine	0.069	µg/tube	C
16-06173-11-A1	W607075-14	N-Nitrosodimethylamine	0.088	µg/tube	
16-06173-11-A1	W607075-14	N-Nitrosomorpholine	0.046	µg/tube	
16-06173-11-A1	W607075-14	N-Nitrosopiperidine	0.046	µg/tube	
16-06173-11-H1	W607075-24	N-Nitrosodiethylamine	0.047	µg/tube	
16-06173-11-H1	W607075-24	N-Nitrosodimethylamine	0.372	µg/tube	
16-06173-11-H1	W607075-24	N-Nitrosomorpholine	0.052	µg/tube	
16-06173-11-H1	W607075-24	N-Nitrosopiperidine	0.042	µg/tube	

Columbia Basin Analytical Laboratories | 2710 North 20th Avenue, Pasco WA 99301 | 509.545.4989

WWW.RJLEEGROUP.COM


RJ LEE GROUP

16-06173-11-H1	W607075-24	N-Nitrosodimethylamine	0.017	µg/tube
16-06173-11-H1	W607075-24	N-Nitrosodi-n-propylamine	0.023	µg/tube

Recovery Failures in the ICV, CCV's, LCS, RL and MRL

There were no recovery failures in the: ICV, CCV, LCS, LCSD, There were recovery failures in the MRL.

RSD Failures in the LCS and LCSD's

There were no RSD failures between the laboratory control samples.

Measurable Blank Values

There were no measurable analytes in the blank samples.

Calibration Curves

The calibration curves for the Nitrosamines had an R-value that was 0.997 or better, over a range of 5.0 ng/mL to 200 ng/mL.

General Lab Comments

The results provided in this report relate only to the items tested. Samples were received in acceptable conditions unless otherwise noted in the comments above. Samples have not been field blank corrected unless otherwise noted in the general set comments above. This test report shall not be reproduced, except in full, without written approval of Columbia Basin Analytical Laboratories.

I certify that this analytical report is in compliance with the Hanford SOW, both technically and for completeness. Release of the data contained in this hard copy report has been authorized by the Laboratory Director or a designee as verified by the following signature.



08/17/16

Scientist II DeNomy Dage

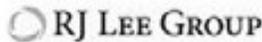
This report has been reviewed and approved by the following individual:



08/18/16

Scientist I Fernanda Pincheira

If you have any questions, please feel free to contact DeNomy Dage at ddage@rjlg.com or at 509-545-4989.



Carl Howald IV
 Washington River Protection
 Solutions, LLC
 P.O. Box 850 MSIN H6-16
 Richland, WA 99352
 Client Project:
 Cartridge Evaluation

Laboratory Report
 NIOSH 2522
 Air/Emissions on GC/TEA Analyzer
 Summary Table

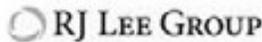
RJ Lee Group No.: W607075
 Samples Received: 07/26/16
 Report Date: 08/18/16
 COC No.: 20162148
 Extraction Date: 8/5/2016

Client Sample ID	Sample Identification RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-00172-11-A1 S16T021811	W607075-01	07/22/16	08/05/16	N-Nitrosodimethylamine	0.416	0.014	
		07/22/16	08/08/16	N-Nitrosodimethylamine	0.043	0.016	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/08/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	0.052	0.021	
		07/22/16	08/08/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	0.024	0.022	
		07/22/16	08/08/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/22/16	08/08/16	N-Nitrosopiperidine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/08/16	N-Nitrosopyrrolidine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	0.024	0.022	
16-00172-11-A2 S16T021812	W607075-02	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022			
07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022			

Report Qualifiers:

A = Target Analyte media breakthrough suspect, see analytical report
 D = Analyte analyzed in a dilution
 E = Report concentration was above the instrument calibration range
 J = Analyte detected below quantitation limits, concentration is estimated
 P = Library spectrum match, not >99% or RT match
 R = RPD (relative percent difference) outside accepted recovery limits
 U = Analyte analyzed for but not detected
 N/A = Not Applicable

B = Analyte detected in the associated blank
 d = Data that exceeds the RSD criteria set by the SOP
 H = Holding times for preparation or analysis exceeded
 L = Sample condition at receipt not of compliance with method defined conditions
 Q = Results not of method specific acceptance QC criteria
 S = Spike recovery outside accepted recovery limits
 Z = Not ELAP accredited analyte
 ND = Not Detected
 C = Confirmation analysis unreliable

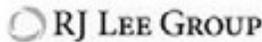


Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	KL	Qualifiers
Client Sample ID	RJLG ID						
16-06172-11-B1 S16T021813	W607075-03	07/22/16	06/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	06/05/16	N-Nitrosomethyl ethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	06/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-BLANK S16T021814	W607075-04	07/22/16	06/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	06/05/16	N-Nitrosomethyl ethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	06/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-C1 S16T021815	W607075-05	07/22/16	06/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	06/05/16	N-Nitrosomethyl ethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	06/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-D1 S16T021816	W607075-06	07/22/16	06/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	06/05/16	N-Nitrosomethyl ethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	06/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosomorpholine	<0.022	0.022	

Report Qualifiers:

A = Target Analyte media insufficient, see analytical report
 D = Analyte analyzed in a dilution
 E = Report concentration was above the instrument calibration range
 J = Analyte detected below quantitation limits, concentration is estimated
 P = Library spectrum match, val >90% w RT match
 R = RPD (relative percent difference) outside accepted recovery limits
 U = Analyte analyzed for but not detected
 NA = Not Applicable

B = Analyte detected in the associated blank
 J = Data that exceeds the RSD criteria set by the SOP
 H = Holding times for preparation or analysis exceeded
 L = Sample condition at receipt out of compliance with method defined conditions
 Q = Result out of method specific acceptance QC criteria
 S = Spike Recovery outside accepted recovery limits
 Z = Not ELAP accredited analyte
 ND = Not Detected
 C = Confirmation analysis unavailable



Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	KL	Qualifiers
Client Sample ID	RJLG ID						
16-06172-11-E1 5167021817	W607075-07	07/22/16	06/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	06/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	06/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-EFF-BASE 5167021818	W607075-08	07/22/16	06/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	06/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	06/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-F1 5167021819	W607075-09	07/22/16	06/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	06/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	06/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-G1 5167021820	W607075-10	07/22/16	06/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	06/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	06/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	06/05/16	N-Nitrosomorpholine	<0.022	0.022	

Report Qualifiers:

A = Target Analyte media breakthrough suspect, see analytical report

D = Analyte analyzed in a dilution

E = Report concentration was above the instrument calibration range

J = Analyte detected below quantitation limits, concentration is estimated

F = Library spectrum match, not >90% or RT match

R = RPD (relative percent difference) outside accepted recovery limits

U = Analyte analyzed for but not detected

N/A = Not Applicable

B = Analyte detected in the associated blank

d = Data that exceeds the RSD criteria set by the SOP

H = Holding times for preparation or analysis exceeded

L = Sample condition at receipt out of compliance with method defined conditions

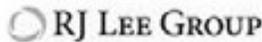
Q = Result out of method specific acceptance QC criteria

S = Spike Recovery outside accepted recovery limits

X = Not ELAP accredited analyte

ND = Not Detected

C = Confirmation analysis unavailable

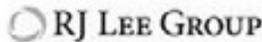


Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	KL	Qualifiers
Client Sample ID	RJLG ID						
16-06172-11-H1 S16T021821	W607075-11	07/22/16	08/08/16	N-Nitrosodimethylamine	<0.016	0.016	
		07/22/16	08/05/16	N-Nitrosodimethylamine	0.359	0.014	
		07/22/16	08/08/16	N-Nitrosomethyl ethylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosomethyl ethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	0.050	0.022	
		07/22/16	08/08/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/22/16	08/08/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/08/16	N-Nitrosodi-n-butylamine	0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	0.031	0.022	
		07/22/16	08/08/16	N-Nitrosopiperidine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosopiperidine	0.019	0.022	
		07/22/16	08/08/16	N-Nitrosopyrrolidine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
		07/22/16	08/08/16	N-Nitrosomorpholine	<0.020	0.020	
16-06172-11-H2 S16T021822	W607075-12	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethyl ethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-IN-BASE S16T021823	W607075-13	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethyl ethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	

Report Qualifiers:

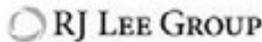
A = Target Analyte media breakthrough suspect, see analytical report
 D = Analyte analyzed in a dilution
 E = Report concentration was above the instrument calibration range
 J = Analyte detected below quantitation limits, concentration is estimated
 P = Library spectrum match, val >80% or RT match
 R = RPD (relative percent difference) outside accepted recovery limits
 U = Analyte analyzed for but not detected
 N/A = Not Applicable

B = Analyte detected in the associated blank
 d = Data that exceeds the RSD criteria set by the SOP
 H = Holding times for preparation or analysis exceeded
 L = Sample condition at receipt out of compliance with method defined conditions
 Q = Result out of method specific acceptance QC criteria
 S = Spike Recovery outside accepted recovery limits
 Z = Not ELAP accredited analyte
 ND = Not Detected
 C = Confirmation analysis unavailable



Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	KL	Qualifiers
Client Sample ID	RJLG ID						
16-06173-11-A1 516T021824	W607075-14	07/23/16	08/05/16	N-Nitrosodimethylamine	0.068	0.014	C
		07/23/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosodiethylamine	0.069	0.022	
		07/23/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosopiperidine	0.046	0.022	
		07/23/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosomorpholine	0.046	0.022	
16-06173-11-A2 516T021825	W607075-15	07/23/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-B1 516T021826	W607075-16	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-BLANK 516T021927	W607075-17	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	

<p><i>Report Qualifiers:</i></p> <p>A = Target Analyte media breakthrough suspect, see analytical report</p> <p>D = Analyte analyzed in a dilution</p> <p>E = Report concentration was above the instrument calibration range</p> <p>J = Analyte Detected below quantitation limits, concentration is estimated</p> <p>P = Library spectrum match, val >80% or RT match</p> <p>R = RPD (relative percent difference) outside accepted recovery limits</p> <p>U = Analyte analyzed for but not detected</p> <p>N/A = Not Applicable</p>	<p>B = Analyte detected in the associated blank</p> <p>d = Data that exceeds the RSD criteria set by the SOP</p> <p>H = Holding times for preparation or analysis exceeded</p> <p>L = Sample condition at receipt out of compliance with method defined conditions</p> <p>Q = Result out of method specific acceptance QC criteria</p> <p>S = Spike Recovery outside accepted recovery limits</p> <p>Z = Not ELAP accredited analyte</p> <p>ND = Not Detected</p> <p>C = Confirmation analysis unavailable</p>
---	--



Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	KL	Qualifiers
Client Sample ID	RJLG ID						
16-06173-11-C1 516T021829	W607075-18	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-D1 516T021830	W607075-19	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-E1 516T021831	W607075-20	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-EFF-BASE 516T021832	W607075-21	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	

Report Qualifiers:

A = Target Analyte media breakthrough suspect, see analytical report

D = Analyte analyzed in a dilution

E = Report concentration was above the instrument calibration range

J = Analyte Detected below quantitation limits, concentration is estimated

P = Library spectrum match, val >80% or RT match

R = RPD (relative percent difference) outside accepted recovery limits

U = Analyte analyzed for but not detected

N/A = Not Applicable

B = Analyte detected in the associated blank

d = Data that exceeds the RSD criteria set by the SOP

H = Holding times for preparation or analysis exceeded

L = Sample condition at receipt out of compliance with method defined conditions

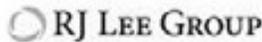
Q = Result out of method specific acceptance QC criteria

S = Spike Recovery outside accepted recovery limits

Z = Not ELAP accredited analyte

ND = Not Detected

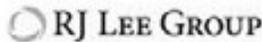
C = Confirmation analysis unavailable



Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	KL	Qualifiers
Client Sample ID	RJLG ID						
16-06173-11-F1 S16T021833	W607075-22	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	
16-06173-11-G1 S16T021834	W607075-23	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	
16-06173-11-H1 S16T021835	W607075-24	07/23/16	08/08/16	N-Nitrosodimethylamine	0.017	0.016	
		07/23/16	08/06/16	N-Nitrosodimethylamine	0.372	0.025	
		07/23/16	08/08/16	N-Nitrosomethylethylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/08/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/23/16	08/06/16	N-Nitrosodiethylamine	0.047	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/08/16	N-Nitrosodi-n-propylamine	0.023	0.021	
		07/23/16	08/08/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/08/16	N-Nitrosopiperidine	<0.020	0.020	
		07/23/16	08/06/16	N-Nitrosopiperidine	0.042	0.022	
		07/23/16	08/08/16	N-Nitrosopyrrolidine	<0.020	0.020	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	0.052	0.021	
07/23/16	08/08/16	N-Nitrosomorpholine	<0.020	0.020			

Report Qualifiers:
 A = Target Analyte media breakthrough suspect, see analytical report
 D = Analyte analyzed in a dilution
 E = Report concentration was above the instrument calibration range
 J = Analyte detected below quantitation limits, concentration is estimated
 P = Library spectrum match, val >80% or RT match
 R = RPD (relative percent difference) outside accepted recovery limits
 U = Analyte analyzed for but not detected
 N/A = Not Applicable

D = Analyte detected in the associated blank
 d = Data that exceeds the RSD criteria set by the SOP
 H = Holding times for preparation or analysis exceeded
 I = Sample condition at receipt out of compliance with method defined conditions
 Q = Result out of method specific acceptance QC criteria
 S = Spike Recovery outside accepted recovery limits
 Z = Not ELAP accredited analyte
 ND = Not Detected
 C = Confirmation analysis unavailable



Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/rbse	KL	Qualifiers
Client Sample ID	RJLG ID						
16-06173-11-F2 S16T021836	W607075-25	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	
16-06173-11-IN-BASE S16T021837	W607075-26	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	

Report Qualifiers:

A = Target Analyte media breakthrough suspect, see analytical report

D = Analyte analyzed in a dilution

E = Report concentration was above the instrument calibration range

J = Analyte detected below quantitation limits, concentration is estimated

P = Library spectrum match, not >90% or RT match

R = RPD (relative percent difference) outside accepted recovery limits

U = Analyte analyzed for but not detected

NA = Not Applicable

B = Analyte detected in the associated blank

d = Data that exceeds the RSD criteria set by the SOP

H = Holding times for preparation or analysis exceeded

L = Sample condition at receipt out of compliance with method defined conditions

Q = Result out of method specific acceptance QC criteria

S = Spike Recovery outside accepted recovery limits

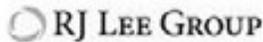
Z = Not ELAP accredited analyte

ND = Not Detected

C = Confirmation analysis unavailable

Scientist II DeNomy Dage

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples created by this report, RJ Lee Group will store the samples for a period of ninety (90) days before discarding. A shipping and handling fee will be assessed for the return of any samples. Unless otherwise noted, samples were received in an acceptable condition. This laboratory operates in accordance with ISO 17025 guidelines, and holds limited scope accreditation under ORILLAP Lab Code 4061 ADMA-LAP, LLC Lab ID 178836 EPA ID WA01195 and WA DCM Lab ID C439. This report may not be used to claim product endorsement by any laboratory accrediting agency. The results contained in this report relate only to the items tested or to the sample(s) as received by the laboratory. Any reproduction of this document must be in full for the report to be valid. Quality control data is available upon request.



Carl Howald IV
Washington River Protection
Solutions, LLC
P.O. Box 880 MSIN H6-16
Richland, WA 99352

Quality Control

NIOSH 2522

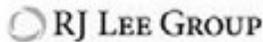
RJ Lee Group No: W607075
Samples Received: 07/26/16
Report Date: 08/18/16
COC No: 20162148
Extraction Date: 8/5/2016

Client Project:
Cartridge Evaluation

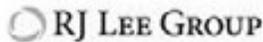
Analyte	CAS No.	Sample ID	Analyzed Date	Expected µg/tube	Result µg/tube	DE	DE Corrected	REC %	RSD %	Qualifier
N-Nitrosodiethylamine	55-18-5	LCS1	08/05/16	0.200	0.188	0.93	0.203	101	1.14	
N-Nitrosodiethylamine	55-18-5	LCS1	08/06/16	0.200	0.184	0.92	0.200	99.8	0.343	
N-Nitrosodiethylamine	55-18-5	LCS1	08/08/16	0.200	0.193	0.98	0.196	97.9	1.95	
N-Nitrosodimethylamine	62-75-9	LCS1	08/05/16	0.200	0.182	0.89	0.206	103	2.53	
N-Nitrosodimethylamine	62-75-9	LCS1	08/06/16	0.200	0.166	0.80	0.206	103	2.79	
N-Nitrosodimethylamine	62-75-9	LCS1	08/08/16	0.200	0.184	0.94	0.195	97.4	3.45	
N-Nitrosodi-n-butylamine	924-16-3	LCS1	08/05/16	0.200	0.182	0.91	0.200	99.6	1.73	
N-Nitrosodi-n-butylamine	924-16-3	LCS1	08/06/16	0.200	0.195	0.97	0.201	100	0.547	
N-Nitrosodi-n-butylamine	924-16-3	LCS1	08/08/16	0.200	0.191	0.96	0.200	99.7	1.20	
N-Nitrosodi-n-propylamine	621-64-7	LCS1	08/05/16	0.200	0.187	0.94	0.199	98.9	2.54	
N-Nitrosodi-n-propylamine	621-64-7	LCS1	08/06/16	0.200	0.195	0.97	0.201	100	0.120	
N-Nitrosodi-n-propylamine	621-64-7	LCS1	08/08/16	0.200	0.193	0.97	0.200	100	0.667	
N-Nitrosomethylethylamine	10595-95-6	LCS1	08/05/16	0.200	0.182	0.91	0.200	100	1.06	
N-Nitrosomethylethylamine	10595-95-6	LCS1	08/06/16	0.200	0.177	0.89	0.198	98.8	1.21	
N-Nitrosomethylethylamine	10595-95-6	LCS1	08/08/16	0.200	0.192	0.97	0.197	98.5	1.92	
N-Nitrosomorpholine	59-89-2	LCS1	08/05/16	0.200	0.186	0.93	0.200	100	0.891	
N-Nitrosomorpholine	59-89-2	LCS1	08/06/16	0.200	0.189	0.95	0.198	99.0	0.927	
N-Nitrosomorpholine	59-89-2	LCS1	08/08/16	0.200	0.195	0.99	0.198	99.0	2.53	
N-Nitrosopiperidine	100-75-4	LCS1	08/05/16	0.200	0.183	0.91	0.201	99.9	0.890	
N-Nitrosopiperidine	100-75-4	LCS1	08/06/16	0.200	0.179	0.91	0.197	98.4	1.53	
N-Nitrosopiperidine	100-75-4	LCS1	08/08/16	0.200	0.195	0.98	0.199	99.1	1.56	
N-Nitrosopyrrolidine	930-55-2	LCS1	08/05/16	0.200	0.182	0.92	0.198	99.3	2.11	
N-Nitrosopyrrolidine	930-55-2	LCS1	08/06/16	0.200	0.185	0.91	0.202	101	1.29	
N-Nitrosopyrrolidine	930-55-2	LCS1	08/08/16	0.200	0.193	0.98	0.198	98.9	1.05	
N-Nitrosodiethylamine	55-18-5	LCS2	08/05/16	0.200	0.185	0.93	0.199	99.7	1.14	
N-Nitrosodiethylamine	55-18-5	LCS2	08/06/16	0.200	0.184	0.92	0.200	99.8	0.343	
N-Nitrosodiethylamine	55-18-5	LCS2	08/08/16	0.200	0.201	0.98	0.204	102	1.95	
N-Nitrosodimethylamine	62-75-9	LCS2	08/05/16	0.200	0.177	0.89	0.200	99.7	2.53	
N-Nitrosodimethylamine	62-75-9	LCS2	08/06/16	0.200	0.160	0.80	0.199	99.0	2.79	
N-Nitrosodimethylamine	62-75-9	LCS2	08/08/16	0.200	0.196	0.94	0.208	104	3.45	
N-Nitrosodi-n-butylamine	924-16-3	LCS2	08/05/16	0.200	0.186	0.91	0.204	102	1.73	
N-Nitrosodi-n-butylamine	924-16-3	LCS2	08/06/16	0.200	0.193	0.97	0.199	99.4	0.547	
N-Nitrosodi-n-butylamine	924-16-3	LCS2	08/08/16	0.200	0.194	0.96	0.203	101	1.20	
N-Nitrosodi-n-propylamine	621-64-7	LCS2	08/05/16	0.200	0.194	0.94	0.206	103	2.54	
N-Nitrosodi-n-propylamine	621-64-7	LCS2	08/06/16	0.200	0.195	0.97	0.201	100	0.120	

Columbia Basin Analytical Laboratories | 2710 North 20th Avenue, Pasco WA 99301 | 509.545.4989

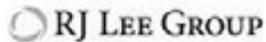
WWW.RJLEEGROUP.COM



Analyte	CAS No.	Sample ID	Analyzed Date	Expected µg/tube	Result µg/tube	DE	DE Corrected	REC %	RSD %	Qualifier
N-Nitrosodi-n-propylamine	621-64-7	LCS2	08/08/16	0.200	0.195	0.97	0.202	101	0.667	
N-Nitrosomethylethylamine	10595-95-6	LCS2	08/05/16	0.200	0.184	0.91	0.202	101	1.06	
N-Nitrosomethylethylamine	10595-95-6	LCS2	08/06/16	0.200	0.179	0.89	0.201	99.9	1.21	
N-Nitrosomethylethylamine	10595-95-6	LCS2	08/08/16	0.200	0.199	0.97	0.204	102	1.92	
N-Nitrosomorpholine	59-89-2	LCS2	08/05/16	0.200	0.187	0.93	0.201	101	0.891	
N-Nitrosomorpholine	59-89-2	LCS2	08/06/16	0.200	0.191	0.95	0.201	100	0.927	
N-Nitrosomorpholine	59-89-2	LCS2	08/08/16	0.200	0.203	0.99	0.206	103	2.53	
N-Nitrosopiperidine	100-75-4	LCS2	08/05/16	0.200	0.184	0.91	0.202	101	0.890	
N-Nitrosopiperidine	100-75-4	LCS2	08/06/16	0.200	0.184	0.91	0.203	101	1.53	
N-Nitrosopiperidine	100-75-4	LCS2	08/08/16	0.200	0.200	0.98	0.204	102	1.56	
N-Nitrosopyrrolidine	930-55-2	LCS2	08/05/16	0.200	0.188	0.92	0.205	102	2.11	
N-Nitrosopyrrolidine	930-55-2	LCS2	08/06/16	0.200	0.184	0.91	0.201	100	1.29	
N-Nitrosopyrrolidine	930-55-2	LCS2	08/08/16	0.200	0.197	0.98	0.202	101	1.05	
N-Nitrosodiethylamine	55-18-5	LCS3	08/05/16	0.200	0.184	0.93	0.198	99.1	1.14	
N-Nitrosodiethylamine	55-18-5	LCS3	08/06/16	0.200	0.185	0.92	0.201	100	0.343	
N-Nitrosodiethylamine	55-18-5	LCS3	08/08/16	0.200	0.198	0.98	0.201	100	1.95	
N-Nitrosodimethylamine	62-75-9	LCS3	08/05/16	0.200	0.173	0.89	0.195	97.6	2.53	
N-Nitrosodimethylamine	62-75-9	LCS3	08/06/16	0.200	0.188	0.80	0.196	97.8	2.79	
N-Nitrosodimethylamine	62-75-9	LCS3	08/08/16	0.200	0.186	0.94	0.198	98.7	3.45	
N-Nitrosodi-n-butylamine	924-16-3	LCS3	08/05/16	0.200	0.180	0.91	0.198	98.5	1.73	
N-Nitrosodi-n-butylamine	924-16-3	LCS3	08/06/16	0.200	0.195	0.97	0.201	100	0.547	
N-Nitrosodi-n-butylamine	924-16-3	LCS3	08/08/16	0.200	0.190	0.96	0.198	99.0	1.20	
N-Nitrosodi-n-propylamine	621-64-7	LCS3	08/05/16	0.200	0.185	0.94	0.196	98.2	2.54	
N-Nitrosodi-n-propylamine	621-64-7	LCS3	08/06/16	0.200	0.194	0.97	0.200	99.9	0.120	
N-Nitrosodi-n-propylamine	621-64-7	LCS3	08/08/16	0.200	0.192	0.97	0.199	99.3	0.667	
N-Nitrosomethylethylamine	10595-95-6	LCS3	08/05/16	0.200	0.180	0.91	0.198	98.9	1.06	
N-Nitrosomethylethylamine	10595-95-6	LCS3	08/06/16	0.200	0.181	0.89	0.203	101	1.21	
N-Nitrosomethylethylamine	10595-95-6	LCS3	08/08/16	0.200	0.194	0.97	0.199	99.3	1.92	
N-Nitrosomorpholine	59-89-2	LCS3	08/05/16	0.200	0.184	0.93	0.198	99.0	0.891	
N-Nitrosomorpholine	59-89-2	LCS3	08/06/16	0.200	0.192	0.95	0.202	101	0.927	
N-Nitrosomorpholine	59-89-2	LCS3	08/08/16	0.200	0.194	0.99	0.197	98.2	2.53	
N-Nitrosopiperidine	100-75-4	LCS3	08/05/16	0.200	0.181	0.91	0.198	99.1	0.890	
N-Nitrosopiperidine	100-75-4	LCS3	08/06/16	0.200	0.182	0.91	0.201	100	1.53	
N-Nitrosopiperidine	100-75-4	LCS3	08/08/16	0.200	0.194	0.98	0.198	99.1	1.56	
N-Nitrosopyrrolidine	930-55-2	LCS3	08/05/16	0.200	0.181	0.92	0.197	98.3	2.11	
N-Nitrosopyrrolidine	930-55-2	LCS3	08/06/16	0.200	0.180	0.91	0.197	98.5	1.29	
N-Nitrosopyrrolidine	930-55-2	LCS3	08/08/16	0.200	0.196	0.98	0.201	100	1.05	
N-Nitrosodiethylamine	55-18-5	MB	08/05/16		0.00	0.93	0.00			
N-Nitrosodiethylamine	55-18-5	MB	08/06/16		0.00	0.92	0.00			
N-Nitrosodiethylamine	55-18-5	MB	08/08/16		0.00	0.98	0.00			
N-Nitrosodimethylamine	62-75-9	MB	08/05/16		0.00	0.89	0.00			
N-Nitrosodimethylamine	62-75-9	MB	08/06/16		0.00	0.80	0.00			



Analyte	CAS No.	Sample ID	Analyzed Date	Expected µg/tube	Result µg/tube	DE	DE Corrected	REC %	RSD %	Qualifier
N-Nitrosodimethylamine	62-75-9	MB	08/08/16		0.00	0.94	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	08/05/16		0.00	0.91	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	08/06/16		0.00	0.97	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	08/08/16		0.00	0.96	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	08/05/16		0.00	0.94	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	08/06/16		0.00	0.97	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	08/08/16		0.00	0.97	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	08/05/16		0.00	0.91	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	08/06/16		0.00	0.89	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	08/08/16		0.00	0.97	0.00			
N-Nitrosomorpholine	59-89-2	MB	08/05/16		0.00	0.93	0.00			
N-Nitrosomorpholine	59-89-2	MB	08/06/16		0.00	0.95	0.00			
N-Nitrosomorpholine	59-89-2	MB	08/08/16		0.00	0.99	0.00			
N-Nitrosopiperidine	100-75-4	MB	08/05/16		0.00	0.91	0.00			
N-Nitrosopiperidine	100-75-4	MB	08/06/16		0.00	0.91	0.00			
N-Nitrosopiperidine	100-75-4	MB	08/08/16		0.00	0.98	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	08/05/16		0.00	0.92	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	08/06/16		0.00	0.91	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	08/08/16		0.00	0.98	0.00			
N-Nitrosodiethylamine	55-18-5	MRL	08/05/16	0.020	0.021	0.93	0.023	114		
N-Nitrosodiethylamine	55-18-5	MRL	08/06/16	0.020	0.024	0.92	0.026	129		
N-Nitrosodiethylamine	55-18-5	MRL	08/08/16	0.020	0.026	0.98	0.026	130		
N-Nitrosodimethylamine	62-75-9	MRL	08/05/16	0.020	0.023	0.89	0.026	130		
N-Nitrosodimethylamine	62-75-9	MRL	08/06/16	0.020	0.019	0.80	0.024	120		
N-Nitrosodimethylamine	62-75-9	MRL	08/08/16	0.020	0.025	0.94	0.027	134		
N-Nitrosodi-n-butylamine	924-16-3	MRL	08/05/16	0.020	0.025	0.91	0.028	141		
N-Nitrosodi-n-butylamine	924-16-3	MRL	08/06/16	0.020	0.026	0.97	0.027	135		
N-Nitrosodi-n-butylamine	924-16-3	MRL	08/08/16	0.020	0.025	0.96	0.026	129		
N-Nitrosodi-n-propylamine	621-64-7	MRL	08/05/16	0.020	0.023	0.94	0.024	121		
N-Nitrosodi-n-propylamine	621-64-7	MRL	08/06/16	0.020	0.026	0.97	0.027	137		
N-Nitrosodi-n-propylamine	621-64-7	MRL	08/08/16	0.020	0.025	0.97	0.026	129		
N-Nitrosomethylethylamine	10595-95-6	MRL	08/05/16	0.020	0.023	0.91	0.025	126		
N-Nitrosomethylethylamine	10595-95-6	MRL	08/06/16	0.020	0.023	0.89	0.026	128		
N-Nitrosomethylethylamine	10595-95-6	MRL	08/08/16	0.020	0.025	0.97	0.026	131		
N-Nitrosomorpholine	59-89-2	MRL	08/05/16	0.020	0.024	0.93	0.026	128		
N-Nitrosomorpholine	59-89-2	MRL	08/06/16	0.020	0.026	0.95	0.027	136		
N-Nitrosomorpholine	59-89-2	MRL	08/08/16	0.020	0.024	0.99	0.024	119		
N-Nitrosopiperidine	100-75-4	MRL	08/05/16	0.020	0.022	0.91	0.024	118		
N-Nitrosopiperidine	100-75-4	MRL	08/06/16	0.020	0.023	0.91	0.025	126		
N-Nitrosopiperidine	100-75-4	MRL	08/08/16	0.020	0.026	0.98	0.027	133		
N-Nitrosopyrrolidine	930-55-2	MRL	08/05/16	0.020	0.023	0.92	0.027	137		
N-Nitrosopyrrolidine	930-55-2	MRL	08/06/16	0.020	0.026	0.91	0.028	138		



Analyte	CAS No.	Sample ID	Analyzed Date	Expected $\mu\text{g}/\text{tube}$	Result $\mu\text{g}/\text{tube}$	DE	DE Corrected	REC %	RSD %	Qualifier
N-Nitrosopyrrolidine	930-55-2	MRL	08/08/16	0.020	0.023	0.98	0.024	118		

Report Qualifiers:

A = Target Analyte media breakthrough suspect, see analytical report

D = Analyte analyzed in a dilution

E = Report concentration was above the instrument calibration range

J = Analyte detected below quantitation limits, concentration is estimated

P = Library spectrum match, $\geq 90\%$ or RF match

K = RPD (relative percent difference) outside accepted recovery limits

U = Analyte analyzed for but not detected

N/A = Not Applicable

B = Analyte detected in the associated blank

F = Data that exceeds the RSD criteria set by the SOP

H = Holding times for preparation or analysis exceeded

I = Sample condition at receipt out of compliance with method defined conditions

Q = Result out of method specific acceptance QC criteria

S = Spike Recovery outside accepted recovery limits

Z = Not ILAP accredited analyte

ND = Not Detected

Scientist II DeNomy Dage

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples covered by this report, RJ Lee Group will store the samples for a period of ninety (90) days before discarding. A shipping and handling fee will be assessed for the return of any samples. Unless otherwise noted, samples were received in an acceptable condition. This laboratory operates in accordance with ISO 17025 guidelines, and holds limited scopes of accreditation under CRIILAP Lab Code 4061 ABNA-LAP, LLC Lab ID 170656 EPA ID WA001965 and WA DOE Lab ID C636. This report may not be used to claim product endorsement by any laboratory accrediting agency. The results contained in this report relate only to the items tested or to the sample(s) as received by the laboratory. Any reproduction of this document must be in full for the report to be valid.

W607075

Assembler		COC No.				
N/A		20162148				
CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						
Collector		Page 1 of 3				
JONES						
SAF No.		MSIN 16-05 FAX 372-1878				
N/A		Purchase Order/Charge Code 302037020				
Project Title		Temp.				
CALIFORNIA EVALUATOR						
Shipped To (Lab)		Bill of Lading/IR Bill No.				
CAL		Parts and Return No.				
Product		Data Turnaround				
S/A		16 DAYS				
Sample No.	LAB ID	Date	Time	No./Type Container	Sample Analysis	Preferential
	S167021811	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-A1 ✓	N/A
	S167021812	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-A2 ✓	N/A
	S167021813	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-B1 ✓	N/A
	S167021814	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-BLANK ✓	N/A
	S167021815	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-C1 ✓	N/A
	S167021816	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-D1 ✓	N/A
	S167021817	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-E1 ✓	N/A
	S167021818	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-EFF-BASE ✓	N/A
	S167021819	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-F1 ✓	N/A
	S167021820	VA	7/22/16	Thermoseal-N	Nitrosamines 16-06172-11-G1 ✓	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSOS Yes No

SPECIAL INSTRUCTIONS
 Send Results to Capt Howard IV & Greg Moore
 POWER@302037020 and Greg_Moore@302037020
 see SOB for email
 CONTRACT 55903
 RELEASE 5

Hold Time

Requisitioned By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
Sharon L Wolden			7/26/16 09:00	Re Rogers			7/26/16 09:00
Requisitioned By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
Re Rogers			7/26/16 11:50	Re Rogers			7/26/16 11:50
Requisitioned By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
Re Rogers			7/26/16 11:50	Re Rogers			7/26/16 11:50

Disposal Method (e.g., Return to customer, per lab procedure, used in process) Consumed

Disposed By: [Signature]

Date/Time: 08/15/16 12:27

All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.

A-6003-962 (03/05)

Assembly		Date/Time		C.O.C. No.				
W607075		20162148		Page 2 of 3				
CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST								
Collector	Contract/Requester	Telephone No.	MSIN	FAX	312-1378			
3085	CAL BOWALD IV	313-6863	16-05					
SAF No.	Sample Origin	Purchase Order/Charge Code						
N/A	CARTILOG EVALUATION	222602/CR10						
Project Title	Lot/Order Work Package No.	Job Chart No.	Temp.					
CHARILOG EVALUATION	N/A							
Shipped To (Lab)	Method of Shipment	Bill of Lading/air Bill No.						
CAL	Over Turnaround 20 DAYS	Parts and Return No.						
Protocol								
N/A								
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative		
	3167021821	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06173-11-B1 ✓	N/A		
	3167021822	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06172-11-B2 ✓	N/A		
	3167021823	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06172-11-20-BASE ✓	N/A		
	3167021824	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06173-11-B1 ✓	N/A		
	3167021825	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06173-11-B2 ✓	N/A		
	3167021826	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06173-11-B1 ✓	N/A		
	3167021827	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06173-11-BLANK ✓	N/A		
	3167021829	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06173-11-C1 ✓	N/A		
	3167021830	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06173-11-01 ✓	N/A		
	3167021831	VA	7/23/16	Thermosorb-N	NIETROSAMLine 16-06173-11-B1 ✓	N/A		
<p>POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No</p> <p>SPECIAL INSTRUCTIONS: Send Results to Carl Bowald IV & Greg Moore Robert W. Royster, 11907 and Greg S. Moore, 211, 906 See SOH for email CONTRACT 55593 RELEASE 5</p>								
Hold Time								
Requested By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix*
Sharon Holden	Sharon Holden	SH	7/21/16 0900	Re Rogers	Re Rogers	RR	7/21/16 0900	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air DS = Drum Solids DL = Drum Liquids T = Tissue VM = Vial L = Liquid V = Vegetation VA = Vapor X = Other
Requested By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix*
Re Rogers	Re Rogers	RR	7-26-16 1150	J. Rice	J. Rice	JR	7/26/16 1150	
Requested By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix*
Final Sample Disposition	Disposition Method (e.g., Return to customer, per lab procedure, used in process)	Consumed	Disposed By	Date/Time				
			DSA	08/15/16 12:27				

All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.

A-6603-962 (03/06)

Appendix D

Data Reduction Steps

Appendix D

Data Reduction Steps

1. Only chemicals in the current Chemicals Of Potential Concern (COPC) list were included in the calculated data. Nitrous oxide and methanol were not measured in the study. Any other missing COPCs were analyzed as “Tentatively Identified Compounds.”
2. The COPCs are ranked in the order of their COPC number. Within the data section for each COPC, data are ranked in the order of survey (1 and 2). Within every survey, data are ranked in the order of inlet and outlet and following the time sequence.
3. Except for mercury, COPC concentrations were converted into parts per million using their molecular weights and corresponding flow rates after volume correction as shown in the following equation:

$$C = 24.25 \frac{r}{M V}$$

where C is the concentration of COPC in ppmv; r is the analytical result with units of $\mu\text{g}/\text{sample}$ (if the analytical result unit is expressed in mg/sample , the value of C needs to be multiplied by 1000; if the analytical result unit is in ng/sample the value of C needs to be divided by 1000); V is the collected volume in 2 hours expressed in liters; M is the molecular weight of COPC with unit of g/mol . When the ratio between concentration and the corresponding OEL is larger than 10%, the fraction is shown in red.

4. The reported volume measurements in Appendix C were made via DryCal devices placed downstream of each sample media tube. This allowed for precise volume measurements through each of the tubes. However, to perform the concentration conversion to ppm, the “actual” volumetric values required conversion to standard temperature and pressure conditions.

Ideal gas behavior was assumed for these volume corrections and standard temperatures and pressures were assumed to be 298 K (T_{standard}) and 760 Torr (P_{standard}), respectively. For temperatures, the reported upstream temperatures for each time period were used (T_{upstream} , in Kelvin), and the temperature correction factor (i.e. the factor multiplied by each reported volume) was simply $T_{\text{standard}}/T_{\text{upstream}}$.

For the pressure corrections, additional pressure drop information was gathered so that the pressure at the point of the DryCal device could be calculated. Each time step had reported upstream pressures (P_{upstream} , or upstream of the respirator cartridges). Therefore, pressure drop measurements across the respirator cartridge and each sample media tube were performed offline to gather the additional information necessary for the correction.

The average reported pressure drop reading for the respirator cartridge ($P_{\text{cartridge}}$) tested was 3.2 inches of water column (WC). The pressure drop measurements across the individual sample tubes are shown in the table below (all in inches of WC).

The average pressure drops were then used in a pressure correction factor for the reported volumes. Note that all pressure values were first converted to units of Torr. For measurements made at the inlet of the respirator cartridge the pressure correction factor is $(P_{\text{upstream}} - P_{\text{tube}}) \div P_{\text{standard}}$. For measurements made at the outlet of the respirator cartridge the pressure correction factor is $(P_{\text{upstream}} - P_{\text{cartridge}} - P_{\text{tube}}) \div P_{\text{standard}}$.

Tube Location	First Measure (inches of WC, tube on cartridge inlet side)	Second Measure (inches of WC, tube on cartridge outlet side)	Average of Both Measurements (P_{tube} , inches of WC)
A	5.0	12.4	8.7
B	6.9	7.2	7.1
C	2.3	2.5	2.4
D	0.8	0.8	0.8
E	1.9	2.1	2.0
F	3.8	6.8	5.3
G	1.6	1.7	1.7
H	7.7	6.5	7.1
I	5.2	4.0	4.6
J	15.9	16.3	16.1
K	10.1	9.7	9.9

An example of calculating the correction factors is as follows. For a given time period assume that the reported upstream pressure (P_{upstream}) was 734 Torr and the corresponding temperature (T_{upstream}) was 85.9F (or 302.9K). Here, for tube location ‘A’ and upstream of the respirator cartridge, the corresponding temperature correction factor would be 0.984 and the pressure correction factor for the respirator cartridge outlet is 0.944. When multiplied, these two factors equal 0.929 which would be the overall correction to the reported volume measurement.

5. The analytical detection limit (DL)—or reporting limit in some cases—for every COPC was obtained from the raw analytical data. Here, the average flow rate was used to calculate the approximate analytical detection limit as the percentage of OEL for each COPC. Because the flow rates vary, the calculated concentrations were different for each point, even though some of the results are less than the DL in the original reading. The last column in the tables below indicate if the original readings were less than the DL or not.
 1. For ammonia and mercury, only the results obtained from using method of total vapor of ammonia and mercury were used.
 2. For furan, results from furan category instead of VOC (or VOA) were used. For acetonitrile, results from VOC (or VOA) category were used.
 3. For N-Nitrosodimethylamine (NDMA) and other nitrosamines, data values above analytical DLs for the same time and position were added together because the original sample was diluted into three samples for measurement. This same rule applies to 1, 3-Butadiene. The results in the plots and tables reflect the results.

The following tables show the calculated concentrations for each of the COPC measurements conducted in this study. Red highlighted values reflect measurements that were above 10% of the respective OEL values. COPCs with these highlights are plotted and shown in Section 5.0. Orange highlighted values reflect measurements in the 2 to 10% (of OEL) range. COPCs with these highlights (only) are plotted and shown in Appendix E.

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
1	Ammonia	2	6172-A1	121	2.50E+01	484%		2.55%
1	Ammonia	16	6172-H1	121	2.50E+01	484%		2.55%
1	Ammonia	2	6172-A2	0.62	2.50E+01	2.48%	YES	2.55%
1	Ammonia	4	6172-B1	7.6	2.50E+01	30.3%		2.55%
1	Ammonia	6	6172-C1	63	2.50E+01	253%		2.55%
1	Ammonia	8	6172-D1	11	2.50E+01	43.7%		2.55%
1	Ammonia	10	6172-E1	72	2.50E+01	289%		2.55%
1	Ammonia	12	6172-F1	87	2.50E+01	348%		2.55%
1	Ammonia	14	6172-G1	18	2.50E+01	72.4%		2.55%
1	Ammonia	16	6172-H2	0.61	2.50E+01	2.44%	YES	2.55%
1	Ammonia	2	6173-A1	111	2.50E+01	442%		2.55%
1	Ammonia	16	6173-H1	48	2.50E+01	192%		2.55%
1	Ammonia	2	6173-A2	0.62	2.50E+01	2.50%	YES	2.55%
1	Ammonia	4	6173-B1	0.64	2.50E+01	2.55%	YES	2.55%
1	Ammonia	6	6173-C1	0.64	2.50E+01	2.54%	YES	2.55%
1	Ammonia	8	6173-D1	2.0	2.50E+01	7.89%		2.55%
1	Ammonia	10	6173-E1	3.4	2.50E+01	13.4%		2.55%
1	Ammonia	12	6173-F1	0.64	2.50E+01	2.55%	YES	2.55%
1	Ammonia	14	6173-G1	78	2.50E+01	314%		2.55%
1	Ammonia	16	6173-H2	5.1	2.50E+01	20.3%		2.55%
3	Mercury	2	6172-A1	0.0009	3.00E-03	31.5%		7.38%
3	Mercury	16	6172-H1	0.0009	3.00E-03	29.6%		7.38%
3	Mercury	2	6172-A2	0.0002	3.00E-03	7.11%	YES	7.38%
3	Mercury	4	6172-B1	0.0002	3.00E-03	7.27%	YES	7.38%
3	Mercury	6	6172-C1	0.0002	3.00E-03	6.83%	YES	7.38%
3	Mercury	8	6172-D1	0.0002	3.00E-03	7.51%	YES	7.38%
3	Mercury	10	6172-E1	0.0002	3.00E-03	7.14%	YES	7.38%
3	Mercury	12	6172-F1	0.0002	3.00E-03	7.03%	YES	7.38%
3	Mercury	14	6172-G1	0.0002	3.00E-03	7.02%	YES	7.38%
3	Mercury	16	6172-H2	0.0002	3.00E-03	7.00%	YES	7.38%
3	Mercury	2	6173-A1	0.0010	3.00E-03	32.0%		7.38%
3	Mercury	16	6173-H1	0.001	3.00E-03	33.8%		7.38%
3	Mercury	2	6173-A2	0.0002	3.00E-03	7.11%	YES	7.38%
3	Mercury	4	6173-B1	0.0002	3.00E-03	7.22%	YES	7.38%
3	Mercury	6	6173-C1	0.0002	3.00E-03	7.26%	YES	7.38%
3	Mercury	8	6173-D1	0.0002	3.00E-03	7.38%	YES	7.38%
3	Mercury	10	6173-E1	0.0002	3.00E-03	7.26%	YES	7.38%
3	Mercury	12	6173-F1	0.0002	3.00E-03	7.23%	YES	7.38%
3	Mercury	14	6173-G1	0.0002	3.00E-03	7.15%	YES	7.38%
3	Mercury	16	6173-H2	0.0002	3.00E-03	6.98%	YES	7.38%
4	1,3-Butadiene	2	6172-A1	0.019	1.00E+00	1.95%	YES	2.44%
4	1,3-Butadiene	16	6172-H1	0.020	1.00E+00	1.97%	YES	2.44%
4	1,3-Butadiene	2	6172-A2	0.020	1.00E+00	1.98%	YES	2.44%
4	1,3-Butadiene	4	6172-B1	0.024	1.00E+00	2.44%		2.44%
4	1,3-Butadiene	6	6172-C1	0.019	1.00E+00	1.94%		2.44%
4	1,3-Butadiene	8	6172-D1	0.024	1.00E+00	2.38%		2.44%
4	1,3-Butadiene	10	6172-E1	0.020	1.00E+00	1.97%	YES	2.44%
4	1,3-Butadiene	12	6172-F1	0.020	1.00E+00	1.99%	YES	2.44%
4	1,3-Butadiene	14	6172-G1	0.020	1.00E+00	1.96%	YES	2.44%
4	1,3-Butadiene	16	6172-H2	0.019	1.00E+00	1.94%	YES	2.44%
4	1,3-Butadiene	2	6173-A1	0.020	1.00E+00	1.98%	YES	2.64%
4	1,3-Butadiene	16	6173-H1	0.020	1.00E+00	1.97%	YES	2.64%
4	1,3-Butadiene	2	6173-A2	0.026	1.00E+00	2.64%	YES	2.64%
4	1,3-Butadiene	4	6173-B1	0.020	1.00E+00	2.01%	YES	2.64%
4	1,3-Butadiene	6	6173-C1	0.020	1.00E+00	2.00%	YES	2.64%
4	1,3-Butadiene	8	6173-D1	0.020	1.00E+00	2.01%	YES	2.64%
4	1,3-Butadiene	10	6173-E1	0.020	1.00E+00	2.03%	YES	2.64%
4	1,3-Butadiene	12	6173-F1	0.020	1.00E+00	2.00%	YES	2.64%
4	1,3-Butadiene	14	6173-G1	0.020	1.00E+00	2.00%	YES	2.64%
4	1,3-Butadiene	16	6173-H2	0.020	1.00E+00	1.98%	YES	2.64%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
5	Benzene	2	6172-A1	0.0007	5.00E-01	0.133%		0.03%
5	Benzene	16	6172-H1	0.0006	5.00E-01	0.122%		0.03%
5	Benzene	2	6172-A2	0.0001	5.00E-01	0.026%	YES	0.03%
5	Benzene	4	6172-B1	0.0002	5.00E-01	0.030%		0.03%
5	Benzene	6	6172-C1	0.0002	5.00E-01	0.031%		0.03%
5	Benzene	8	6172-D1	0.0002	5.00E-01	0.031%		0.03%
5	Benzene	10	6172-E1	0.0001	5.00E-01	0.028%		0.03%
5	Benzene	12	6172-F1	0.0001	5.00E-01	0.026%		0.03%
5	Benzene	14	6172-G1	0.0001	5.00E-01	0.028%		0.03%
5	Benzene	16	6172-H2	0.0001	5.00E-01	0.030%		0.03%
5	Benzene	2	6173-A1		5.00E-01			0.03%
5	Benzene	16	6173-H1	0.0005	5.00E-01	0.108%		0.03%
5	Benzene	2	6173-A2		5.00E-01			0.03%
5	Benzene	4	6173-B1	0.0001	5.00E-01	0.021%	YES	0.03%
5	Benzene	6	6173-C1	0.0001	5.00E-01	0.021%	YES	0.03%
5	Benzene	8	6173-D1	0.0001	5.00E-01	0.021%	YES	0.03%
5	Benzene	10	6173-E1	0.0001	5.00E-01	0.024%		0.03%
5	Benzene	12	6173-F1	0.0001	5.00E-01	0.025%		0.03%
5	Benzene	14	6173-G1	0.0001	5.00E-01	0.022%		0.03%
5	Benzene	16	6173-H2	0.0001	5.00E-01	0.020%	YES	0.03%
6	Biphenyl	2	6172-A1	0.0002	2.00E-01	0.087%	YES	0.29%
6	Biphenyl	16	6172-H1	0.0002	2.00E-01	0.085%	YES	0.29%
6	Biphenyl	2	6172-A2	0.0002	2.00E-01	0.080%	YES	0.29%
6	Biphenyl	4	6172-B1	0.0002	2.00E-01	0.084%	YES	0.29%
6	Biphenyl	6	6172-C1	0.0002	2.00E-01	0.081%	YES	0.29%
6	Biphenyl	8	6172-D1	0.0002	2.00E-01	0.083%	YES	0.29%
6	Biphenyl	10	6172-E1	0.0002	2.00E-01	0.086%	YES	0.29%
6	Biphenyl	12	6172-F1	0.0002	2.00E-01	0.084%	YES	0.29%
6	Biphenyl	14	6172-G1	0.0002	2.00E-01	0.085%	YES	0.29%
6	Biphenyl	16	6172-H2	0.0002	2.00E-01	0.083%	YES	0.29%
6	Biphenyl	2	6173-A1	0.0003	2.00E-01	0.151%	YES	0.29%
6	Biphenyl	16	6173-H1	0.0006	2.00E-01	0.287%	YES	0.29%
6	Biphenyl	2	6173-A2	0.0002	2.00E-01	0.092%	YES	0.29%
6	Biphenyl	4	6173-B1	0.0002	2.00E-01	0.091%	YES	0.29%
6	Biphenyl	6	6173-C1	0.0002	2.00E-01	0.087%	YES	0.29%
6	Biphenyl	8	6173-D1	0.0002	2.00E-01	0.090%	YES	0.29%
6	Biphenyl	10	6173-E1	0.0002	2.00E-01	0.088%	YES	0.29%
6	Biphenyl	12	6173-F1	0.0002	2.00E-01	0.086%	YES	0.29%
6	Biphenyl	14	6173-G1		2.00E-01			0.29%
6	Biphenyl	16	6173-H2	0.0004	2.00E-01	0.179%	YES	0.29%
7	1-Butanol	2	6172-A1	0.026	2.00E+01	0.129%		0.004%
7	1-Butanol	16	6172-H1	0.025	2.00E+01	0.123%		0.004%
7	1-Butanol	2	6172-A2	0.0007	2.00E+01	0.003%		0.004%
7	1-Butanol	4	6172-B1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	6	6172-C1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	8	6172-D1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	10	6172-E1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	12	6172-F1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	14	6172-G1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	16	6172-H2	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	2	6173-A1		2.00E+01			0.004%
7	1-Butanol	16	6173-H1	0.020	2.00E+01	0.098%		0.004%
7	1-Butanol	2	6173-A2		2.00E+01			0.004%
7	1-Butanol	4	6173-B1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	6	6173-C1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	8	6173-D1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	10	6173-E1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	12	6173-F1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	14	6173-G1	0.0008	2.00E+01	0.004%	YES	0.004%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
7	1-Butanol	16	6173-H2	0.0008	2.00E+01	0.004%	YES	0.004%
9	2-Hexanone	2	6172-A1	0.0010	5.00E+00	0.020%		0.016%
9	2-Hexanone	16	6172-H1	0.0007	5.00E+00	0.015%	YES	0.016%
9	2-Hexanone	2	6172-A2	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	4	6172-B1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	6	6172-C1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	8	6172-D1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	10	6172-E1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	12	6172-F1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	14	6172-G1	0.0002	5.00E+00	0.003%		0.016%
9	2-Hexanone	16	6172-H2	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	2	6173-A1		5.00E+00			0.016%
9	2-Hexanone	16	6173-H1	0.0008	5.00E+00	0.016%	YES	0.016%
9	2-Hexanone	2	6173-A2		5.00E+00			0.016%
9	2-Hexanone	4	6173-B1	0.0001	5.00E+00	0.002%		0.016%
9	2-Hexanone	6	6173-C1	0.0001	5.00E+00	0.002%	YES	0.016%
9	2-Hexanone	8	6173-D1	0.0001	5.00E+00	0.002%	YES	0.016%
9	2-Hexanone	10	6173-E1	0.0001	5.00E+00	0.002%	YES	0.016%
9	2-Hexanone	12	6173-F1	0.0001	5.00E+00	0.002%	YES	0.016%
9	2-Hexanone	14	6173-G1	0.0001	5.00E+00	0.002%		0.016%
9	2-Hexanone	16	6173-H2	0.0001	5.00E+00	0.002%	YES	0.016%
11	4-Methyl-2-hexanone	2	6172-A1	0.0001	5.00E-01	0.028%	YES	0.033%
11	4-Methyl-2-hexanone	16	6172-H1	0.0002	5.00E-01	0.033%	YES	0.033%
11	4-Methyl-2-hexanone	2	6172-A2	0.0002	5.00E-01	0.031%	YES	0.033%
11	4-Methyl-2-hexanone	4	6172-B1	0.0002	5.00E-01	0.032%	YES	0.033%
11	4-Methyl-2-hexanone	6	6172-C1	0.0001	5.00E-01	0.029%	YES	0.033%
11	4-Methyl-2-hexanone	8	6172-D1	0.0002	5.00E-01	0.030%	YES	0.033%
11	4-Methyl-2-hexanone	10	6172-E1	0.0001	5.00E-01	0.030%	YES	0.033%
11	4-Methyl-2-hexanone	12	6172-F1	0.0001	5.00E-01	0.029%	YES	0.033%
11	4-Methyl-2-hexanone	14	6172-G1	0.0001	5.00E-01	0.029%	YES	0.033%
11	4-Methyl-2-hexanone	16	6172-H2	0.0001	5.00E-01	0.029%	YES	0.033%
11	4-Methyl-2-hexanone	2	6173-A1		5.00E-01			0.033%
11	4-Methyl-2-hexanone	16	6173-H1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	2	6173-A2		5.00E-01			0.033%
11	4-Methyl-2-hexanone	4	6173-B1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	6	6173-C1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	8	6173-D1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	10	6173-E1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	12	6173-F1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	14	6173-G1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	16	6173-H2	0.0001	5.00E-01	0.015%	YES	0.033%
13	3-Buten-2-one	2	6172-A1	0.0006	2.00E-01	0.291%		0.093%
13	3-Buten-2-one	16	6172-H1	0.0008	2.00E-01	0.380%		0.093%
13	3-Buten-2-one	2	6172-A2	0.0002	2.00E-01	0.093%	YES	0.093%
13	3-Buten-2-one	4	6172-B1	0.0002	2.00E-01	0.114%		0.093%
13	3-Buten-2-one	6	6172-C1	0.0002	2.00E-01	0.087%	YES	0.093%
13	3-Buten-2-one	8	6172-D1	0.0006	2.00E-01	0.285%		0.093%
13	3-Buten-2-one	10	6172-E1	0.0002	2.00E-01	0.088%	YES	0.093%
13	3-Buten-2-one	12	6172-F1	0.0012	2.00E-01	0.594%		0.093%
13	3-Buten-2-one	14	6172-G1	0.0002	2.00E-01	0.087%	YES	0.093%
13	3-Buten-2-one	16	6172-H2	0.0013	2.00E-01	0.644%		0.093%
13	3-Buten-2-one	2	6173-A1		2.00E-01			0.093%
13	3-Buten-2-one	16	6173-H1	0.0006	2.00E-01	0.311%		0.093%
13	3-Buten-2-one	2	6173-A2		2.00E-01			0.093%
13	3-Buten-2-one	4	6173-B1	0.0002	2.00E-01	0.082%	YES	0.093%
13	3-Buten-2-one	6	6173-C1	0.0002	2.00E-01	0.082%	YES	0.093%
13	3-Buten-2-one	8	6173-D1	0.0002	2.00E-01	0.082%	YES	0.093%
13	3-Buten-2-one	10	6173-E1	0.0002	2.00E-01	0.081%	YES	0.093%
13	3-Buten-2-one	12	6173-F1	0.0002	2.00E-01	0.080%	YES	0.093%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
13	3-Buten-2-one	14	6173-G1	0.0002	2.00E-01	0.079%	YES	0.093%
13	3-Buten-2-one	16	6173-H2	0.0002	2.00E-01	0.079%	YES	0.093%
14	Formaldehyde	2	6172-A1	0.014	3.00E-01	4.60%		0.607%
14	Formaldehyde	16	6172-H1	0.005	3.00E-01	1.67%		0.607%
14	Formaldehyde	2	6172-A2	0.004	3.00E-01	1.22%		0.607%
14	Formaldehyde	4	6172-B1	0.003	3.00E-01	0.983%		0.607%
14	Formaldehyde	6	6172-C1	0.002	3.00E-01	0.567%	YES	0.607%
14	Formaldehyde	8	6172-D1	0.002	3.00E-01	0.623%		0.607%
14	Formaldehyde	10	6172-E1	0.002	3.00E-01	0.597%	YES	0.607%
14	Formaldehyde	12	6172-F1	0.002	3.00E-01	0.600%	YES	0.607%
14	Formaldehyde	14	6172-G1	0.002	3.00E-01	0.597%	YES	0.607%
14	Formaldehyde	16	6172-H2	0.002	3.00E-01	0.587%	YES	0.607%
14	Formaldehyde	2	6173-A1	0.016	3.00E-01	5.22%		0.607%
14	Formaldehyde	16	6173-H1	0.008	3.00E-01	2.51%		0.607%
14	Formaldehyde	2	6173-A2	0.006	3.00E-01	2.08%		0.607%
14	Formaldehyde	4	6173-B1	0.003	3.00E-01	1.08%		0.607%
14	Formaldehyde	6	6173-C1	0.002	3.00E-01	0.607%	YES	0.607%
14	Formaldehyde	8	6173-D1	0.002	3.00E-01	0.603%	YES	0.607%
14	Formaldehyde	10	6173-E1	0.002	3.00E-01	0.507%	YES	0.607%
14	Formaldehyde	12	6173-F1	0.002	3.00E-01	0.603%	YES	0.607%
14	Formaldehyde	14	6173-G1	0.002	3.00E-01	0.607%	YES	0.607%
14	Formaldehyde	16	6173-H2	0.002	3.00E-01	0.593%	YES	0.607%
15	Acetaldehyde	2	6172-A1	0.056	2.50E+01	0.222%		0.005%
15	Acetaldehyde	16	6172-H1	0.051	2.50E+01	0.205%		0.005%
15	Acetaldehyde	2	6172-A2	0.027	2.50E+01	0.109%		0.005%
15	Acetaldehyde	4	6172-B1	0.032	2.50E+01	0.128%		0.005%
15	Acetaldehyde	6	6172-C1	0.028	2.50E+01	0.112%		0.005%
15	Acetaldehyde	8	6172-D1	0.031	2.50E+01	0.125%		0.005%
15	Acetaldehyde	10	6172-E1	0.027	2.50E+01	0.107%		0.005%
15	Acetaldehyde	12	6172-F1	0.024	2.50E+01	0.096%		0.005%
15	Acetaldehyde	14	6172-G1	0.029	2.50E+01	0.117%		0.005%
15	Acetaldehyde	16	6172-H2	0.029	2.50E+01	0.115%		0.005%
15	Acetaldehyde	2	6173-A1	0.046	2.50E+01	0.185%		0.005%
15	Acetaldehyde	16	6173-H1	0.049	2.50E+01	0.195%		0.005%
15	Acetaldehyde	2	6173-A2	0.027	2.50E+01	0.110%		0.005%
15	Acetaldehyde	4	6173-B1	0.027	2.50E+01	0.110%		0.005%
15	Acetaldehyde	6	6173-C1	0.024	2.50E+01	0.095%		0.005%
15	Acetaldehyde	8	6173-D1	0.025	2.50E+01	0.099%		0.005%
15	Acetaldehyde	10	6173-E1	0.025	2.50E+01	0.099%		0.005%
15	Acetaldehyde	12	6173-F1	0.027	2.50E+01	0.109%		0.005%
15	Acetaldehyde	14	6173-G1	0.027	2.50E+01	0.109%		0.005%
15	Acetaldehyde	16	6173-H2	0.029	2.50E+01	0.117%		0.005%
16	Butanal	2	6172-A1	0.0019	2.50E+01	0.008%		0.001%
16	Butanal	16	6172-H1	0.0017	2.50E+01	0.007%		0.001%
16	Butanal	2	6172-A2	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	4	6172-B1	0.0003	2.50E+01	0.001%		0.001%
16	Butanal	6	6172-C1	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	8	6172-D1	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	10	6172-E1	0.0005	2.50E+01	0.002%		0.001%
16	Butanal	12	6172-F1	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	14	6172-G1	0.0004	2.50E+01	0.002%		0.001%
16	Butanal	16	6172-H2	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	2	6173-A1		2.50E+01			0.001%
16	Butanal	16	6173-H1	0.0012	2.50E+01	0.005%		0.001%
16	Butanal	2	6173-A2		2.50E+01			0.001%
16	Butanal	4	6173-B1	0.0003	2.50E+01	0.001%		0.001%
16	Butanal	6	6173-C1	0.0002	2.50E+01	0.001%	YES	0.001%
16	Butanal	8	6173-D1	0.0002	2.50E+01	0.001%	YES	0.001%
16	Butanal	10	6173-E1	0.0002	2.50E+01	0.001%	YES	0.001%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
16	Butanal	12	6173-F1	0.0002	2.50E+01	0.001%	YES	0.001%
16	Butanal	14	6173-G1	0.0002	2.50E+01	0.001%	YES	0.001%
16	Butanal	16	6173-H2	0.0002	2.50E+01	0.001%	YES	0.001%
19	Furan	2	6172-A1	0.000027	1.00E-03	2.72%		0.87%
19	Furan	16	6172-H1	0.000036	1.00E-03	3.58%		0.87%
19	Furan	2	6172-A2	0.000009	1.00E-03	0.868%	YES	0.87%
19	Furan	4	6172-B1	0.000008	1.00E-03	0.779%	YES	0.87%
19	Furan	6	6172-C1	0.000008	1.00E-03	0.812%	YES	0.87%
19	Furan	8	6172-D1	0.000009	1.00E-03	0.853%	YES	0.87%
19	Furan	10	6172-E1	0.000009	1.00E-03	0.851%	YES	0.87%
19	Furan	12	6172-F1	0.000009	1.00E-03	0.855%	YES	0.87%
19	Furan	14	6172-G1	0.000009	1.00E-03	0.856%	YES	0.87%
19	Furan	16	6172-H2	0.000008	1.00E-03	0.847%	YES	0.87%
19	Furan	2	6173-A1	0.000035	1.00E-03	3.46%		0.87%
19	Furan	16	6173-H1	0.000048	1.00E-03	4.84%		0.87%
19	Furan	2	6173-A2	0.000010	1.00E-03	0.973%		0.87%
19	Furan	4	6173-B1	0.000009	1.00E-03	0.861%	YES	0.87%
19	Furan	6	6173-C1	0.000008	1.00E-03	0.846%		0.87%
19	Furan	8	6173-D1	0.000010	1.00E-03	1.01%		0.87%
19	Furan	10	6173-E1	0.000011	1.00E-03	1.07%		0.87%
19	Furan	12	6173-F1	0.000009	1.00E-03	0.861%	YES	0.87%
19	Furan	14	6173-G1	0.000008	1.00E-03	0.835%	YES	0.87%
19	Furan	16	6173-H2	0.000013	1.00E-03	1.29%		0.87%
20	2,3-Dihydrofuran	2	6172-A1	0.000042	1.00E-03	4.23%		1.77%
20	2,3-Dihydrofuran	16	6172-H1	0.000016	1.00E-03	1.65%	YES	1.77%
20	2,3-Dihydrofuran	2	6172-A2	0.000017	1.00E-03	1.69%	YES	1.77%
20	2,3-Dihydrofuran	4	6172-B1	0.000015	1.00E-03	1.51%	YES	1.77%
20	2,3-Dihydrofuran	6	6172-C1	0.000016	1.00E-03	1.58%	YES	1.77%
20	2,3-Dihydrofuran	8	6172-D1	0.000017	1.00E-03	1.66%	YES	1.77%
20	2,3-Dihydrofuran	10	6172-E1	0.000017	1.00E-03	1.65%	YES	1.77%
20	2,3-Dihydrofuran	12	6172-F1	0.000017	1.00E-03	1.66%	YES	1.77%
20	2,3-Dihydrofuran	14	6172-G1	0.000017	1.00E-03	1.66%	YES	1.77%
20	2,3-Dihydrofuran	16	6172-H2	0.000016	1.00E-03	1.65%	YES	1.77%
20	2,3-Dihydrofuran	2	6173-A1	0.000016	1.00E-03	1.63%	YES	1.77%
20	2,3-Dihydrofuran	16	6173-H1	0.000020	1.00E-03	2.03%		1.77%
20	2,3-Dihydrofuran	2	6173-A2	0.000017	1.00E-03	1.70%	YES	1.77%
20	2,3-Dihydrofuran	4	6173-B1	0.000017	1.00E-03	1.67%	YES	1.77%
20	2,3-Dihydrofuran	6	6173-C1	0.000016	1.00E-03	1.64%	YES	1.77%
20	2,3-Dihydrofuran	8	6173-D1	0.000018	1.00E-03	1.77%	YES	1.77%
20	2,3-Dihydrofuran	10	6173-E1	0.000025	1.00E-03	2.55%		1.77%
20	2,3-Dihydrofuran	12	6173-F1	0.000017	1.00E-03	1.67%	YES	1.77%
20	2,3-Dihydrofuran	14	6173-G1	0.000016	1.00E-03	1.62%	YES	1.77%
20	2,3-Dihydrofuran	16	6173-H2	0.000016	1.00E-03	1.62%	YES	1.77%
21	2,5-Dihydrofuran	2	6172-A1	0.000020	1.00E-03	2.03%	YES	2.17%
21	2,5-Dihydrofuran	16	6172-H1	0.000021	1.00E-03	2.10%	YES	2.17%
21	2,5-Dihydrofuran	2	6172-A2	0.000022	1.00E-03	2.15%	YES	2.17%
21	2,5-Dihydrofuran	4	6172-B1	0.000019	1.00E-03	1.93%	YES	2.17%
21	2,5-Dihydrofuran	6	6172-C1	0.000020	1.00E-03	2.02%	YES	2.17%
21	2,5-Dihydrofuran	8	6172-D1	0.000021	1.00E-03	2.12%	YES	2.17%
21	2,5-Dihydrofuran	10	6172-E1	0.000024	1.00E-03	2.39%		2.17%
21	2,5-Dihydrofuran	12	6172-F1	0.000021	1.00E-03	2.12%	YES	2.17%
21	2,5-Dihydrofuran	14	6172-G1	0.000021	1.00E-03	2.13%	YES	2.17%
21	2,5-Dihydrofuran	16	6172-H2	0.000021	1.00E-03	2.10%	YES	2.17%
21	2,5-Dihydrofuran	2	6173-A1	0.000021	1.00E-03	2.09%	YES	2.17%
21	2,5-Dihydrofuran	16	6173-H1	0.000021	1.00E-03	2.12%	YES	2.17%
21	2,5-Dihydrofuran	2	6173-A2	0.000022	1.00E-03	2.17%	YES	2.17%
21	2,5-Dihydrofuran	4	6173-B1	0.000021	1.00E-03	2.14%	YES	2.17%
21	2,5-Dihydrofuran	6	6173-C1	0.000021	1.00E-03	2.10%	YES	2.17%
21	2,5-Dihydrofuran	8	6173-D1	0.000018	1.00E-03	3.84%		2.17%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
21	2,5-Dihydrofuran	10	6173-E1	0.000022	1.00E-03	2.17%	YES	2.17%
21	2,5-Dihydrofuran	12	6173-F1	0.000021	1.00E-03	2.14%	YES	2.17%
21	2,5-Dihydrofuran	14	6173-G1	0.000021	1.00E-03	2.07%	YES	2.17%
21	2,5-Dihydrofuran	16	6173-H2	0.000021	1.00E-03	2.07%	YES	2.17%
22	2-Methylfuran	2	6172-A1	0.000017	1.00E-03	1.73%	YES	1.93%
22	2-Methylfuran	16	6172-H1	0.000018	1.00E-03	1.79%	YES	1.93%
22	2-Methylfuran	2	6172-A2	0.000018	1.00E-03	1.84%	YES	1.93%
22	2-Methylfuran	4	6172-B1	0.000017	1.00E-03	1.65%	YES	1.93%
22	2-Methylfuran	6	6172-C1	0.000017	1.00E-03	1.72%	YES	1.93%
22	2-Methylfuran	8	6172-D1	0.000018	1.00E-03	1.81%	YES	1.93%
22	2-Methylfuran	10	6172-E1	0.000021	1.00E-03	2.12%		1.93%
22	2-Methylfuran	12	6172-F1	0.000018	1.00E-03	1.81%	YES	1.93%
22	2-Methylfuran	14	6172-G1	0.000018	1.00E-03	1.81%	YES	1.93%
22	2-Methylfuran	16	6172-H2	0.000018	1.00E-03	1.80%	YES	1.93%
22	2-Methylfuran	2	6173-A1	0.000018	1.00E-03	1.78%	YES	1.93%
22	2-Methylfuran	16	6173-H1	0.000018	1.00E-03	1.81%	YES	1.93%
22	2-Methylfuran	2	6173-A2	0.000019	1.00E-03	1.86%	YES	1.93%
22	2-Methylfuran	4	6173-B1	0.000018	1.00E-03	1.82%	YES	1.93%
22	2-Methylfuran	6	6173-C1	0.000018	1.00E-03	1.79%	YES	1.93%
22	2-Methylfuran	8	6173-D1	0.000019	1.00E-03	1.93%	YES	1.93%
22	2-Methylfuran	10	6173-E1	0.000019	1.00E-03	1.85%	YES	1.93%
22	2-Methylfuran	12	6173-F1	0.000018	1.00E-03	1.82%	YES	1.93%
22	2-Methylfuran	14	6173-G1	0.000018	1.00E-03	1.77%	YES	1.93%
22	2-Methylfuran	16	6173-H2	0.000018	1.00E-03	1.76%	YES	1.93%
23	2,5-Dimethylfuran	2	6172-A1	0.000028	1.00E-03	2.76%	YES	3.08%
23	2,5-Dimethylfuran	16	6172-H1	0.000029	1.00E-03	2.87%	YES	3.08%
23	2,5-Dimethylfuran	2	6172-A2	0.000029	1.00E-03	2.94%	YES	3.08%
23	2,5-Dimethylfuran	4	6172-B1	0.000026	1.00E-03	2.64%	YES	3.08%
23	2,5-Dimethylfuran	6	6172-C1	0.000027	1.00E-03	2.75%	YES	3.08%
23	2,5-Dimethylfuran	8	6172-D1	0.000029	1.00E-03	2.89%	YES	3.08%
23	2,5-Dimethylfuran	10	6172-E1	0.000029	1.00E-03	2.88%	YES	3.08%
23	2,5-Dimethylfuran	12	6172-F1	0.000029	1.00E-03	2.89%	YES	3.08%
23	2,5-Dimethylfuran	14	6172-G1	0.000029	1.00E-03	2.90%	YES	3.08%
23	2,5-Dimethylfuran	16	6172-H2	0.000029	1.00E-03	2.87%	YES	3.08%
23	2,5-Dimethylfuran	2	6173-A1	0.000028	1.00E-03	2.85%	YES	3.08%
23	2,5-Dimethylfuran	16	6173-H1	0.000029	1.00E-03	2.89%	YES	3.08%
23	2,5-Dimethylfuran	2	6173-A2	0.000030	1.00E-03	2.96%	YES	3.08%
23	2,5-Dimethylfuran	4	6173-B1	0.000029	1.00E-03	2.91%	YES	3.08%
23	2,5-Dimethylfuran	6	6173-C1	0.000029	1.00E-03	2.86%	YES	3.08%
23	2,5-Dimethylfuran	8	6173-D1	0.000031	1.00E-03	3.08%	YES	3.08%
23	2,5-Dimethylfuran	10	6173-E1	0.000030	1.00E-03	2.96%	YES	3.08%
23	2,5-Dimethylfuran	12	6173-F1	0.000029	1.00E-03	2.91%	YES	3.08%
23	2,5-Dimethylfuran	14	6173-G1	0.000028	1.00E-03	2.83%	YES	3.08%
23	2,5-Dimethylfuran	16	6173-H2	0.000028	1.00E-03	2.82%	YES	3.08%
27	2-Pentylfuran	2	6172-A1	0.000020	0.00100	1.97%		1.70%
27	2-Pentylfuran	16	6172-H1	0.000016	0.00100	1.58%	YES	1.70%
27	2-Pentylfuran	2	6172-A2	0.000016	0.00100	1.61%	YES	1.70%
27	2-Pentylfuran	4	6172-B1	0.000017	0.00100	1.66%		1.70%
27	2-Pentylfuran	6	6172-C1	0.000015	0.00100	1.51%	YES	1.70%
27	2-Pentylfuran	8	6172-D1	0.000016	0.00100	1.59%	YES	1.70%
27	2-Pentylfuran	10	6172-E1	0.000016	0.00100	1.58%	YES	1.70%
27	2-Pentylfuran	12	6172-F1	0.000016	0.00100	1.59%	YES	1.70%
27	2-Pentylfuran	14	6172-G1	0.000016	0.00100	1.59%	YES	1.70%
27	2-Pentylfuran	16	6172-H2	0.000016	0.00100	1.58%	YES	1.70%
27	2-Pentylfuran	2	6173-A1	0.000016	0.00100	1.57%	YES	1.70%
27	2-Pentylfuran	16	6173-H1	0.000016	0.00100	1.59%	YES	1.70%
27	2-Pentylfuran	2	6173-A2	0.000016	0.00100	1.63%	YES	1.70%
27	2-Pentylfuran	4	6173-B1	0.000016	0.00100	1.60%	YES	1.70%
27	2-Pentylfuran	6	6173-C1	0.000016	0.00100	1.62%		1.70%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
27	2-Pentylfuran	8	6173-D1	0.000017	0.00100	1.70%	YES	1.70%
27	2-Pentylfuran	10	6173-E1	0.000027	0.00100	2.73%		1.70%
27	2-Pentylfuran	12	6173-F1	0.000016	0.00100	1.60%	YES	1.70%
27	2-Pentylfuran	14	6173-G1	0.000016	0.00100	1.55%	YES	1.70%
27	2-Pentylfuran	16	6173-H2	0.000015	0.00100	1.55%	YES	1.70%
28	2-Heptylfuran	2	6172-A1	0.000016	0.00100	1.63%		1.06%
28	2-Heptylfuran	16	6172-H1	0.000010	0.00100	1.04%	YES	1.06%
28	2-Heptylfuran	2	6172-A2	0.000013	0.00100	1.34%		1.06%
28	2-Heptylfuran	4	6172-B1	0.000013	0.00100	1.28%		1.06%
28	2-Heptylfuran	6	6172-C1	0.000011	0.00100	1.07%		1.06%
28	2-Heptylfuran	8	6172-D1	0.000014	0.00100	1.36%		1.06%
28	2-Heptylfuran	10	6172-E1	0.000010	0.00100	1.05%	YES	1.06%
28	2-Heptylfuran	12	6172-F1	0.000011	0.00100	1.05%	YES	1.06%
28	2-Heptylfuran	14	6172-G1	0.000011	0.00100	1.05%	YES	1.06%
28	2-Heptylfuran	16	6172-H2	0.000010	0.00100	1.04%	YES	1.06%
28	2-Heptylfuran	2	6173-A1	0.000013	0.00100	1.34%		1.06%
28	2-Heptylfuran	16	6173-H1	0.000010	0.00100	1.05%	YES	1.06%
28	2-Heptylfuran	2	6173-A2	0.000011	0.00100	1.12%		1.06%
28	2-Heptylfuran	4	6173-B1	0.000014	0.00100	1.45%		1.06%
28	2-Heptylfuran	6	6173-C1	0.000018	0.00100	1.81%		1.06%
28	2-Heptylfuran	8	6173-D1	0.000018	0.00100	1.82%		1.06%
28	2-Heptylfuran	10	6173-E1	0.000012	0.00100	1.15%		1.06%
28	2-Heptylfuran	12	6173-F1	0.000011	0.00100	1.06%	YES	1.06%
28	2-Heptylfuran	14	6173-G1	0.000010	0.00100	1.03%	YES	1.06%
28	2-Heptylfuran	16	6173-H2	0.000010	0.00100	1.02%	YES	1.06%
29	2-Propylfuran	2	6172-A1	0.000025	0.00100	2.47%	YES	2.75%
29	2-Propylfuran	16	6172-H1	0.000034	0.00100	3.37%		2.75%
29	2-Propylfuran	2	6172-A2	0.000026	0.00100	2.62%	YES	2.75%
29	2-Propylfuran	4	6172-B1	0.000024	0.00100	2.35%	YES	2.75%
29	2-Propylfuran	6	6172-C1	0.000025	0.00100	2.45%	YES	2.75%
29	2-Propylfuran	8	6172-D1	0.000028	0.00100	2.58%	YES	2.75%
29	2-Propylfuran	10	6172-E1	0.000026	0.00100	2.57%	YES	2.75%
29	2-Propylfuran	12	6172-F1	0.000026	0.00100	2.58%	YES	2.75%
29	2-Propylfuran	14	6172-G1	0.000026	0.00100	2.59%	YES	2.75%
29	2-Propylfuran	16	6172-H2	0.000026	0.00100	2.56%	YES	2.75%
29	2-Propylfuran	2	6173-A1	0.000025	0.00100	2.54%	YES	2.75%
29	2-Propylfuran	16	6173-H1	0.000026	0.00100	2.58%	YES	2.75%
29	2-Propylfuran	2	6173-A2	0.000026	0.00100	2.65%	YES	2.75%
29	2-Propylfuran	4	6173-B1	0.000026	0.00100	2.60%	YES	2.75%
29	2-Propylfuran	6	6173-C1	0.000026	0.00100	2.56%	YES	2.75%
29	2-Propylfuran	8	6173-D1	0.000028	0.00100	2.75%	YES	2.75%
29	2-Propylfuran	10	6173-E1	0.000026	0.00100	2.64%	YES	2.75%
29	2-Propylfuran	12	6173-F1	0.000026	0.00100	2.60%	YES	2.75%
29	2-Propylfuran	14	6173-G1	0.000025	0.00100	2.52%	YES	2.75%
29	2-Propylfuran	16	6173-H2	0.000025	0.00100	2.51%	YES	2.75%
33	Diethylphthalate	2	6172-A1	0.0002	0.55010	0.039%	YES	0.127%
33	Diethylphthalate	16	6172-H1	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	2	6172-A2	0.0002	0.55010	0.035%	YES	0.127%
33	Diethylphthalate	4	6172-B1	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	6	6172-C1	0.0002	0.55010	0.036%	YES	0.127%
33	Diethylphthalate	8	6172-D1	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	10	6172-E1	0.0002	0.55010	0.038%	YES	0.127%
33	Diethylphthalate	12	6172-F1	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	14	6172-G1	0.0002	0.55010	0.038%	YES	0.127%
33	Diethylphthalate	16	6172-H2	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	2	6173-A1	0.0004	0.55010	0.067%	YES	0.127%
33	Diethylphthalate	16	6173-H1	0.0007	0.55010	0.127%	YES	0.127%
33	Diethylphthalate	2	6173-A2	0.0002	0.55010	0.040%	YES	0.127%
33	Diethylphthalate	4	6173-B1	0.0002	0.55010	0.040%	YES	0.127%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
33	Diethylphthalate	6	6173-C1	0.0002	0.55010	0.039%	YES	0.127%
33	Diethylphthalate	8	6173-D1	0.0002	0.55010	0.040%	YES	0.127%
33	Diethylphthalate	10	6173-E1	0.0002	0.55010	0.039%	YES	0.127%
33	Diethylphthalate	12	6173-F1	0.0002	0.55010	0.038%	YES	0.127%
33	Diethylphthalate	14	6173-G1		0.55010			0.127%
33	Diethylphthalate	16	6173-H2	0.0004	0.55010	0.079%	YES	0.127%
34	Acetonitrile	2	6172-A1	0.042	20.00000	0.211%		0.001%
34	Acetonitrile	16	6172-H1	0.139	20.00000	0.694%		0.001%
34	Acetonitrile	2	6172-A2	0.016	20.00000	0.081%		0.001%
34	Acetonitrile	4	6172-B1	0.051	20.00000	0.255%		0.001%
34	Acetonitrile	6	6172-C1	0.067	20.00000	0.335%		0.001%
34	Acetonitrile	8	6172-D1	0.292	20.00000	1.46%		0.001%
34	Acetonitrile	10	6172-E1	0.071	20.00000	0.357%		0.001%
34	Acetonitrile	12	6172-F1	0.075	20.00000	0.375%		0.001%
34	Acetonitrile	14	6172-G1	0.100	20.00000	0.501%		0.001%
34	Acetonitrile	16	6172-H2	0.097	20.00000	0.487%		0.001%
34	Acetonitrile	2	6173-A1		20.00000			0.001%
34	Acetonitrile	16	6173-H1	0.095	20.00000	0.475%		0.001%
34	Acetonitrile	2	6173-A2		20.00000			0.001%
34	Acetonitrile	4	6173-B1	0.097	20.00000	0.486%		0.001%
34	Acetonitrile	6	6173-C1	0.131	20.00000	0.655%		0.001%
34	Acetonitrile	8	6173-D1	2.480	20.00000	12.4%		0.001%
34	Acetonitrile	10	6173-E1	0.086	20.00000	0.432%		0.001%
34	Acetonitrile	12	6173-F1	0.082	20.00000	0.411%		0.001%
34	Acetonitrile	14	6173-G1	0.152	20.00000	0.761%		0.001%
34	Acetonitrile	16	6173-H2	0.175	20.00000	0.873%		0.001%
35	Propanenitrile	2	6172-A1	0.0037	6.00000	0.062%		0.004%
35	Propanenitrile	16	6172-H1	0.0040	6.00000	0.066%		0.004%
35	Propanenitrile	2	6172-A2	0.0002	6.00000	0.004%	YES	0.004%
35	Propanenitrile	4	6172-B1	0.0002	6.00000	0.004%	YES	0.004%
35	Propanenitrile	6	6172-C1	0.0003	6.00000	0.005%		0.004%
35	Propanenitrile	8	6172-D1	0.0007	6.00000	0.012%		0.004%
35	Propanenitrile	10	6172-E1	0.0018	6.00000	0.030%		0.004%
35	Propanenitrile	12	6172-F1	0.0026	6.00000	0.043%		0.004%
35	Propanenitrile	14	6172-G1	0.0025	6.00000	0.041%		0.004%
35	Propanenitrile	16	6172-H2	0.0026	6.00000	0.043%		0.004%
35	Propanenitrile	2	6173-A1		6.00000			0.004%
35	Propanenitrile	16	6173-H1	0.0037	6.00000	0.062%		0.004%
35	Propanenitrile	2	6173-A2		6.00000			0.004%
35	Propanenitrile	4	6173-B1	0.0003	6.00000	0.006%		0.004%
35	Propanenitrile	6	6173-C1	0.0007	6.00000	0.012%		0.004%
35	Propanenitrile	8	6173-D1	0.0009	6.00000	0.016%		0.004%
35	Propanenitrile	10	6173-E1	0.0017	6.00000	0.028%		0.004%
35	Propanenitrile	12	6173-F1	0.0014	6.00000	0.024%		0.004%
35	Propanenitrile	14	6173-G1	0.0025	6.00000	0.041%		0.004%
35	Propanenitrile	16	6173-H2	0.0017	6.00000	0.028%		0.004%
36	Butanenitrile	2	6172-A1	0.0034	8.00000	0.043%		0.003%
36	Butanenitrile	16	6172-H1	0.0027	8.00000	0.034%		0.003%
36	Butanenitrile	2	6172-A2	0.0002	8.00000	0.003%	YES	0.003%
36	Butanenitrile	4	6172-B1	0.0002	8.00000	0.003%	YES	0.003%
36	Butanenitrile	6	6172-C1	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	8	6172-D1	0.0002	8.00000	0.003%	YES	0.003%
36	Butanenitrile	10	6172-E1	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	12	6172-F1	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	14	6172-G1	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	16	6172-H2	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	2	6173-A1		8.00000			0.003%
36	Butanenitrile	16	6173-H1	0.0020	8.00000	0.025%		0.003%
36	Butanenitrile	2	6173-A2		8.00000			0.003%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
36	Butanenitrile	4	6173-B1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	6	6173-C1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	8	6173-D1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	10	6173-E1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	12	6173-F1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	14	6173-G1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	16	6173-H2	0.0001	8.00000	0.001%	YES	0.003%
37	Pentanenitrile	2	6172-A1	0.0009	6.00000	0.015%		0.004%
37	Pentanenitrile	16	6172-H1	0.0004	6.00000	0.007%		0.004%
37	Pentanenitrile	2	6172-A2	0.0002	6.00000	0.004%	YES	0.004%
37	Pentanenitrile	4	6172-B1	0.0002	6.00000	0.004%	YES	0.004%
37	Pentanenitrile	6	6172-C1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	8	6172-D1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	10	6172-E1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	12	6172-F1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	14	6172-G1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	16	6172-H2	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	2	6173-A1		6.00000			0.004%
37	Pentanenitrile	16	6173-H1	0.0006	6.00000	0.010%		0.004%
37	Pentanenitrile	2	6173-A2		6.00000			0.004%
37	Pentanenitrile	4	6173-B1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	6	6173-C1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	8	6173-D1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	10	6173-E1	0.0003	6.00000	0.006%		0.004%
37	Pentanenitrile	12	6173-F1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	14	6173-G1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	16	6173-H2	0.0001	6.00000	0.002%	YES	0.004%
38	Hexanenitrile	2	6172-A1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	16	6172-H1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	2	6172-A2	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	4	6172-B1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	6	6172-C1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	8	6172-D1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	10	6172-E1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	12	6172-F1	0.0002	6.00000	0.003%		0.003%
38	Hexanenitrile	14	6172-G1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	16	6172-H2	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	2	6173-A1		6.00000			0.003%
38	Hexanenitrile	16	6173-H1	0.0001	6.00000	0.002%		0.003%
38	Hexanenitrile	2	6173-A2		6.00000			0.003%
38	Hexanenitrile	4	6173-B1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	6	6173-C1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	8	6173-D1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	10	6173-E1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	12	6173-F1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	14	6173-G1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	16	6173-H2	0.0001	6.00000	0.002%	YES	0.003%
42	Ethylamine	2	6172-A1	0.0045	5.00000	0.091%	YES	0.10%
42	Ethylamine	16	6172-H1	0.0168	5.00000	0.337%		0.10%
42	Ethylamine	2	6172-A2	0.0045	5.00000	0.090%	YES	0.10%
42	Ethylamine	4	6172-B1	0.0047	5.00000	0.095%	YES	0.10%
42	Ethylamine	6	6172-C1	0.0046	5.00000	0.092%	YES	0.10%
42	Ethylamine	8	6172-D1	0.0047	5.00000	0.093%	YES	0.10%
42	Ethylamine	10	6172-E1	0.0047	5.00000	0.095%	YES	0.10%
42	Ethylamine	12	6172-F1	0.0047	5.00000	0.094%	YES	0.10%
42	Ethylamine	14	6172-G1	0.0048	5.00000	0.095%	YES	0.10%
42	Ethylamine	16	6172-H2	0.0046	5.00000	0.092%	YES	0.10%
42	Ethylamine	2	6173-A1	0.0046	5.00000	0.092%	YES	0.10%
42	Ethylamine	16	6173-H1	0.0047	5.00000	0.093%	YES	0.10%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
42	Ethylamine	2	6173-A2	0.0046	5.00000	0.091%	YES	0.10%
42	Ethylamine	4	6173-B1	0.0046	5.00000	0.091%	YES	0.10%
42	Ethylamine	6	6173-C1	0.0047	5.00000	0.094%	YES	0.10%
42	Ethylamine	8	6173-D1	0.0048	5.00000	0.097%	YES	0.10%
42	Ethylamine	10	6173-E1	0.0049	5.00000	0.097%	YES	0.10%
42	Ethylamine	12	6173-F1	0.0049	5.00000	0.097%	YES	0.10%
42	Ethylamine	14	6173-G1	0.0048	5.00000	0.095%	YES	0.10%
42	Ethylamine	16	6173-H2	0.0046	5.00000	0.092%	YES	0.10%
43	N-Nitrosodimethylamine	2	6172-A1	0.00067	0.00030	224%		8.40%
43	N-Nitrosodimethylamine	16	6172-H1	0.00052	0.00030	173%		8.40%
43	N-Nitrosodimethylamine	2	6172-A2	0.00002	0.00030	7.00%	YES	8.40%
43	N-Nitrosodimethylamine	4	6172-B1	0.00002	0.00030	6.97%	YES	8.40%
43	N-Nitrosodimethylamine	6	6172-C1	0.00002	0.00030	6.63%	YES	8.40%
43	N-Nitrosodimethylamine	8	6172-D1	0.00003	0.00030	8.40%	YES	8.40%
43	N-Nitrosodimethylamine	10	6172-E1	0.00002	0.00030	6.73%	YES	8.40%
43	N-Nitrosodimethylamine	12	6172-F1	0.00002	0.00030	6.73%	YES	8.40%
43	N-Nitrosodimethylamine	14	6172-G1	0.00002	0.00030	6.80%	YES	8.40%
43	N-Nitrosodimethylamine	16	6172-H2	0.00002	0.00030	6.87%	YES	8.40%
43	N-Nitrosodimethylamine	2	6173-A1	0.00013	0.00030	43.0%		8.40%
43	N-Nitrosodimethylamine	16	6173-H1	0.00056	0.00030	187%		8.40%
43	N-Nitrosodimethylamine	2	6173-A2	0.00002	0.00030	6.90%	YES	8.40%
43	N-Nitrosodimethylamine	4	6173-B1	0.00002	0.00030	6.90%	YES	8.40%
43	N-Nitrosodimethylamine	6	6173-C1	0.00002	0.00030	6.97%	YES	8.40%
43	N-Nitrosodimethylamine	8	6173-D1	0.00002	0.00030	6.90%	YES	8.40%
43	N-Nitrosodimethylamine	10	6173-E1	0.00002	0.00030	6.90%	YES	8.40%
43	N-Nitrosodimethylamine	12	6173-F1	0.00004	0.00030	12.1%	YES	12.13%
43	N-Nitrosodimethylamine	14	6173-G1	0.00004	0.00030	12.1%	YES	12.13%
43	N-Nitrosodimethylamine	16	6173-H2	0.00004	0.00030	12.1%	YES	12.13%
44	N-Nitrosodiethylamine	2	6172-A1	0.00002	0.00010	23.4%	YES	28.70%
44	N-Nitrosodiethylamine	16	6172-H1	0.00005	0.00010	52.3%		28.70%
44	N-Nitrosodiethylamine	2	6172-A2	0.00002	0.00010	23.9%	YES	28.70%
44	N-Nitrosodiethylamine	4	6172-B1	0.00002	0.00010	23.8%	YES	28.70%
44	N-Nitrosodiethylamine	6	6172-C1	0.00002	0.00010	22.7%	YES	28.70%
44	N-Nitrosodiethylamine	8	6172-D1	0.00003	0.00010	28.7%	YES	28.70%
44	N-Nitrosodiethylamine	10	6172-E1	0.00002	0.00010	23.0%	YES	28.70%
44	N-Nitrosodiethylamine	12	6172-F1	0.00002	0.00010	23.0%	YES	28.70%
44	N-Nitrosodiethylamine	14	6172-G1	0.00002	0.00010	23.2%	YES	28.70%
44	N-Nitrosodiethylamine	16	6172-H2	0.00002	0.00010	23.5%	YES	28.70%
44	N-Nitrosodiethylamine	2	6173-A1	0.00007	0.00010	73.6%		28.70%
44	N-Nitrosodiethylamine	16	6173-H1	0.00005	0.00010	49.1%		28.70%
44	N-Nitrosodiethylamine	2	6173-A2	0.00002	0.00010	23.6%	YES	28.70%
44	N-Nitrosodiethylamine	4	6173-B1	0.00002	0.00010	23.5%	YES	28.70%
44	N-Nitrosodiethylamine	6	6173-C1	0.00002	0.00010	23.8%	YES	28.70%
44	N-Nitrosodiethylamine	8	6173-D1	0.00002	0.00010	23.6%	YES	28.70%
44	N-Nitrosodiethylamine	10	6173-E1	0.00002	0.00010	23.6%	YES	28.70%
44	N-Nitrosodiethylamine	12	6173-F1	0.00002	0.00010	23.2%	YES	28.70%
44	N-Nitrosodiethylamine	14	6173-G1	0.00002	0.00010	23.2%	YES	28.70%
44	N-Nitrosodiethylamine	16	6173-H2	0.00002	0.00010	23.2%	YES	28.70%
45	N-Nitrosomethylethylamine	2	6172-A1	0.00003	0.00030	8.62%	YES	11.09%
45	N-Nitrosomethylethylamine	16	6172-H1	0.00003	0.00030	8.89%	YES	11.09%
45	N-Nitrosomethylethylamine	2	6172-A2	0.00003	0.00030	9.23%	YES	11.09%
45	N-Nitrosomethylethylamine	4	6172-B1	0.00003	0.00030	9.21%	YES	11.09%
45	N-Nitrosomethylethylamine	6	6172-C1	0.00003	0.00030	8.77%	YES	11.09%
45	N-Nitrosomethylethylamine	8	6172-D1	0.00003	0.00030	11.1%	YES	11.09%
45	N-Nitrosomethylethylamine	10	6172-E1	0.00003	0.00030	8.89%	YES	11.09%
45	N-Nitrosomethylethylamine	12	6172-F1	0.00003	0.00030	8.89%	YES	11.09%
45	N-Nitrosomethylethylamine	14	6172-G1	0.00003	0.00030	8.97%	YES	11.09%
45	N-Nitrosomethylethylamine	16	6172-H2	0.00003	0.00030	9.06%	YES	11.09%
45	N-Nitrosomethylethylamine	2	6173-A1	0.00003	0.00030	9.07%	YES	11.09%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
45	N-Nitrosomethylethylamine	16	6173-H1	0.00003	0.00030	8.89%	YES	11.09%
45	N-Nitrosomethylethylamine	2	6173-A2	0.00003	0.00030	9.12%	YES	11.09%
45	N-Nitrosomethylethylamine	4	6173-B1	0.00003	0.00030	9.10%	YES	11.09%
45	N-Nitrosomethylethylamine	6	6173-C1	0.00003	0.00030	9.19%	YES	11.09%
45	N-Nitrosomethylethylamine	8	6173-D1	0.00003	0.00030	9.10%	YES	11.09%
45	N-Nitrosomethylethylamine	10	6173-E1	0.00003	0.00030	9.13%	YES	11.09%
45	N-Nitrosomethylethylamine	12	6173-F1	0.00003	0.00030	8.97%	YES	11.09%
45	N-Nitrosomethylethylamine	14	6173-G1	0.00003	0.00030	8.96%	YES	11.09%
45	N-Nitrosomethylethylamine	16	6173-H2	0.00003	0.00030	8.97%	YES	11.09%
46	N-Nitrosomorpholine	2	6172-A1	0.00002	0.00060	3.43%	YES	3.33%
46	N-Nitrosomorpholine	16	6172-H1	0.00002	0.00060	3.37%	YES	3.33%
46	N-Nitrosomorpholine	2	6172-A2	0.00002	0.00060	3.50%	YES	3.33%
46	N-Nitrosomorpholine	4	6172-B1	0.00002	0.00060	3.50%	YES	3.33%
46	N-Nitrosomorpholine	6	6172-C1	0.00002	0.00060	3.33%	YES	3.33%
46	N-Nitrosomorpholine	8	6172-D1	0.00003	0.00060	4.20%	YES	3.33%
46	N-Nitrosomorpholine	10	6172-E1	0.00002	0.00060	3.37%	YES	3.33%
46	N-Nitrosomorpholine	12	6172-F1	0.00002	0.00060	3.37%	YES	3.33%
46	N-Nitrosomorpholine	14	6172-G1	0.00002	0.00060	3.40%	YES	3.33%
46	N-Nitrosomorpholine	16	6172-H2	0.00002	0.00060	3.43%	YES	3.33%
46	N-Nitrosomorpholine	2	6173-A1	0.00004	0.00060	7.20%		3.33%
46	N-Nitrosomorpholine	16	6173-H1	0.00005	0.00060	7.97%		3.33%
46	N-Nitrosomorpholine	2	6173-A2	0.00002	0.00060	3.47%	YES	3.33%
46	N-Nitrosomorpholine	4	6173-B1	0.00002	0.00060	3.45%	YES	3.33%
46	N-Nitrosomorpholine	6	6173-C1	0.00002	0.00060	3.48%	YES	3.33%
46	N-Nitrosomorpholine	8	6173-D1	0.00002	0.00060	3.45%	YES	3.33%
46	N-Nitrosomorpholine	10	6173-E1	0.00002	0.00060	3.47%	YES	3.33%
46	N-Nitrosomorpholine	12	6173-F1	0.00002	0.00060	3.25%	YES	3.33%
46	N-Nitrosomorpholine	14	6173-G1	0.00002	0.00060	3.25%	YES	3.33%
46	N-Nitrosomorpholine	16	6173-H2	0.00002	0.00060	3.25%	YES	3.33%
47	Tributyl phosphate	2	6172-A1	0.00014	0.20000	0.071%	YES	0.23%
47	Tributyl phosphate	16	6172-H1	0.00014	0.20000	0.069%	YES	0.23%
47	Tributyl phosphate	2	6172-A2	0.00013	0.20000	0.065%	YES	0.23%
47	Tributyl phosphate	4	6172-B1	0.00014	0.20000	0.068%	YES	0.23%
47	Tributyl phosphate	6	6172-C1	0.00013	0.20000	0.065%	YES	0.23%
47	Tributyl phosphate	8	6172-D1	0.00014	0.20000	0.068%	YES	0.23%
47	Tributyl phosphate	10	6172-E1	0.00014	0.20000	0.070%	YES	0.23%
47	Tributyl phosphate	12	6172-F1	0.00014	0.20000	0.068%	YES	0.23%
47	Tributyl phosphate	14	6172-G1	0.00014	0.20000	0.069%	YES	0.23%
47	Tributyl phosphate	16	6172-H2	0.00013	0.20000	0.067%	YES	0.23%
47	Tributyl phosphate	2	6173-A1	0.00025	0.20000	0.123%	YES	0.23%
47	Tributyl phosphate	16	6173-H1	0.00047	0.20000	0.233%	YES	0.23%
47	Tributyl phosphate	2	6173-A2	0.00015	0.20000	0.074%	YES	0.23%
47	Tributyl phosphate	4	6173-B1	0.00015	0.20000	0.074%	YES	0.23%
47	Tributyl phosphate	6	6173-C1	0.00014	0.20000	0.071%	YES	0.23%
47	Tributyl phosphate	8	6173-D1	0.00015	0.20000	0.073%	YES	0.23%
47	Tributyl phosphate	10	6173-E1	0.00014	0.20000	0.071%	YES	0.23%
47	Tributyl phosphate	12	6173-F1	0.00014	0.20000	0.070%	YES	0.23%
47	Tributyl phosphate	14	6173-G1	0.00014	0.20000	0.070%	YES	0.23%
47	Tributyl phosphate	16	6173-H2	0.00029	0.20000	0.145%	YES	0.23%
48	Dibutyl butylphosphonate	2	6172-A1	0.00010	0.00700	1.38%	YES	4.54%
48	Dibutyl butylphosphonate	16	6172-H1	0.00009	0.00700	1.34%	YES	4.54%
48	Dibutyl butylphosphonate	2	6172-A2	0.00009	0.00700	1.27%	YES	4.54%
48	Dibutyl butylphosphonate	4	6172-B1	0.00009	0.00700	1.33%	YES	4.54%
48	Dibutyl butylphosphonate	6	6172-C1	0.00009	0.00700	1.28%	YES	4.54%
48	Dibutyl butylphosphonate	8	6172-D1	0.00009	0.00700	1.32%	YES	4.54%
48	Dibutyl butylphosphonate	10	6172-E1	0.00010	0.00700	1.37%	YES	4.54%
48	Dibutyl butylphosphonate	12	6172-F1	0.00009	0.00700	1.33%	YES	4.54%
48	Dibutyl butylphosphonate	14	6172-G1	0.00009	0.00700	1.35%	YES	4.54%
48	Dibutyl butylphosphonate	16	6172-H2	0.00009	0.00700	1.32%	YES	4.54%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
48	Dibutyl butylphosphonate	2	6173-A1	0.00017	0.00700	2.40%	YES	4.54%
48	Dibutyl butylphosphonate	16	6173-H1	0.00032	0.00700	4.54%	YES	4.54%
48	Dibutyl butylphosphonate	2	6173-A2	0.00010	0.00700	1.45%	YES	4.54%
48	Dibutyl butylphosphonate	4	6173-B1	0.00010	0.00700	1.44%	YES	4.54%
48	Dibutyl butylphosphonate	6	6173-C1	0.00010	0.00700	1.38%	YES	4.54%
48	Dibutyl butylphosphonate	8	6173-D1	0.00010	0.00700	1.42%	YES	4.54%
48	Dibutyl butylphosphonate	10	6173-E1	0.00010	0.00700	1.39%	YES	4.54%
48	Dibutyl butylphosphonate	12	6173-F1	0.00010	0.00700	1.37%	YES	4.54%
48	Dibutyl butylphosphonate	14	6173-G1		0.00700			4.54%
48	Dibutyl butylphosphonate	16	6173-H2	0.00020	0.00700	2.83%	YES	4.54%
51	Pyridine	2	6172-A1	0.00157	1.00000	0.157%		0.03%
51	Pyridine	16	6172-H1	0.00139	1.00000	0.139%		0.03%
51	Pyridine	2	6172-A2	0.00024	1.00000	0.024%	YES	0.03%
51	Pyridine	4	6172-B1	0.00025	1.00000	0.025%	YES	0.03%
51	Pyridine	6	6172-C1	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	8	6172-D1	0.00024	1.00000	0.024%	YES	0.03%
51	Pyridine	10	6172-E1	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	12	6172-F1	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	14	6172-G1	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	16	6172-H2	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	2	6173-A1		1.00000			0.03%
51	Pyridine	16	6173-H1	0.00044	1.00000	0.044%		0.03%
51	Pyridine	2	6173-A2		1.00000			0.03%
51	Pyridine	4	6173-B1	0.00032	1.00000	0.032%	YES	0.03%
51	Pyridine	6	6173-C1	0.00032	1.00000	0.032%	YES	0.03%
51	Pyridine	8	6173-D1	0.00033	1.00000	0.033%	YES	0.03%
51	Pyridine	10	6173-E1	0.00032	1.00000	0.032%	YES	0.03%
51	Pyridine	12	6173-F1	0.00032	1.00000	0.032%	YES	0.03%
51	Pyridine	14	6173-G1	0.00031	1.00000	0.031%	YES	0.03%
51	Pyridine	16	6173-H2	0.00031	1.00000	0.031%	YES	0.03%
52	2,4-Dimethylpyridine	2	6172-A1	0.00024	0.50000	0.047%	YES	0.06%
52	2,4-Dimethylpyridine	16	6172-H1	0.00028	0.50000	0.056%	YES	0.06%
52	2,4-Dimethylpyridine	2	6172-A2	0.00026	0.50000	0.053%	YES	0.06%
52	2,4-Dimethylpyridine	4	6172-B1	0.00027	0.50000	0.053%	YES	0.06%
52	2,4-Dimethylpyridine	6	6172-C1	0.00024	0.50000	0.049%	YES	0.06%
52	2,4-Dimethylpyridine	8	6172-D1	0.00026	0.50000	0.051%	YES	0.06%
52	2,4-Dimethylpyridine	10	6172-E1	0.00025	0.50000	0.050%	YES	0.06%
52	2,4-Dimethylpyridine	12	6172-F1	0.00025	0.50000	0.049%	YES	0.06%
52	2,4-Dimethylpyridine	14	6172-G1	0.00025	0.50000	0.049%	YES	0.06%
52	2,4-Dimethylpyridine	16	6172-H2	0.00025	0.50000	0.049%	YES	0.06%
52	2,4-Dimethylpyridine	2	6173-A1		0.50000			0.06%
52	2,4-Dimethylpyridine	16	6173-H1	0.00020	0.50000	0.041%	YES	0.06%
52	2,4-Dimethylpyridine	2	6173-A2		0.50000			0.06%
52	2,4-Dimethylpyridine	4	6173-B1	0.00021	0.50000	0.042%	YES	0.06%
52	2,4-Dimethylpyridine	6	6173-C1	0.00021	0.50000	0.041%	YES	0.06%
52	2,4-Dimethylpyridine	8	6173-D1	0.00021	0.50000	0.042%	YES	0.06%
52	2,4-Dimethylpyridine	10	6173-E1	0.00021	0.50000	0.041%	YES	0.06%
52	2,4-Dimethylpyridine	12	6173-F1	0.00020	0.50000	0.041%	YES	0.06%
52	2,4-Dimethylpyridine	14	6173-G1	0.00020	0.50000	0.040%	YES	0.06%
52	2,4-Dimethylpyridine	16	6173-H2	0.00020	0.50000	0.040%	YES	0.06%

Appendix E

Plots of Other COPCs with Significant (2–10% of OEL) Detected Values

Appendix E

Plots of Other COPCs with Significant (2–10% of OEL) Detected Values

1,3-Butadiene (see Figure E.1) – The detection level (DL) for 1,3-Butadiene corresponds to approximately 2.4% of the OEL for SCOTT 7422-SD1 and 2.6% of the OEL for SCOTT 7422-SC1. All inlet and outlet concentrations for the two different respirator cartridges were less than 10% of the OEL specifically less than 2.6% of the OEL. No evidence of breakthrough is observed in the data.

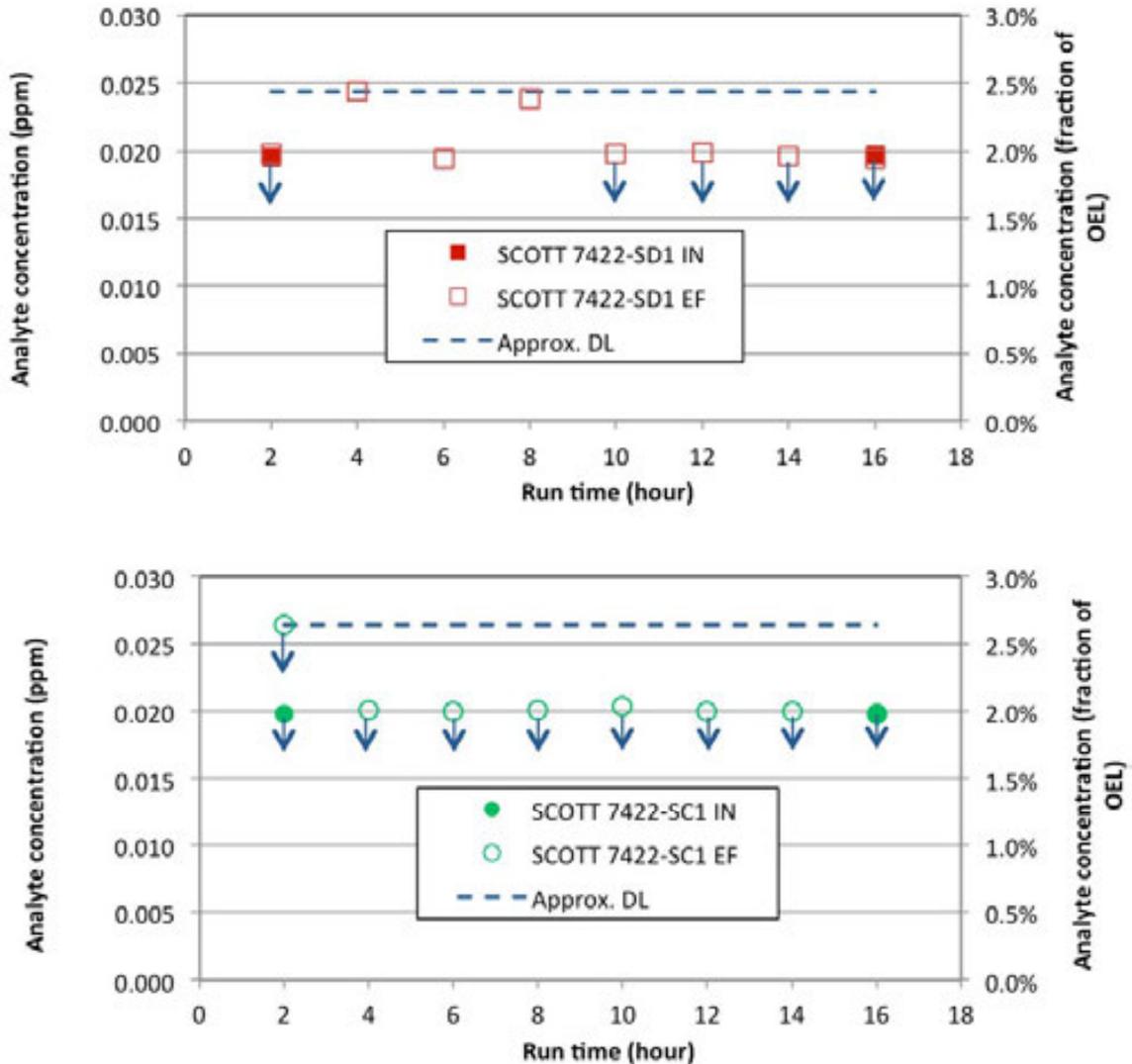


Figure E.1. Plot of Measured 1,3-Butadiene Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

Formaldehyde (see Figure E.2) – The DL for formaldehyde is approximately 0.61% of its OEL. All inlet and outlet values measured for the two respirator cartridges were less than 10% of the OEL; specifically less than 5.2%. The inlet values for both respirator cartridges ranged between 1.7% and 5.2% of the OEL. The outlet measurements for both respirators were greater than detection limits but less than 10% of the OEL for the early readings, but decreased with time (like the inlet values). The latter outlet measurements for both cartridges were all less than detection levels. This same trend was observed in prior tank analyses, suggesting possible environmental background interference. Nevertheless, more measurements are recommended, with higher inlet concentrations, to confirm this conclusion.

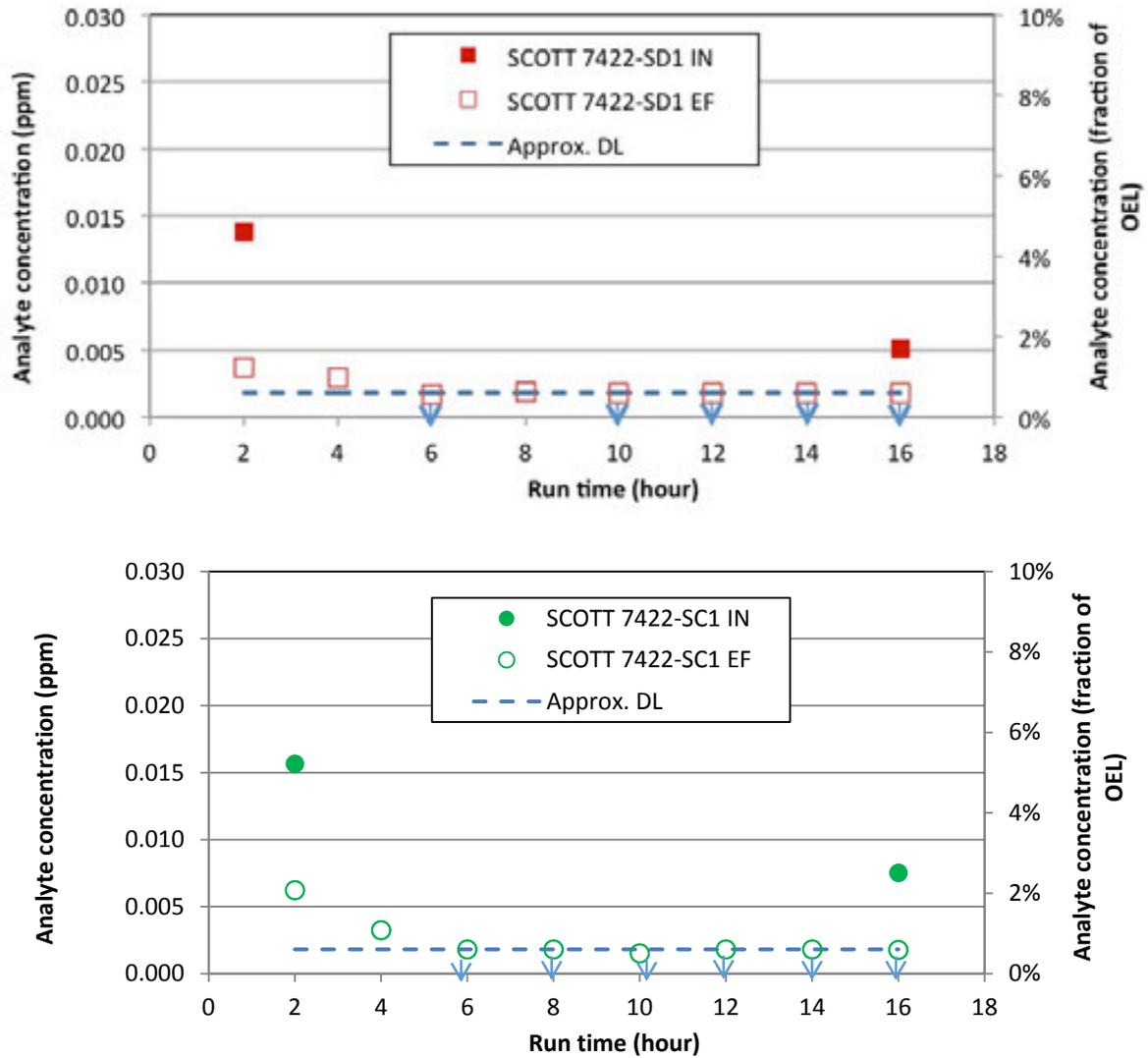


Figure E.2. Plot of Measured Formaldehyde Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

Furan (see Figure E.3) – The DL for furan corresponds to approximately 0.9% of its OEL. All inlet and outlet values measured between the two respirator cartridges were less than 10% of the OEL; specifically less than 5%. The inlet values for both respirator cartridges ranged from 2.7% to 4.8% of the OEL. Outlet measurements for both respirator cartridges were less than the DL, with the exception of several measurements for SCOTT 7422-SC1 that were slightly greater than the DL. The maximum of these values, occurring at the end of the test, was 1.3% of the OEL. This could suggest some breakthrough for that cartridge although the measurement variability is fairly consistent for furans. More measurements are recommended, with higher inlet concentrations, to better determine the behavior. Still, all of the measured inlet and outlet values were less than 5% of the OEL.

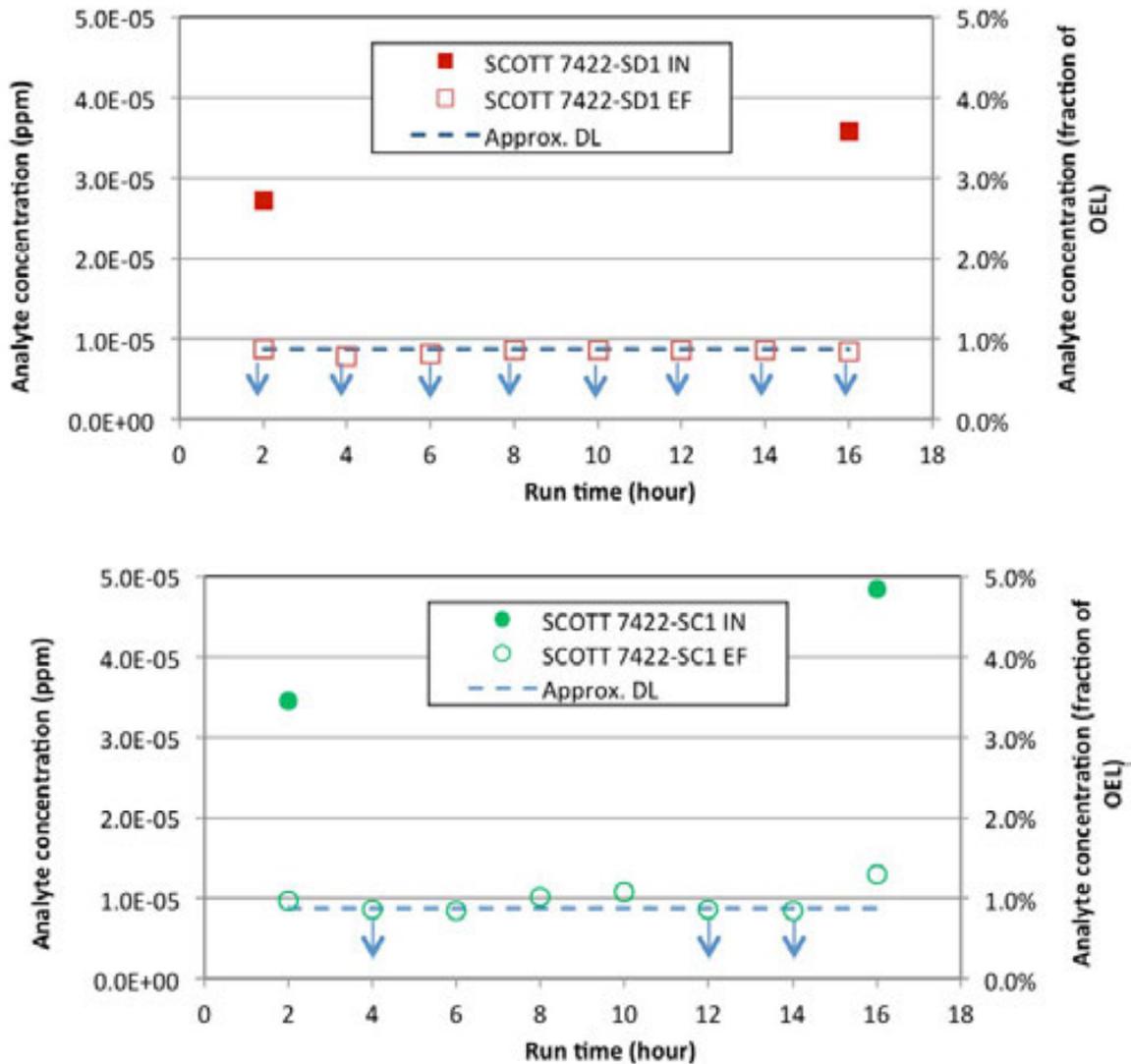


Figure E.3. Plot of Measured Furan Concentrations before the Inlets and after the Outlets of the two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

2,3-Dihydrofuran (see Figure E.4) – The DL for 2,3-Dihydrofuran corresponds to approximately 1.8% of the OEL. Two initial inlet concentrations for the two different respirator cartridges had measurements above the DL (4.2% and 2.0% of the OEL, respectively). All other measurements were below the DL for 2,3-Dihydrofuran, with the exception of one outlet value for SCOTT 7422-SC1 during the 8-to-10-hour period (2.6% of OEL). This elevated value could be due to measurement error. No evidence of breakthrough is observed in the data.

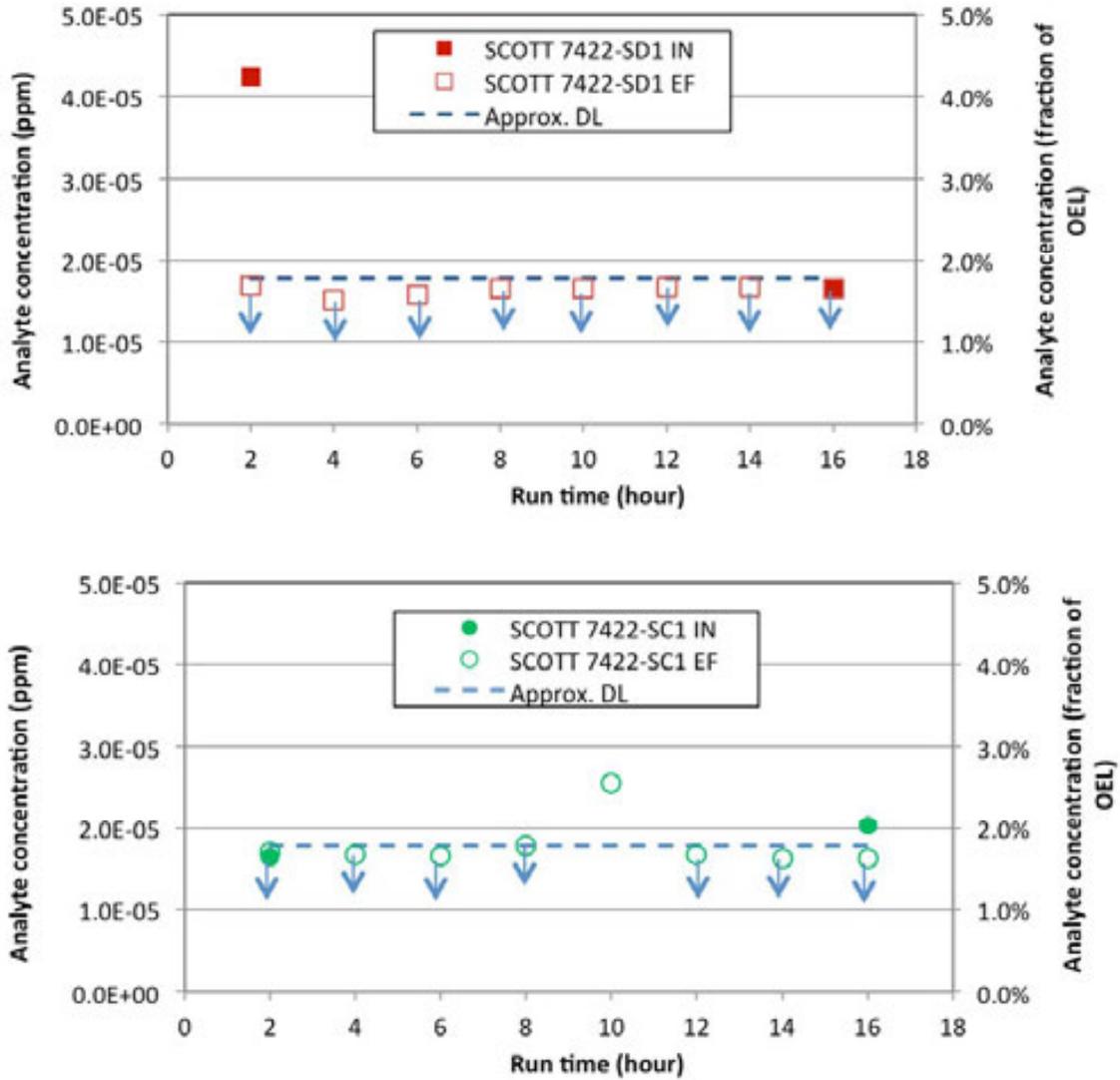


Figure E.4. Plot of Measured 2,3-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

2,5-Dihydrofuran (see Figure E.5) – The DL for 2,5-Dihydrofuran corresponds to approximately 2.2% of the OEL. All of the inlet and outlet concentrations were below the DL, with two exceptions—one outlet value for SCOTT 7422-SD1 during the 8-to-10 hour period (2.4% of OEL) and one outlet value for SCOTT 7422-SC1 during the 6-to-8- hour period (3.8% of OEL). These elevated values could be due to measurement error. No evidence of breakthrough is observed in the data.

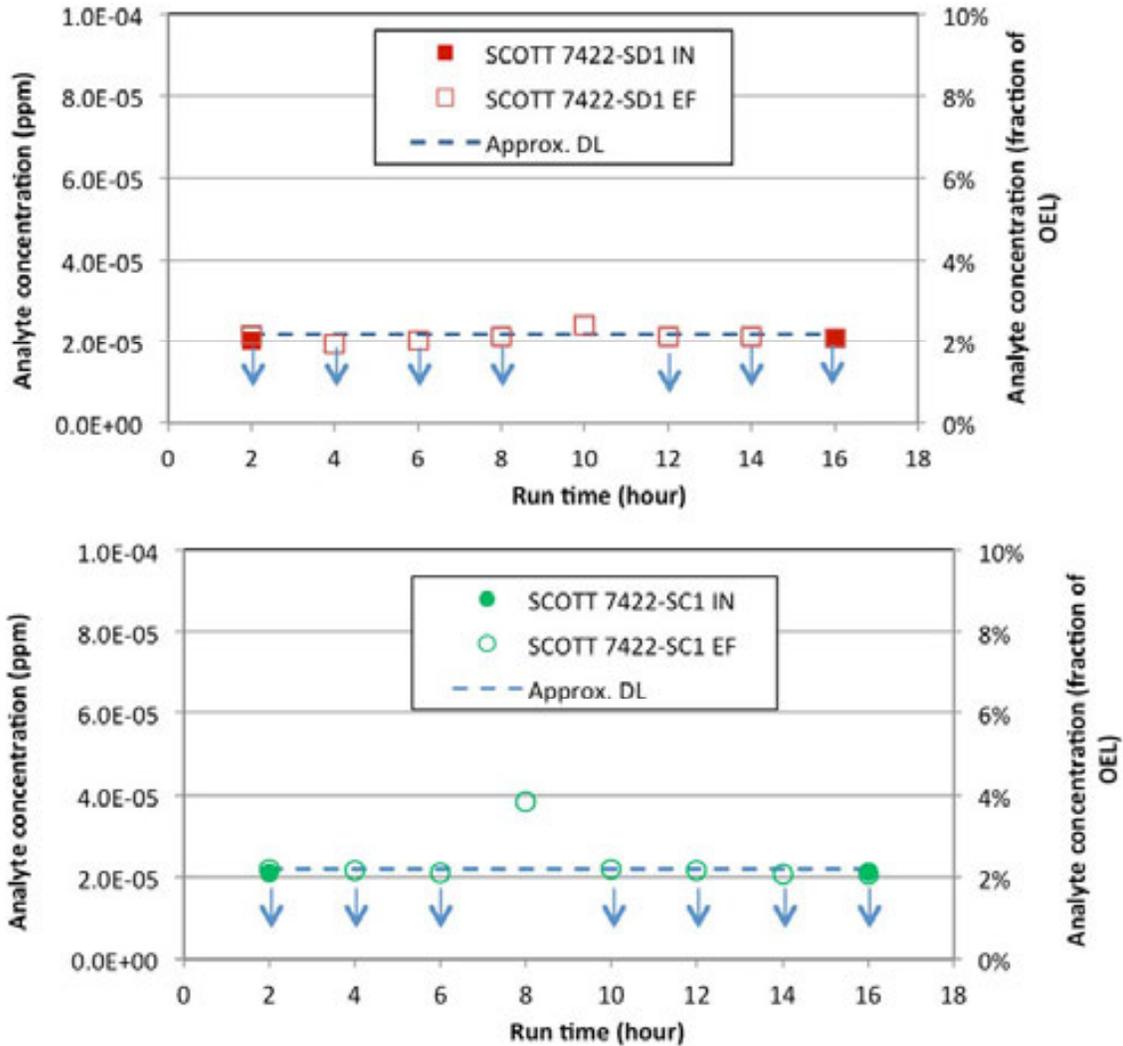


Figure E.5. Plot of Measured 2,5-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

2-Methylfuran (see Figure E.6) – The DL for 2-Methylfuran corresponds to approximately 1.9% of the OEL. All inlet values were less than the DL. All outlet measurements were below the DL, with the exception of one outlet value for SCOTT 7422-SD1 during the 8-to-10-hour period (2.1% of the OEL). This elevated value could be due to measurement error. No evidence of breakthrough is observed in the data.

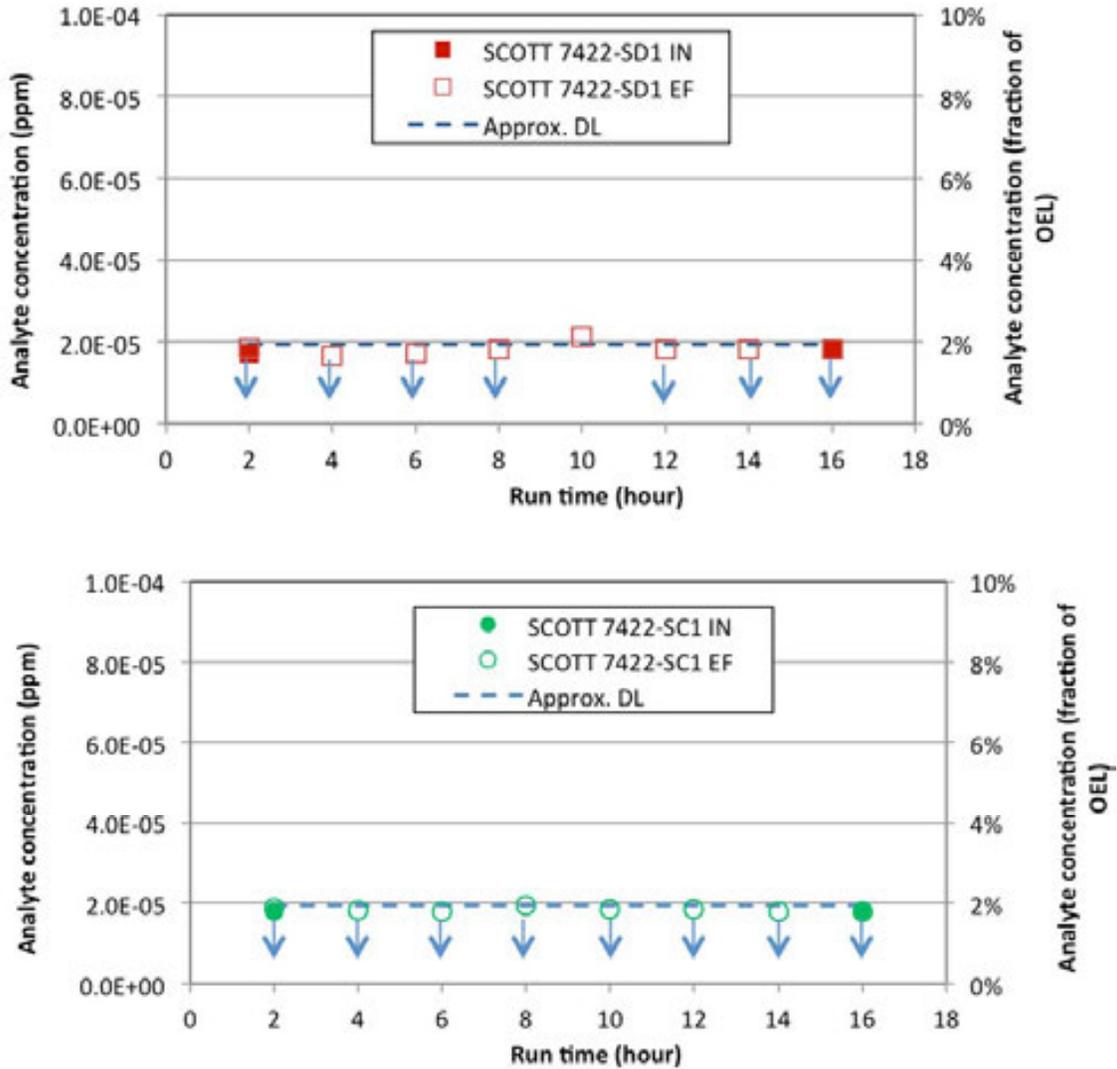


Figure E.6. Plot of Measured 2-Methylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

2,5-Dimethylfuran (see Figure E.7) – The DL for 2,5-Dimethylfuran corresponds to approximately 3.1% of the OEL. All inlet and outlet values were less than DL. No evidence of breakthrough is observed in the data.

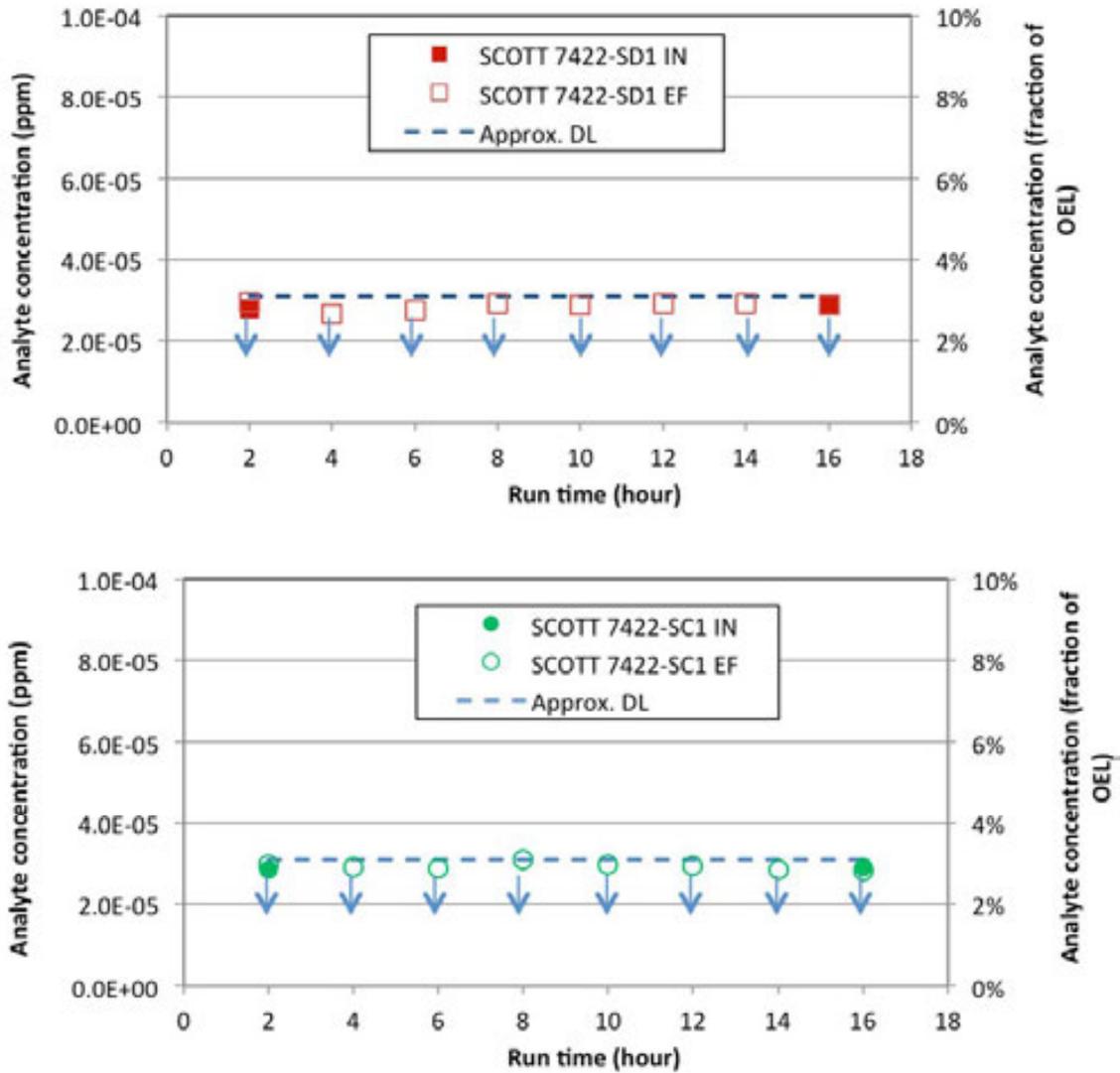


Figure E.7. Plot of Measured 2,5-Dimethylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

2-Pentylfuran (see Figure E.8) – The DL for 2-Pentylfuran corresponds to approximately 1.7% of the OEL. All values (inlet and outlet) were less than 10% of the OEL; specifically less than 3%. Several inlet and outlet values were greater than the DL, but all of these were less than 2.7% of OEL. One elevated outlet reading was observed for SCOTT 7422-SC1 during the 8-to-10-hour period (2.7% of OEL). This value could be due to measurement error. Thus, there was no evidence of breakthrough is observed in the data.

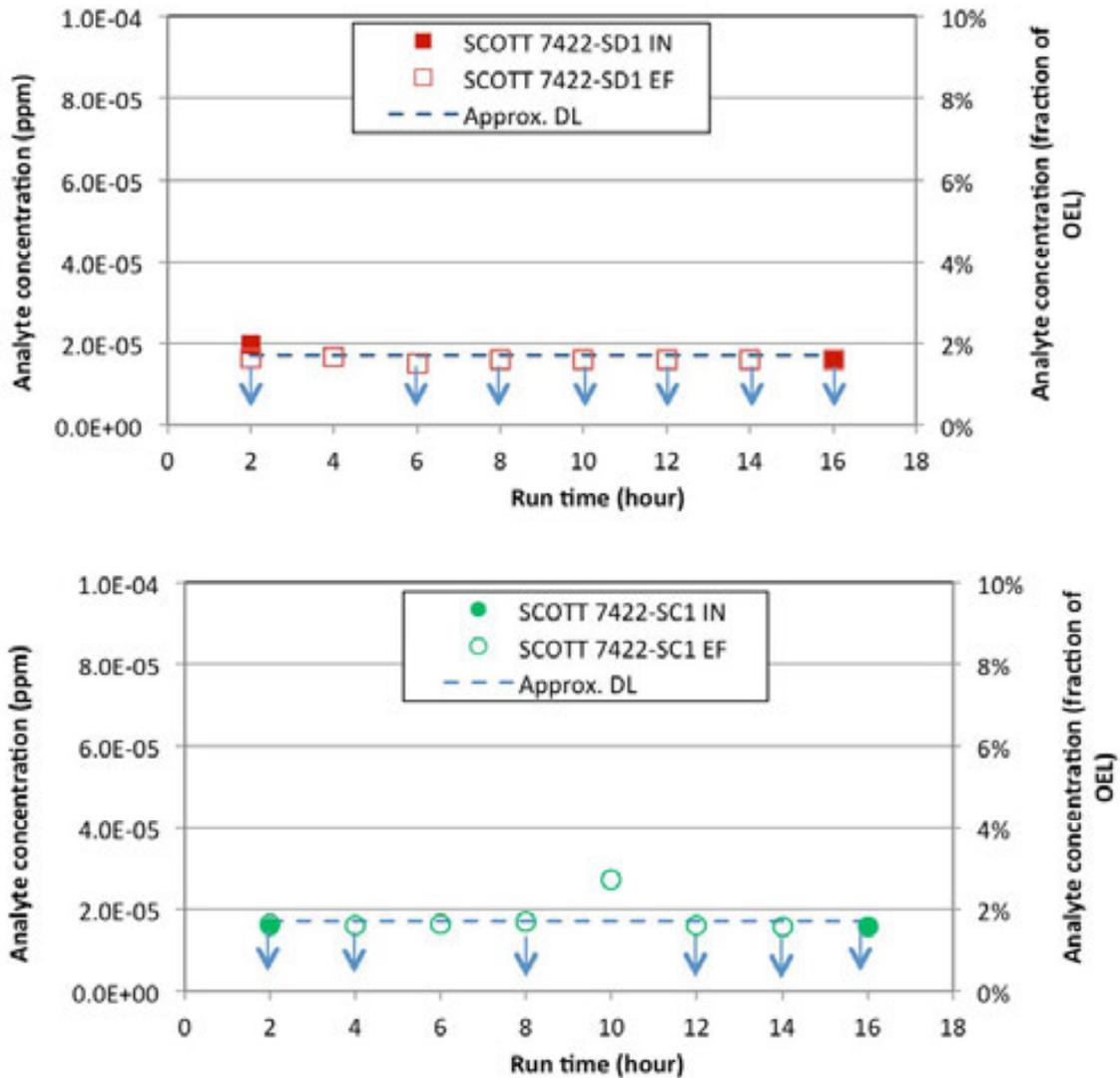


Figure E.8. Plot of Measured 2-Pentylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

2-Propylfuran (see Figure E.9) – The DL for 2-Propylfuran corresponds to approximately 2.8% of the OEL. All values (inlet and outlet) were less than 10% of the OEL; specifically less than 4%. All of the measured inlet and outlet values from both cartridges were less than the DL, except for the last inlet concentration for SCOTT 7422-SD1 (3.4% of OEL). Thus, there was no evidence of breakthrough observed in the data.

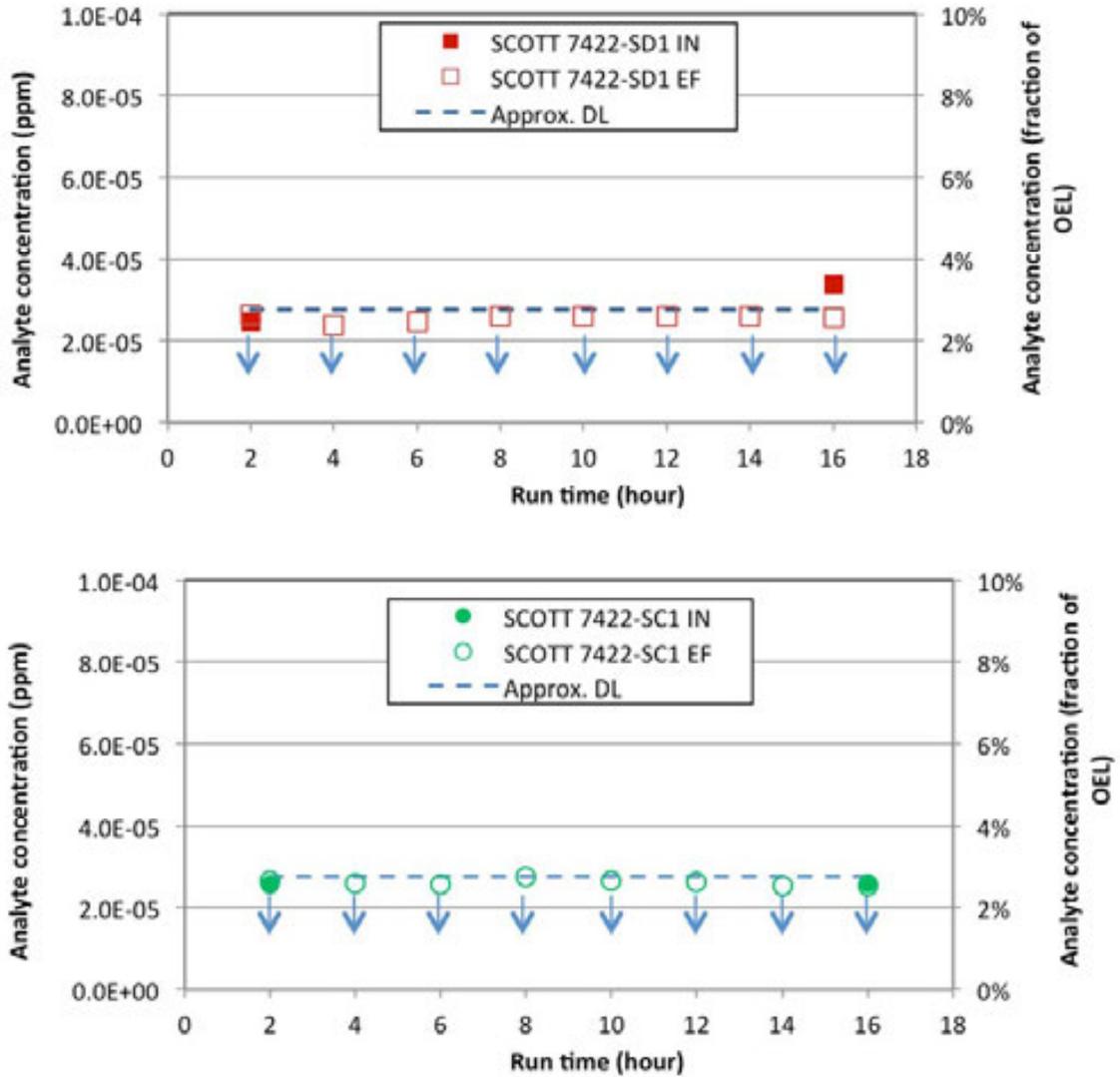


Figure E.9. Plot of Measured 2-Propylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

N-Nitrosomorpholine (see Figure E.10) – The DL for N-Nitrosomorpholine corresponds to approximately 3.3% of the OEL. All the inlet and outlet values for SCOTT 7422-SD1 were below the DL. Both the inlet concentrations for SCOTT 7422-SC1 were greater than the DL (7.2% and 8.0%, respectively); however, none of the corresponding outlet measurements were greater than the DL. Therefore, there was no evidence of breakthrough over the measured time period for either cartridge.

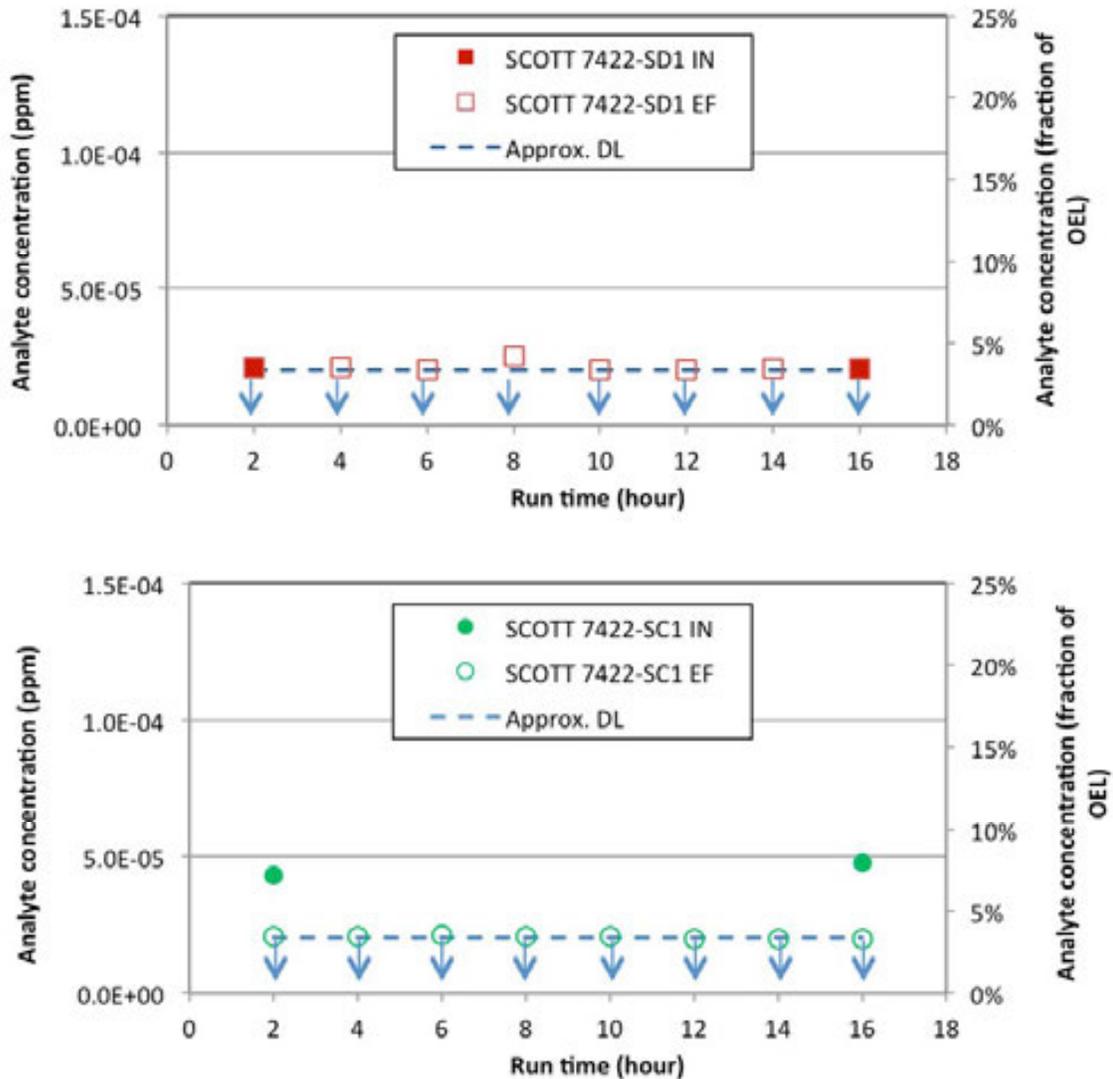


Figure E.10. Plot of Measured N-Nitrosomorpholine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

Dibutyl butylphosphonate (see Figure E.11) – The DL for Dibutyl butylphosphonate corresponds to approximately 4.5% of the OEL. Two initial inlet concentrations for the SCOTT 7422-SD1 were similar (1.4% and 1.3% of the OEL, respectively) and are less than the DL; however, the two inlet concentrations for the SCOTT 7422-SC1 cartridge were a bit scattered but are less than the DL (2.4% and 4.5% of the OEL, respectively). All outlet values were less than the DL; therefore, no evidence of breakthrough is observed in the data.

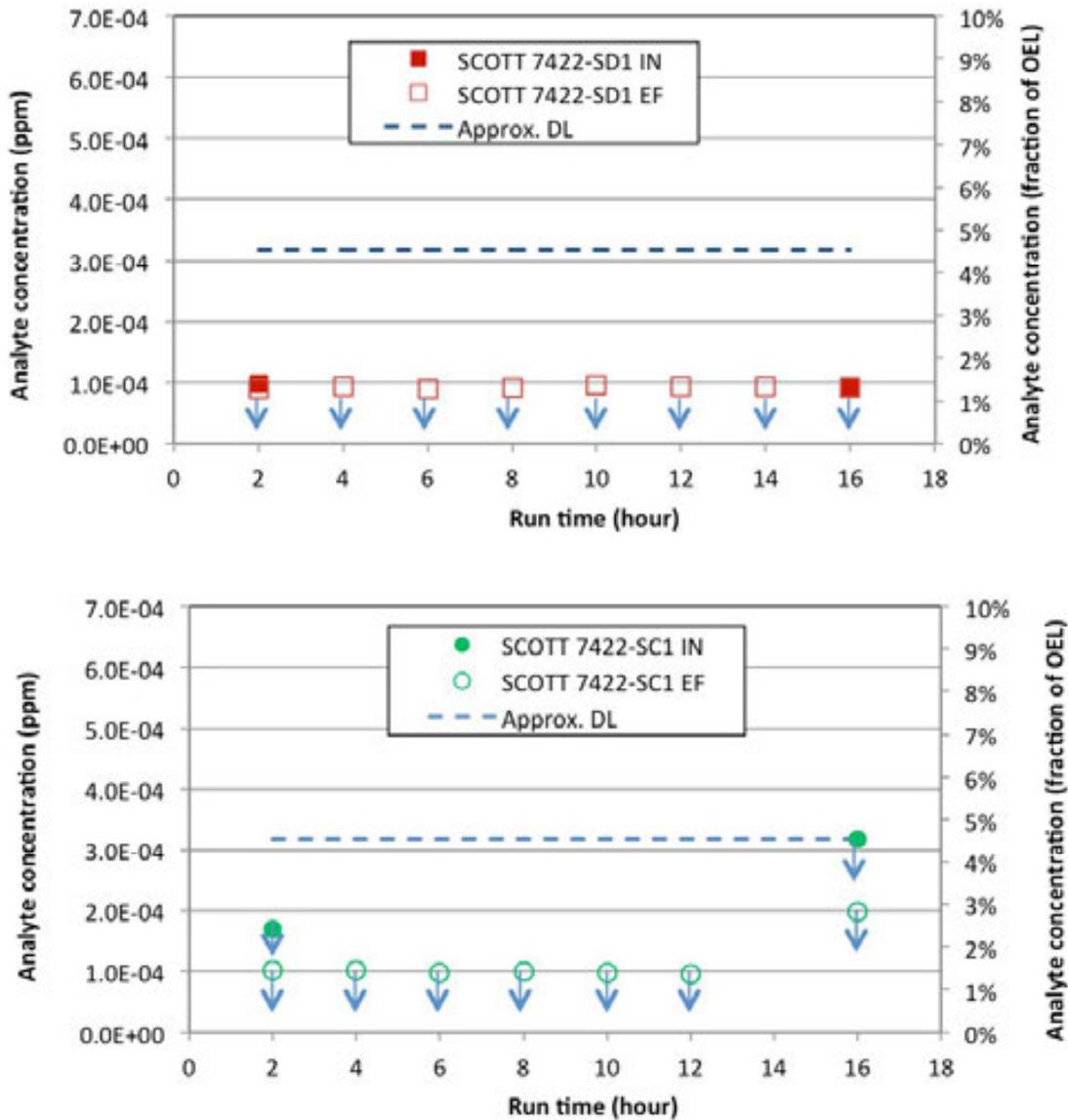


Figure E.11. Plot of Measured Dibutyl butylphosphonate Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the detection or reporting limit.

Appendix F

Historical Data Comparison

Appendix F

Historical Data Comparison

Headspace-characterization data and industrial hygiene (IH) data—hereafter referred to as “TWINS HS” and “TWINS IH”—were obtained from the Tank Characterization Database via the Tank Waste Information Network System (TWINS). All vapor analysis results for tank 241-A-101 (A-101) and its exhaust system were obtained via a TWINS query on June 20, 2016, for TWINS HS,⁽¹⁾ and another query on October 7, 2016, for TWINS IH. More recent headspace data were also obtained from the Site-Wide Industrial Hygiene Database (SWIHD) by two queries. The first query, on July 12, 2016, contained all data loaded as of that date. The second query contained all data with survey dates between May 1, 2016, and October 7, 2016. This latter data set was used to update and supplement the former, producing a set referred to as “SWIHD HS.”

TWINS HS and TWINS IH data were eliminated from consideration if they met the following criteria:

- Quality Assurance samples (blanks, laboratory control samples, or spikes)
- Marked as suspect (Data Qualifier flag S)
- Associated with a contaminant in a blank, trip blank, or field blank (Data Qualifier flags B, T, or F)
- A laboratory control sample that was out of range (Data Qualifier flag a)
- An excessive relative percent difference (Data Qualifier flag c)
- Marked with a laboratory-defined flag whose meaning was not generically defined and might indicate a serious data-quality issue (Data Qualifier flags L or Y).

Flags a, c, and L were found only in the TWINS IH database, not in TWINS HS.

The exclusions for the SWIHD HS data set were similar:

- Having a laboratory control sample that was out of range (flag a)
- Associated with a contaminant in a blank (flags b or B)
- Having an excessive relative percent difference or relative standard deviation (flags c or d)
- Having an excessive difference between the sample result and its serial dilution (flag e)
- Having a failed mass spectrometer reading on the sample but not on its serial dilution (flag f)
- Marked with a laboratory-defined flag whose meaning was not generically defined and might indicate a serious data-quality issue (flags L or Y).

TWINS HS results associated with chemicals that were ambiguously identified (e.g., “alkane,” “unknown,” “C6 ketone”) were deleted unless the molecular weight of one of the chemicals could be unambiguously specified (e.g., “octanenitrile and others” was kept). In these mixture cases, where the

¹ No data have been added to TWINS HS since April 2005, so the June 2016 download does not require updating.

Chemical ID consisted of a Chemical Abstracts Service (CAS) number followed by M, the molecular weight of the identified chemical was added to the data record, the CAS number was used for the Chemical ID, and the concentration expressed in parts per million (absent from the downloaded database) was calculated from the concentration in milligrams per cubic meter at 25°C and the molecular weight.

A number of chemicals in the TWINS IH data set had “needs conversion” notes in the concentration (mg/m³ and ppm) columns, rather than numbers, and required calculations to supply these concentrations. The calculations made use of values already in the database: the molecular weight, the Reported Value and its units, and the Sample Volume and its units. A temperature of 25°C and a pressure of 1 atm were assumed.

The method described above was consistent with that used in PNNL-25880¹, except that measurements that were non-reports—less than the reporting limit (RL) for the analyte—were excluded in PNNL-25880 and were not excluded in this study.

For comparison to cartridge tests that were made using a gas stream from the A-101 headspace, only headspace measurements were appropriate. This required no scrutiny for the TWINS HS or SWIHD HS databases because they were headspace only for A Farm tanks, but the TWINS IH database required sorting so that only headspace data were used. Almost all A Farm data in the TWINS IH database were attributed to individual tank locations, although three rows had locations of “Inside Farm.” Only data that listed A-101 as a location were used. All of these had Survey Titles that included phrases such as “Breather Filter Sampling,” or “Headspace.” Because the location was specified as A-101 and the Survey Title all referred to headspace or breather filter sampling, all of the TWINS IH A-101 data were considered to be from tank headspace.

Maximum and average⁽²⁾ headspace concentrations were found for each analyte for the combined TWINS IH and SWIHD HS databases.⁽³⁾ These maxima and averages are given in Table F.1, together with Occupational Exposure Limits (OELs) and counts of the number of samples. The notation “n/a” is used where there were no measurements of the analyte.

Because the TWINS HS data were older, they were considered less representative of the vapors present during cartridge testing, and the default approach was to omit them from calculations. However, in some cases, the maximum and average for an analyte were considerably different if they were determined from a combination of all three databases. When this was the case, the results for the three-database combination are tabulated along with those for the default two-database combination. That is, Table F.1 contains two rows for the chemical instead of one, with the upper row (the default two-database combination) in normal font and the lower row (the two-database combination) in italics. The criterion for tabulating this extra information was that there was difference of a factor of three or more, in either direction, between the value obtained from the two-database combination and that from the three-database combination.

¹ Hoppe, EW, LA Mahoney, J Cole, and KS Rohlifing. 2016. *Hanford Tank Vapors COPCs Update*. PNNL-25880, Pacific Northwest National Laboratory, Richland, Washington.

² Arithmetic average.

³ The A-101 data in the SWIHD HS database were for dates between July 17, 2015 and June 1, 2016.

Because the reporting limits on concentrations in the historical database were generally higher than the reporting limits or detection limits in the cartridge tests, it was necessary to analyze data in a way that would let the effect of < RL historical data be recognized. To do this, it was assumed that all of the non-reports in the databases had concentrations equal to the measurements' RLs. Then the following rules were applied:

1. If a maximum value was a non-report, it was marked as "< RL" in the table.
2. If all the data contributing to an average were non-reports, the average was marked as "< RL".
3. If the presence of non-reports in an average caused it to be more than a factor of two different, in either direction, from the value it would have had if only the reported concentrations were averaged, the average was marked with an asterisk ("*").

Table F.1. COPC Comparison to Historical A-101 Measurements

COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements ¹					Measurements in this study				
					Number of Values	Maximum Value	Average Value	Maximum Value (NOEL)	Average Value (NOEL)	Max Inlet (NOEL)	Avg. Inlet (NOEL)	Max. outlet (NOEL)	Approx. DL ² (NOEL)	
Inorganics														
1 Ammonia	7664-41-7	-28	Poling et al., 2007 ²	25 ppm	15 21	148 800	58.7* 257	592% 3200%	233%* 1028%	484%	401%	348%	2.55% (RL)	
2 Nitrous Oxide	10024-97-2	-127	Poling et al., 2007	50 ppm	1 20	<RL 250	<RL 158	<RL 500%	<RL 316%	Not Measured				
3 Mercury	7439-97-6	674	Poling et al., 2007	0.025 mg/m ³	15	0.011	0.00482	44%	19%	33.8%	31.7%	<RL	7.38% (RL)	
Hydrocarbons														
4 1,3-Butadiene	106-99-0	24	Poling et al., 2007	1 ppm	37	0.512	0.0287*	51%	2.9%*	<RL	<RL	2.44%	2.44-2.64% (RL)	
5 Benzene	71-43-2	176	Poling et al., 2007	0.5 ppm	37	0.0085	0.00492	1.7%	0.9%	0.13%	0.12%	0.03%	0.03%	
6 Biphenyl	92-52-4	491	Poling et al., 2007	0.2 ppm	26	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.13%	
Alcohols														
7 1-Butanol	71-36-3	243	NIOSH	20 ppm	23	0.044	0.0168	0.22%	0.08%	0.13%	0.12%	<DL	0.004%	
8 Methanol	67-56-1	148	Poling et al., 2007	200 ppm	6	0.43	0.251	0.22%	0.13%	Not Measured				
Ketones														
9 2-Hexanone	591-78-6	262	NIOSH	5 ppm	37	<RL	0.00421*	<RL	0.08%*	0.02%	<DL	<DL	0.020%	
10 3-Methyl-2-butanone	814-78-8	208	CRC Handbook 1983 ⁴	0.02 ppm	0	n/a	n/a	n/a	n/a	Not detected - TIC ¹¹				
11 4-Methyl-2-hexanone	105-42-0	282	Predicted ACD/Labs ⁵	0.5 ppm	25	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.03%	
12 6-Methyl-2-heptanone	928-68-7	333	Predicted ACD/Labs	8 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC				
13 3-Buten-2-one	78-94-4	179	CRC Handbook 1983	0.2 ppm	35	<RL	0.00509*	<RL	2.5%*	0.38%	0.33%	0.64%	0.03%	
Aldehydes														
14 Formaldehyde	50-00-0	-6	NIOSH	0.3 ppm	15	0.024	0.00726	8.0%	2.4%	5.2%	3.5%	2.3%	0.61% (RL)	
15 Acetaldehyde	75-07-0	69	NIOSH	25 ppm	24	0.142	0.0308	0.57%	0.12%	0.22%	0.20%	0.13%	0.005% (RL)	
16 Butanal	128-72-8	167	Oxford safety data ⁶	25 ppm	50	0.015	0.00542	0.06%	0.02%	0.008%	0.006%	0.002%	0.001%	
17 2-Methyl-2-butanal	1115-11-3	244	United Nitro ⁷	0.03 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC				
18 2-Ethyl-hex-2-enal	645-62-5	347	Predicted ACD/Labs	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC				

Table F.1. COPC Comparison to Historical A-101 Measurements (continued)

COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements ²						Measurements in this study					
					Number of Values	Maximum Value	Average Value	Maximum Value (NOEL)	Average Value (NOEL)	Max Inlet (NOEL)	Avg. Inlet (NOEL)	Max outlet (NOEL)	Approp. DL ¹³ (NOEL)			
Furans																
19	Furan	88	Poling et al., 2007	1 ppb	40	<RL	3.17	<RL	317%	4.8%	3.7%	1.3%	0.87%			
20	2,3-Dihydrofuran	130	Alfa Aesar ⁴	1 ppb	13	<RL	<RL	<RL	<RL	4.2%	2.4%	2.6%	1.8%			
21	2,5-Dihydrofuran	152	Aldrich ⁵	1 ppb	40	<RL	<RL	<RL	<RL	<DL	<DL	3.8%	2.2%			
22	2-Methylfuran	147	Oxford safety data	1 ppb	39	<RL	<RL	<RL	<RL	<DL	<DL	2.1%	1.9%			
23	2,5-Dimethylfuran	199	Alfa Aesar	1 ppb	13	<RL	<RL	<RL	<RL	<DL	<DL	<DL	3.1%			
24	2-Ethyl-5-methylfuran	246	Predicted ACO/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not detected - TIC ²²						
25	4-(1-Methylpropyl)-2,3-dihydrofuran	328	Predicted ACO/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not detected - TIC						
26	3-(1,1-Dimethylethyl)-2,3-dihydrofuran	306	Predicted ACO/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not detected - TIC						
27	2-Pentylfuran	333	Alfa Aesar	1 ppb	13	<RL	<RL	<RL	<RL	2.0%	1.7%	2.7%	1.7%			
28	2-Heptylfuran	410	Alfa Aesar	1 ppb	13	<RL	<RL	<RL	<RL	1.8%	1.3%	1.8%	1.1%			
29	2-Propylfuran	231	Alfa Aesar	1 ppb	13	<RL	<RL	<RL	<RL	3.4%	<DL	<DL	2.8%			
30	2-Octylfuran	452	Predicted ACO/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not detected - TIC						
31	2-(3-Octa-3-phenylprop-1-enyl)furan	606	Predicted ACO/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not detected - TIC						
32	2-(2-Methyl-6-oxyheptyl)furan	Not available	Not available	1 ppb	0	n/a	n/a	n/a	n/a	Not detected - TIC						
Bifluorides																
33	Dichlorodibutylate	563	NIOSH	5 mg/m ³	26	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.13%			

Table F.1. COPC Comparison to Historical A-101 Measurements (continued)

COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements ¹					Measurements in this study				
					Number of Values	Maximum Value	Average Value	Maximum Value (MOEL)	Average Value (MOEL)	Max Inlet (MOEL)	Avg. Inlet (%OEL)	Max. Inlet outlet (MOEL)	Approx. DL ² (MOEL)	
Nitriles														
34	Acetonitrile	75-05-8	179	NIOSH	20 ppm	35	5.16	0.875	26%	4.4%	0.65%	0.45%	12.4%	0.001%
35	Propanenitrile	107-12-0	207	NIOSH	6 ppm	27	<RL	0.00393	<RL	0.07%	0.07%	0.05%	0.04%	0.004%
36	Butanenitrile	109-74-0	244	NIOSH	8 ppm	25	0.041	0.0024*	0.51%	0.10%*	0.04%	0.03%	<DL	0.003%
37	Pentanenitrile	110-39-8	284	Alfa Aesar	6 ppm	27	<RL	<RL	<RL	<RL	0.015%	0.010%	0.006%	0.004%
38	Hexanenitrile	628-73-9	328	Predicted ACD/Labs	6 ppm	27	<RL	<RL	<RL	<RL	<DL	<DL	0.003%	0.003%
39	Heptanenitrile	629-08-3	368	Alfa Aesar	6 ppm	0	n/a	n/a	n/a	n/a		Not detected - TIC ¹²		
40	2-Methylpropanenitrile	1647-11-6	Not available	Not available	0.3 ppm	0	n/a	n/a	n/a	n/a		Not Detected - TIC		
41	2,4-Pentanedinitrile	1615-70-9	278	Predicted ACD/Labs	0.3 ppm	0	n/a	n/a	n/a	n/a		Not Detected - TIC		
Amines														
42	Ethylamine	75-04-7	62	Felling et al., 2007	5 ppm	17	<RL	<RL	<RL	<RL	0.34%	0.15%	<RL	0.10% (RL)
Nitrosamines														
43	N-Nitrosodimethylamine	62-75-9	306	NIOSH	0.3 ppb	15	1.25	0.372*	417%	124%*	224%	157%	<RL	8-12% (RL)
44	N-Nitrosodiethylamine	55-18-5	351	Oxford safety data	0.1 ppb	15	<RL	0.0725	<RL	73%	74%	50%	<RL	26.7% (RL)
45	N-Nitrosomethylethylamine	10595-95-6	310	Predicted ACD/Labs	0.3 ppb	15	<RL	<RL	<RL	<RL	<RL	<RL	<RL	11.1% (RL)
46	N-Nitrosomorpholine	59-89-2	435	Oxford safety data	0.5 ppb	15	0.143	0.0671*	24%	11%*	8.0%	5.5%	<RL	3.3% (RL)
Organophosphates														
47	Tributyl phosphate	126-73-8	552	NIOSH	0.2 ppm	26	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.23%
48	Dibutyl butylphosphonate	78-46-6	602	Predicted ACD/Labs	0.007 ppm	26	<RL	<RL	<RL	<RL	<DL	<DL	<DL	4.5%
Halogenated														
49	Chlorinate d Biphenyls	Varies	Varies	Varies	1 mg/m ³	0	n/a	n/a	n/a	n/a		Not Detected - TIC		
50	2-Fluoropropene	1184-60-7	-11	SynQuest ¹¹	0.1 ppm	1	<RL	<RL	<RL	<RL		Not Detected - TIC		
Pyridines														
51	Pyridine	110-86-1	240	NIOSH	1 ppm	40	<RL	0.00518*	<RL	0.52%*	0.16%	0.11%	<RL	0.03% (RL)
52	2,4-Dimethylpyridine	108-47-4	318	Alfa Aesar	0.5 ppm	39	<RL	<RL	<RL	<RL	<RL	<RL	<RL	0.06% (RL)

Table F.1. COPC Comparison to Historical A-101 Measurements (continued)

COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements ¹					Measurements in this study						
					Number of Values	Maximum Value	Average Value	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max. outlet (%OEL)	Approx. DL ¹⁰ (%OEL)			
Oxamides/Nes																
53 Methyl nitrite	624-91-9	10	Oxford safety data	0.1 ppm	0	n/a	n/a	n/a	n/a	n/a	Not detected - TIC ¹¹					
					3	0.43	0.328	430%	32.8%							
54 Butyl nitrite	544-16-1	172	Alfa Aesar	0.1 ppm	0	n/a	n/a	n/a	n/a	n/a	Not Detected - TIC					
Oxamides																
55 Butyl nitrate	528-45-0	276	Predicted ACD/Labs	2.5 ppm	0	n/a	n/a	n/a	n/a	n/a	Not Detected - TIC					
56 1,4-Buranechel, di-nitrate	3457-91-8	499	Predicted ACD/Labs	0.05 ppm	0	n/a	n/a	n/a	n/a	n/a	Not Detected - TIC					
57 2-Nitro-2-methylpropane	594-70-7	260	Alfa Aesar	0.3 ppm	0	n/a	n/a	n/a	n/a	n/a	Not Detected - TIC					
58 1,2,3-Propionitril, 1,3-dinitrate	623-87-0	338	Predicted ACD/Labs	0.05 ppm	0	n/a	n/a	n/a	n/a	n/a	Not Detected - TIC					
Isocyanates																
59 Methyl isocyanate	624-83-9	103	NIOSH	0.02 ppm	2	<RL	<RL	<RL	<RL	<RL	Not Detected - TIC					

¹ Historical data from TWWS industrial hygiene vapor database and SWH database; see text for links and dates of queries. Values in italics include those data plus data from the pre-2006 TWWS headspace database; all samples earlier than May 2005.

* (indicates that the value of the average would differ by a factor of 2 or more (in either direction) if non-reports were excluded).

¹⁰ "RL" indicates that all pertinent measurements of the analyte were less than the reporting limit.

¹¹ Plain font in the table indicates that only the recent databases (SARND headspace and TWWS Industrial Hygiene) were included. Italics mean that the pre-2006 TWWS headspace data were also included.

¹ Poling, B. E.; Prausnitz, J. M.; O'Connell, A. P. *The Properties of Gases and Liquids*. McGraw Hill, 2007.

² ACD/Labs software <http://www.acdlabs.com/products/percepta/predictor.php>

³ CRC Handbook of Chemistry and Physics, CRC Press, 1969.

⁴ Oxford safety data from The Physical and Theoretical Chemistry Laboratory at Oxford University

⁵ Food and Agriculture Organization of the United Nations

⁶ Alfa Aesar <https://www.alfa.com/>

⁷ Aldrich <https://www.sigmaaldrich.com/>

⁸ OSHA: Occupational Safety and Health Administration

⁹ SynQuest: <https://synquestlabs.com/product/549330.html>

¹⁰ TIC: Tentatively Identified Compounds that were not observed in this study using the specified analytical methods.

¹¹ Approximate Detection Limit (DL) is calculated using the reported detection limit (or reporting limit) from the analytical laboratory and the average volume (from flowrate x time) of vapor exposed to the sorbent tube.



Pacific Northwest
NATIONAL LABORATORY

*Proudly Operated by **Battelle** Since 1965*

902 Battelle Boulevard
P.O. Box 999
Richland, WA 99352
1-888-375-PNNL (7665)

U.S. DEPARTMENT OF
ENERGY

www.pnnl.gov