

# Analysis of Respirator Cartridge Performance Testing on Hanford Tank BY-108

**January 2017**

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the U.S. Department of Energy  
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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 (APR) to determine the period of time that the cartridges would provide adequate performance for APRs to protect workers when exposed to a mixture of Chemicals of Potential Concern (COPCs) from vapors emanating from the headspace of tank BY-108 on the Hanford Site. The Occupational Safety and Health Administration (OSHA) recognizes 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 assure 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 15–17, 2016, using headspace vapors from Hanford tank BY-108 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 SCOTT 7422-SC1 (SCOTT Safety, Monroe, North Carolina) were assessed on separate days with BY-108 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 described below:

- Based on measurements of the cartridge inlet vapor concentrations from tank BY-108, ammonia, 1,3-butadiene, N-Nitrosodimethylamine (NDMA), and N-Nitrosomethylethylamine (NMEA) exceeded their Occupational Exposure Limit, (OEL).<sup>1</sup> Eight additional COPCs—mercury, 3-buten-2-one, 2,3-dihydrofuran, 2,5-dihydrofuran, 2-methylfuran, 2-propylfuran, N-Nitrosodiethylamine (NDEA), and N-Nitrosomorpholine—had inlet concentrations greater than 10% of their corresponding OELs.
- Ammonia inlet concentrations during the testing reached 479 ppm, comparable to BY-108 headspace measurements previously obtained.<sup>2</sup> The apparent breakthrough for both respirator cartridges (SCOTT 7422-SD1 and SCOTT 7422-SC1) occurred quickly during testing (i.e., less than 2 hours). Direct reading instrument measurements taken at intervals during the first 90 minutes of testing indicate that breakthrough occurred after 40 minutes. This breakthrough is consistent with expectations, considering the high inlet concentrations.
- 1,3-Butadiene inlet measurements were lower than previous headspace measurements, and appeared to exhibit breakthrough for both of the cartridges tested. The observed breakthrough time for the SCOTT 7422-SD1 cartridge was after 2 hours and the breakthrough time for the SCOTT 7422-SC1 cartridge was after 4 hours.

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<sup>1</sup> 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 and other nitrosamines was established in 2005 based on the MAK (Maximale Arbeitsplatzkonzentration) Commission standard adopted in Europe.

<sup>2</sup> Comparison was made to the most recent BY-108 sampling and analysis (2008-2009) available from the SWIHL database at the time of this report.

- NDMA and NMEA inlet concentrations reached 0.4 ppb or approximately 130% of their OELs. All outlet concentrations were less than the analytical reporting limit at approximately 12% and 9.9% of their OELs, respectively, indicating no breakthrough at the measured levels for either cartridge.
- Outlet concentrations for mercury, 3-buten-2-one, 2,5-dihydrofuran, and 2-methylfuran were above detection limits (DL) for one or more measurements. Mercury outlet concentrations reached 13.5% of the OEL for mercury at the 16 hour time period on one cartridge, but were <DL for all other outlet measurements, indicating the potential beginning of breakthrough at the end of testing. Outlet measurements for the other COPCs never exceeded 10% of their OELs. In addition, outlet concentrations for 2,3-dihydrofuran, 2-propylfuran, NDEA, and N-Nitrosomorpholine were all less than their DLs, indicating no breakthroughs at the measured levels.
- Based on the measurements taken for this study, breakthrough occurred early in the test sequence for ammonia and 1,3-butadiene. The ammonia breakthrough alone was less than 2 hours for both cartridges tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Because outlet measurements from laboratory analysis are unavailable between time zero and 2 hours, and inlet ammonia concentrations exceed Centers for Disease Control and Prevention–National Institute for Occupational Safety and Health recommendations for APR use,<sup>1</sup> identification of an acceptable change-out frequency is not possible or recommended for the use of these cartridges in similar concentration environments.

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<sup>1</sup> CDC–NIOSH *Pocket Guide to Chemical Hazards – Ammonia*. Available at <https://www.cdc.gov/niosh/npg/npgd0028.html>.

## **Acronyms and Abbreviations**

ALS	ALS Environmental Salt Lake City
APR	Air-Purifying Respirator
CBAL	Columbia Basin Analytical Laboratory
CFR	Code of Federal Regulations
COPC	Chemicals of Potential Concern
CVAA	Cold Vapor Atomic Absorption
DL	Detection Limit
EPA	Environmental Protection Agency
GC-FID	Gas Chromatography-Flame Ionization Detector
GC/MS	Gas Chromatography/Mass Spectrometry
GCTEA	Gas Chromatography-Thermal Energy Analyzer
HPLC	High-Performance Liquid Chromatography
HPLC-UV	High-Performance Liquid Chromatography-Ultraviolet
IC	Ion Chromatography
IH	Industrial Hygiene
NDEA	N-Nitrosodiethylamine
NDMA	N-Nitrosodimethylamine
NMEA	N-Nitrosomethylethylamine
NIOSH	National Institute for Occupational Safety and Health
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PPM	Parts Per Million
PNNL	Pacific Northwest National Laboratory
SWIHD	Site-Wide Industrial Hygiene Database
TIC	Tentatively Identified Compound
TWINS	Tank Waste Information Network System
VOC	Volatile Organic Compound
WC	Water Column
WRPS	Washington River Protection Solutions
WHL	Wastren Hanford Laboratory (222S)





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## **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 performance for APRs to protect 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 to ensure that change-outs occur before the end of service life.[1-4] The change schedule can be based on objective information or data that ensures cartridge change-outs occur before the end of their service life.[2-5] 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 BY-108 single shell tank.



## 2.0 Regulatory Requirements

### 2.1 Background on Regulatory Requirements

OSHA Respiratory Protection Standard (29 CFR 1910.134) mandates/requires that 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 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 or self-contained breathing apparatuses (SCBA) must be used to provide additional protection. While the use of supplied air respirators 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* – First, 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 of the 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 manufacture's recommendation* – Once information on airborne contaminants (including concentrations, temperature, and humidity) has been obtained, contact the manufacturer of the respirator to be used and provide all the information. 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 can be obtained quickly. However, the estimates are not as accurate as testing; sometimes it might result in a service-life estimate that is shorter than needed 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 provide an estimation of cartridge 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 BY-108 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 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 vapor source sampling was performed on headspace vapors rather than from Hanford Tank Farm atmospheric concentrations (i.e., source sampling vs. the breathing zone).
- 10% of the 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 OELs, 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 15–17, 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 average temperatures of the sample slipstream during testing, which ranged from 66 to 91°F as well as the average relative humidity measurements, which ranged from 34 to 86%. 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 COPCs tested. The inlet concentrations of four COPCs—ammonia, 1,3-butadiene, N-Nitrosodimethylamine (NDMA), and N-Nitrosomethylethylamine (NMEA)—exceeded their OELs. The inlet concentrations of eight additional COPCs—mercury, 3-buten-2-one, 2,3-dihydrofuran, 2,5-dihydrofuran, 2-methylfuran, 2-propylfuran, N-Nitrosodiethylamine, and N-Nitrosomorpholine—exceeded 10% of their OELs. All 12 of these COPCs (highlighted in yellow in Table 1) are assessed in more detail in Section 5.0. Appendix E shows similar detailed assessments for an additional seven COPCs with (cartridge inlet) concentrations less than 10% of their OELs but greater than 2%. Note that all of the other COPCs had inlet concentrations less than 2% of their OELs or their detection limits (DL).<sup>1</sup>

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<sup>1</sup> The term “detection limit” is used here to refer either to analytical reporting limit or detection limit. The use of either a reporting or detection limit varied among analytical laboratories. The reporting limit (equivalent to a limit of quantification) was used instead of an analytical method detection limit by several laboratories for specific COPC analyses. See Appendices C and F for additional information on the specific use of reporting or detection limits for each COPC.

**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 <sup>1</sup> (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
<b>Inorganic</b>						
1 Ammonia	7664-41-7	479 ppm	25 ppm	2.35%		Up to 1915% of OEL for inlet and outlet values. None <100% OEL
2 Nitrous Oxide	10024-97-2	Not Measured	50 ppm			
3 Mercury	7439-97-6	13.0 ug/m3	25 ug/m3	7.43%		Up to 52% of OEL for inlet values. All outlets <13.5%
<b>Hydrocarbons</b>						
4 1,3-Butadiene	106-99-0	2.68 ppm	1 ppm	2.02%		Up to 138% of OEL for inlets and 268% of OEL for outlets
5 Benzene	71-43-2	0.0043 ppm	0.5 ppm	0.024%		Up to 0.9% of OEL for inlets. All outlets <0.05%
6 Biphenyl	92-52-4	0.0002 ppm	0.2 ppm	0.048-0.092%	X	
<b>Alcohols</b>						
7 1-Butanol	71-36-3	1.00 ppm	20 ppm	0.005%		Up to 5.0% of OEL for inlet values. All outlets <0.008%
8 Methanol	67-56-1	Not Measured	200 ppm			
<b>Ketones</b>						
9 2-Hexanone	591-78-6	0.0183 ppm	5 ppm	0.003%		Up to 0.4% of OEL for inlet values. All outlets <DL
10 3-Methyl-3-butene-2-one	814-78-8	Not Detected	0.02 ppm	TIC <sup>2</sup>	X	
11 4-Methyl-2-hexanone	105-42-0	0.0014 ppm	0.5 ppm	0.030%		Up to 0.3% of OEL for inlet values. All outlets <DL
12 6-Methyl-2-heptanone	928-68-7	Not Detected	8 ppm	TIC	X	
13 3-Buten-2-one	78-94-4	0.0469 ppm	0.2 ppm	0.090%		Up to 23.5% of OEL for inlet values. All outlets <1.9%
<b>Aldehydes</b>						
14 Formaldehyde	50-00-0	0.0257 ppm	0.3 ppm	0.631%		Up to 8.6% of OEL for inlet values. All outlets <0.9%
15 Acetaldehyde	75-07-0	0.279 ppm	25 ppm	0.005%		Up to 1.1% of OEL for inlet values. All outlets <0.8%
16 Butanal	123-72-8	0.0338 ppm	25 ppm	0.001%		Up to 0.13% of OEL for inlet values. All outlets <0.001%
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	

<sup>1</sup> Approximate Detection Limit (DL) is 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.

<sup>2</sup> 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 the 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 <sup>1</sup> (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
<b>Furans</b>						
19 Furan	110-00-9	0.05 ppb	1 ppb	0.933%		Up to 4.9% of OEL for inlet values. All outlets <1.3%
20 2,3-Dihydrofuran	1191-99-7	0.74 ppb	1 ppb	1.81%		Up to 74.5% OEL for inlet values. All outlets <DL
21 2,5-Dihydrofuran	1708-29-8	0.21 ppb	1 ppb	2.31%		Up to 20.7% OEL for inlet values. All outlets <3.1%
22 2-Methylfuran	534-22-5	0.12 ppb	1 ppb	1.98%		Up to 12.3% OEL for inlet values. All outlets <4.4%
23 2,5-Dimethylfuran	625-86-5	0.03 ppb	1 ppb	3.16%	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	0.04 ppb	1 ppb	1.74%		Up to 3.6% of OEL for inlet values. All outlets <2.5%
28 2-Heptylfuran	3777-71-7	0.05 ppb	1 ppb	1.15%		Up to 4.5% of OEL for inlet values. All outlets <1.4%
29 2-Propylfuran	4229-91-8	0.11 ppb	1 ppb	2.82%		Up to 11.1% 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	
<b>Phthalates</b>						
33 Diethylphthalate	84-66-2	0.0020 mg/m3	5 mg/m3	0.017-0.041%	X	
<b>Nitriles</b>						
34 Acetonitrile	75-05-8	1.89 ppm	20 ppm	0.001%		Up to 0.8% of OEL for inlets and 9.5% of OEL for outlets
35 Propanenitrile	107-12-0	0.0540 ppm	6 ppm	0.003%		Up to 0.4% of OEL for inlets and 0.9% of OEL for outlets
36 Butanenitrile	109-74-0	0.0185 ppm	8 ppm	0.003%		Up to 0.2% of OEL for inlet values. All outlets <0.004%
37 Pentanenitrile	110-59-8	0.0113 ppm	6 ppm	0.003%		Up to 0.2% of OEL for inlet values. All outlets <0.008%
38 Hexanenitrile	628-73-9	0.0028 ppm	6 ppm	0.003%		Up to 0.05% of OEL for inlet values. All outlets <DL
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	

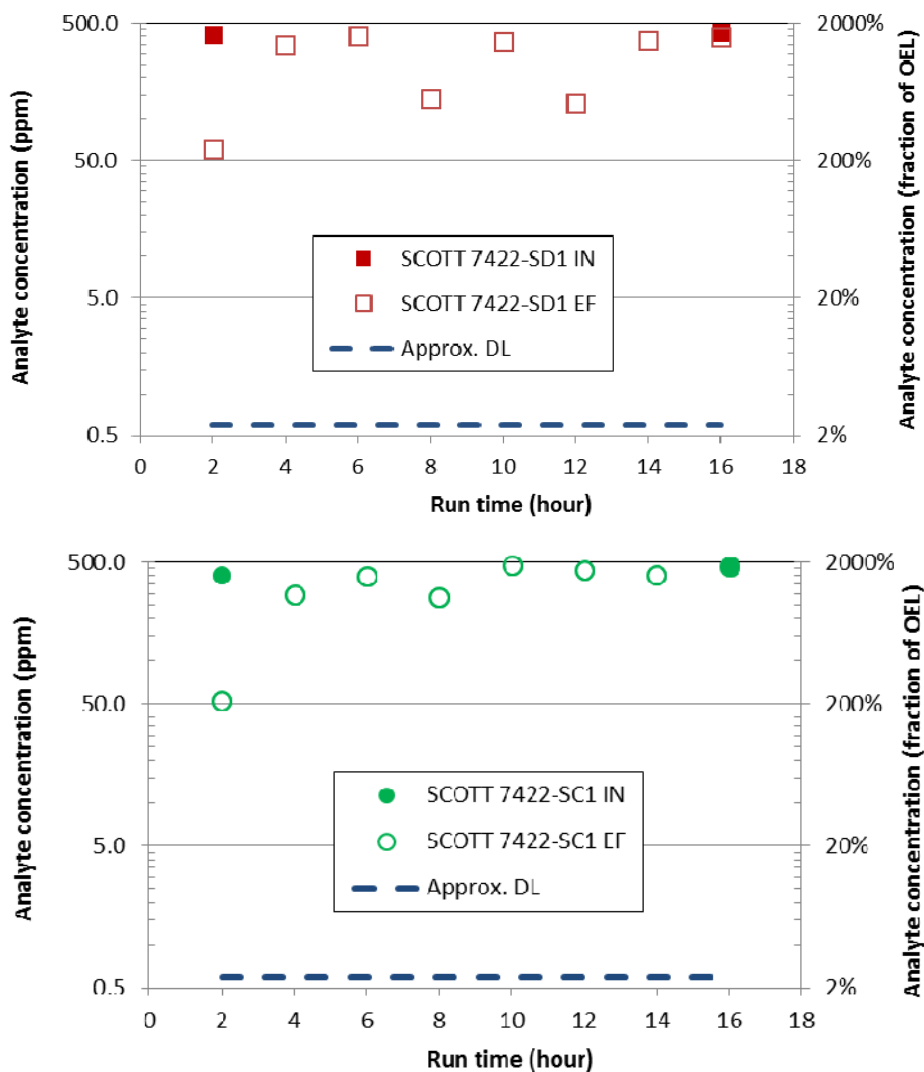
**Table 1. (continued)**

COPC Number and Name	CAS Number	Highest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL <sup>1</sup> (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
<b>Amines</b>						
42 Ethylamine	75-04-7	0.181 ppm	5 ppm	0.103%	X	Up to 3.6% of OEL for inlet values. All outlets <DL
<b>Nitrosamines</b>						
43 N-Nitrosodimethylamine	62-75-9	0.40 ppb	0.3 ppb	11.7%		Up to 134% of OEL for inlet values. All outlets <DL
44 N-Nitrosodiethylamine	55-18-5	0.03 ppb	0.1 ppb	24.4%		Up to 35% of OEL for inlet values. All outlets <DL
45 N-Nitrosomethylethylamine	10595-95-6	0.40 ppb	0.3 ppb	9.85%	X	Up to 132% of OEL for inlet values. All outlets <DL
46 N-Nitrosomorpholine	59-89-2	0.11 ppb	0.6 ppb	3.58%	X	Up to 18.3% of OEL for inlet values. All outlets <DL
<b>Organophosphates</b>						
47 Tributyl phosphate	126-73-8	0.0002 ppm	0.2 ppm	0.084%	X	
48 Dibutyl butylphosphonate	78-46-6	0.0001 ppm	0.007 ppm	1.46%	X	
<b>Halogenated</b>						
49 Chlorinated Biphenyls	Varies	Not Detected	1 mg/m3	TIC	X	
50 2-Fluoropropene	1184-60-7	Not Detected	0.1 ppm	TIC	X	
<b>Pyridines</b>						
51 Pyridine	110-86-1	0.0028 ppm	1 ppm	0.150%		Up to 0.3% of OEL for inlet values. All outlets <DL
52 2,4-Dimethylpyridine	108-47-4	0.0027 ppm	0.5 ppm	0.220%		Up to 0.5% of OEL for inlet values. All outlets <DL
<b>Organonitrites</b>						
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	
<b>Organonitrates</b>						
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	
<b>Isocyanates</b>						
59 Methyl Isocyanate	624-83-9	Not Detected	20 ppb	TIC	X	

## 5.0 Plots of COPCs with Significant Detected Values

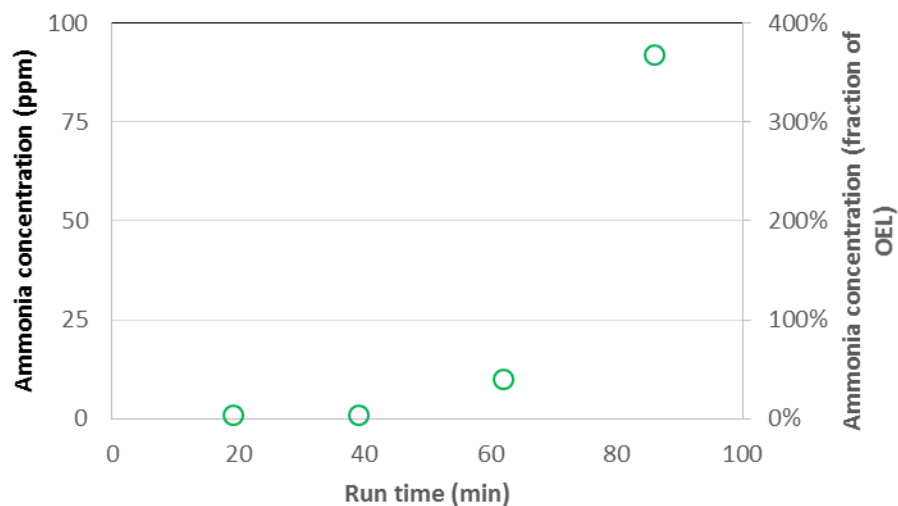
Of the 59 COPCs listed in Table 1, ammonia, 1,3-butadiene, NDMA, and NMEA had detected (cartridge inlet) concentrations greater than their OELs. Eight additional COPCs—mercury, 3-buten-2-one, 2,3-dihydrofuran, 2,5-dihydrofuran, 2-methylfuran, 2-propylfuran, N-Nitrosodiethylamine (NDEA), and N-Nitrosomorpholine—had inlet concentrations greater than 10% of their corresponding OEL (see COPCs highlighted in yellow in Table 1). This section provides more detail on these 12 COPCs, 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% of their corresponding OELs.

**Ammonia** (see Figure 1) – The DL for ammonia corresponds to approximately 2.4% of the OEL. Inlet concentrations exceeded 1611% of the OEL for ammonia at the beginning and end of each cartridge test, with the highest measured value recorded at the end of the SCOTT 7422-SC1 cartridge test at 1915% OEL (479 ppm).



**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)

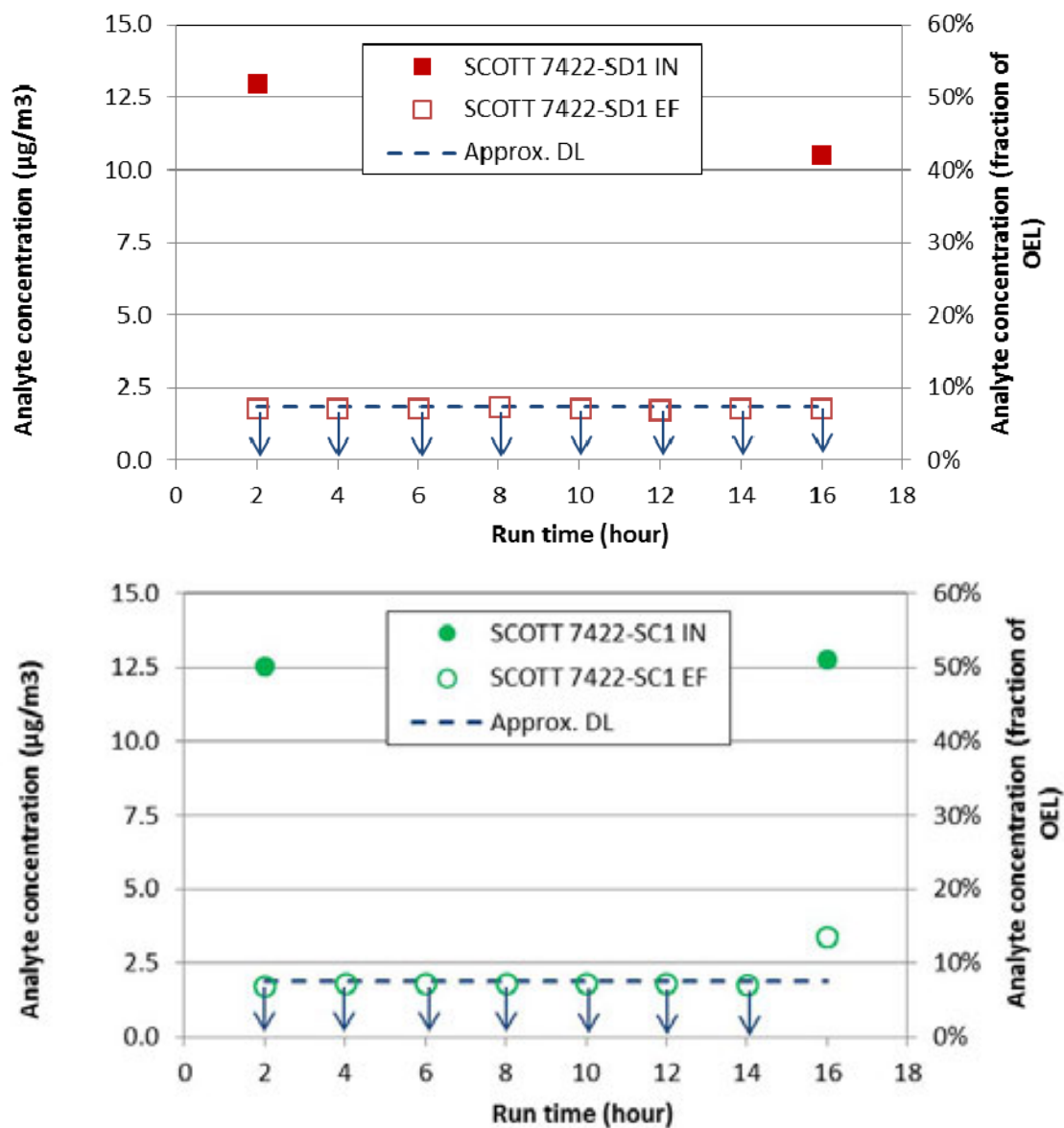
Outlet concentrations exceeded 212% of the OEL for ammonia within the first 2 hours of testing for each cartridge, and remained above 500% of the OEL, near inlet concentrations for all subsequent sample times. Breakthrough for each cartridge was evident within the first 2 hours of testing. For the second cartridge test (SCOTT 7422-SC1), direct reading instrument measurements using a MultiRAE Pro (RAE Systems, Inc., San Jose, California), were made several times during the first 2-hour time period. The ammonia instrument readings shown in Figure 2 provide further indication that breakthrough was initiated between 40 and 60 minutes.



**Figure 2.** Plot of DRI Measurements of Ammonia Concentrations after the Outlet of the SCOTT 7422-SC1 Respirator Cartridge Tested

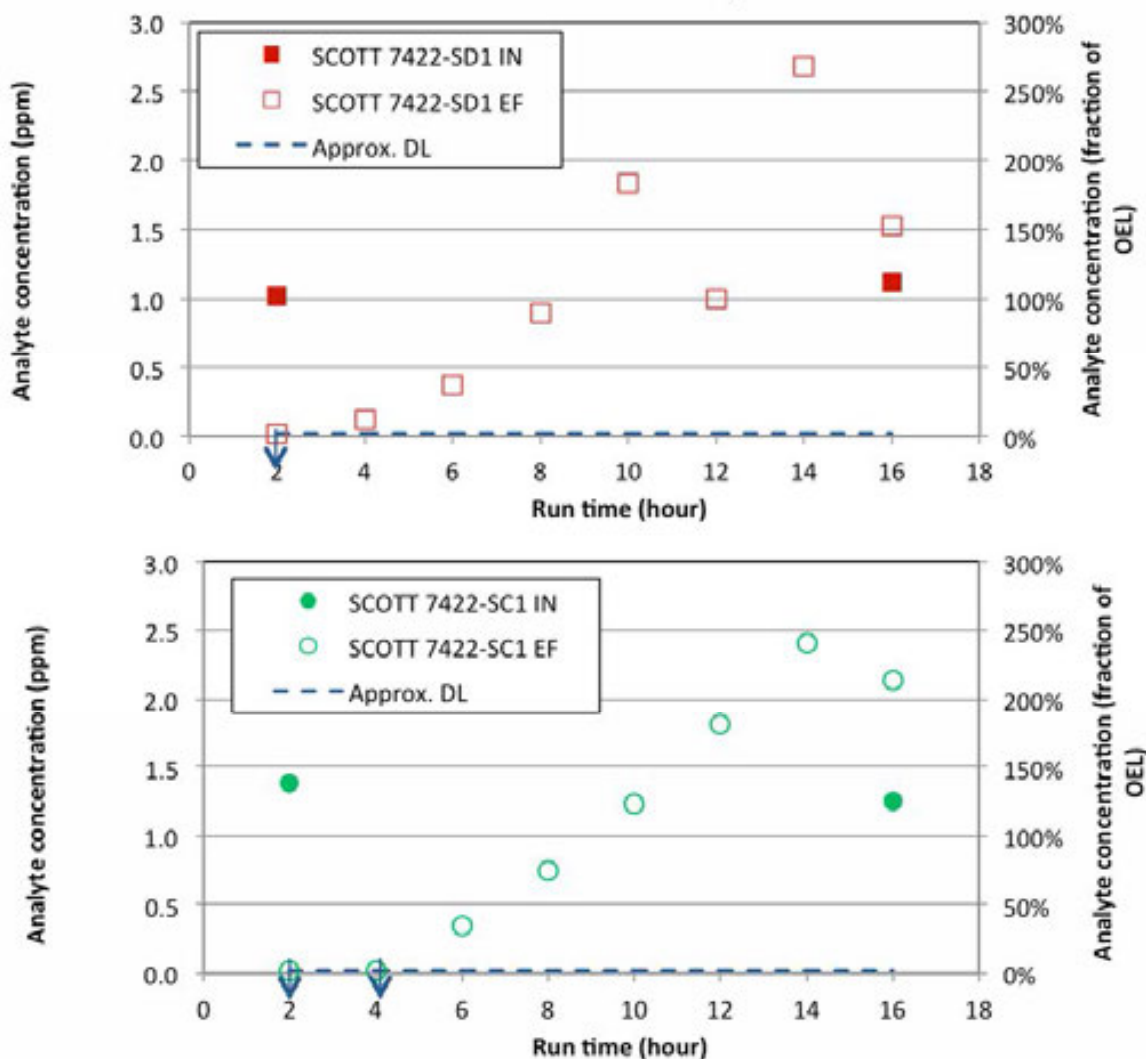


**Mercury** (see Figure 3) – The DL for mercury corresponds to approximately 7.4% of the OEL. Inlet concentrations exceeded 42% of OEL for mercury at the beginning and end of each cartridge test, with the highest value recorded at the beginning of the SCOTT 7422-SD1 cartridge test at 52% of the OEL ( $13 \mu\text{g}/\text{m}^3$ ). All outlet concentrations were below the DL, except for the final sample taken at 16 hours for SCOTT 7422-SC1, with a measured value of 13.5% of the OEL. This single value could indicate the beginning of breakthrough after 14 hours for the SCOTT 7422-SC1 cartridge.



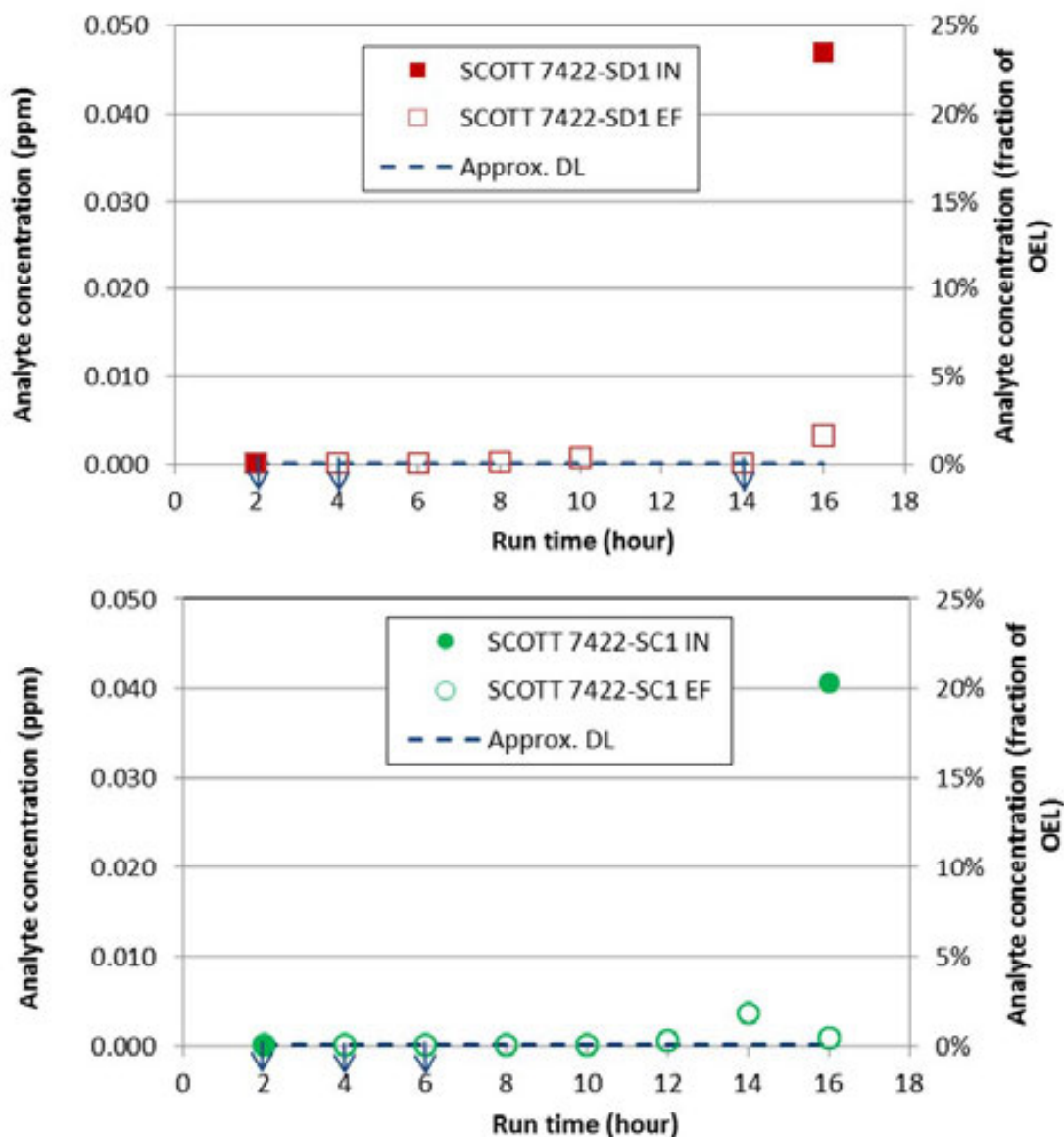
**Figure 3.** Plot of Measured Mercury Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with  $\downarrow$  indicates measurements less than the DL or reporting limit (RL).

**1,3-Butadiene** (see Figure 4) – The DL for 1,3-Butadiene corresponds to approximately 2.0% of the OEL. Inlet concentrations exceeded 102% of OEL during each cartridge test, with the highest value recorded at the beginning of the SCOTT 7422-SC1 cartridge test at 138% OEL. Outlet values appear to exhibit breakthrough behavior over time, with multiple outlet values exceeding 10% of the OEL. Respirator cartridge SCOTT 7422-SD1 appears to show evidence of breakthrough at the 4-hour mark (12.2% the OEL), while cartridge SCOTT 7422-SC1 shows evidence of breakthrough at the 6-hour mark (34.6% the OEL). For both cartridges, outlet concentrations continue to increase, ultimately exceeding inlet concentrations by almost a factor of 2, reaching a maximum outlet concentration of 268% of the OEL after 14 hours for the SCOTT 7422-SD1 cartridge.



**Figure 4.** 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 DL or RL.

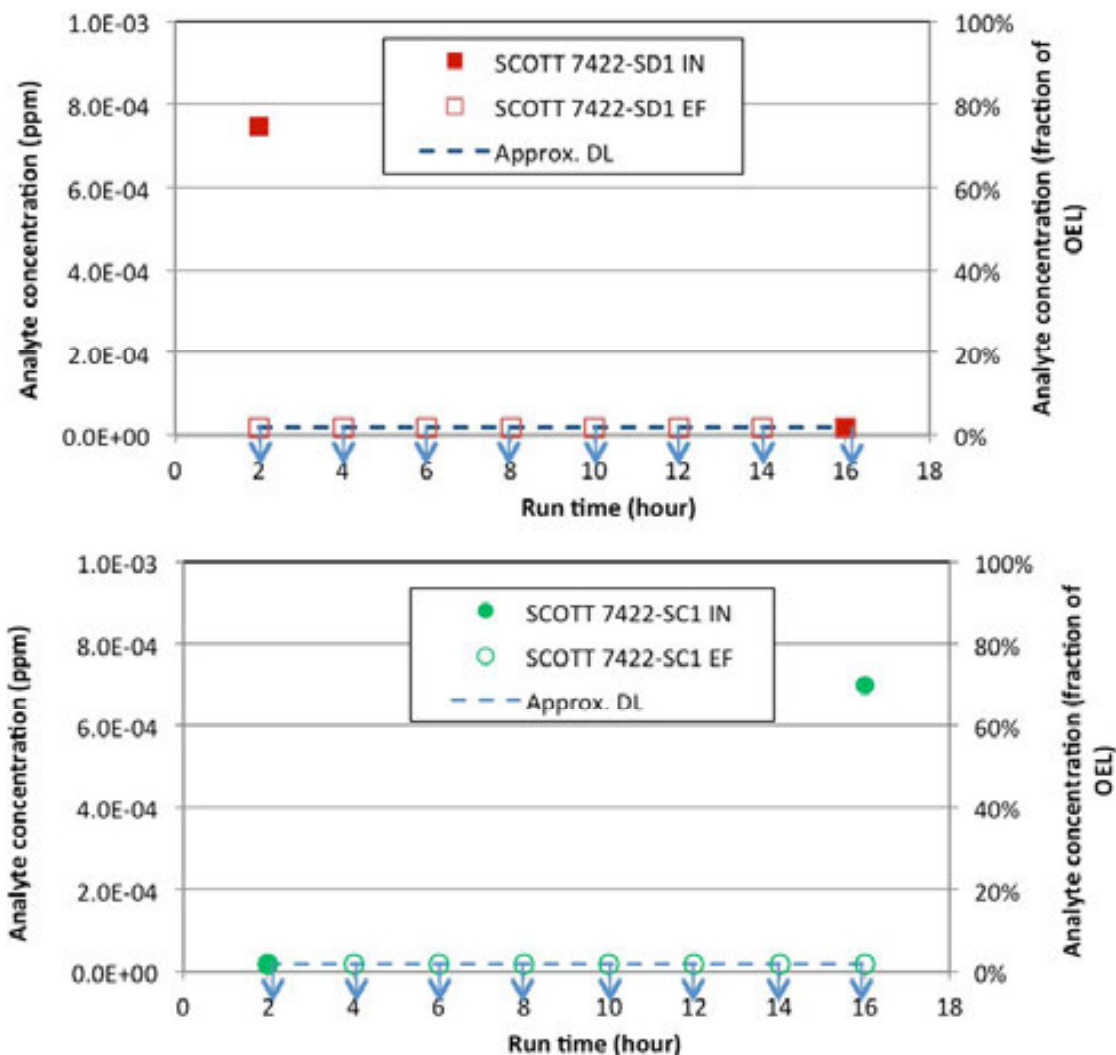
**3-Buten-2-one** (see Figure 5) – The DL for 3-Buten-2-one corresponds to approximately 0.09% of the OEL. Inlet concentrations varied from less than the DL to greater than 20% of the OEL for each of the cartridge tests, with the highest value recorded at the end of the SCOTT 7422-SD1 cartridge test at 23.5% of the OEL (0.047 ppm). Multiple outlet values for both cartridges were consistently above the DL, but less than 10% of the OEL, specifically less than 1.86% of the OEL after 14 hours for cartridge SCOTT 7422-SC1.<sup>1</sup> Neither cartridge showed evidence of breakthrough above 10% of the OEL during the duration of the test.



**Figure 5.** Plot of Measured 3-Buten-2-one 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 DL or RL.

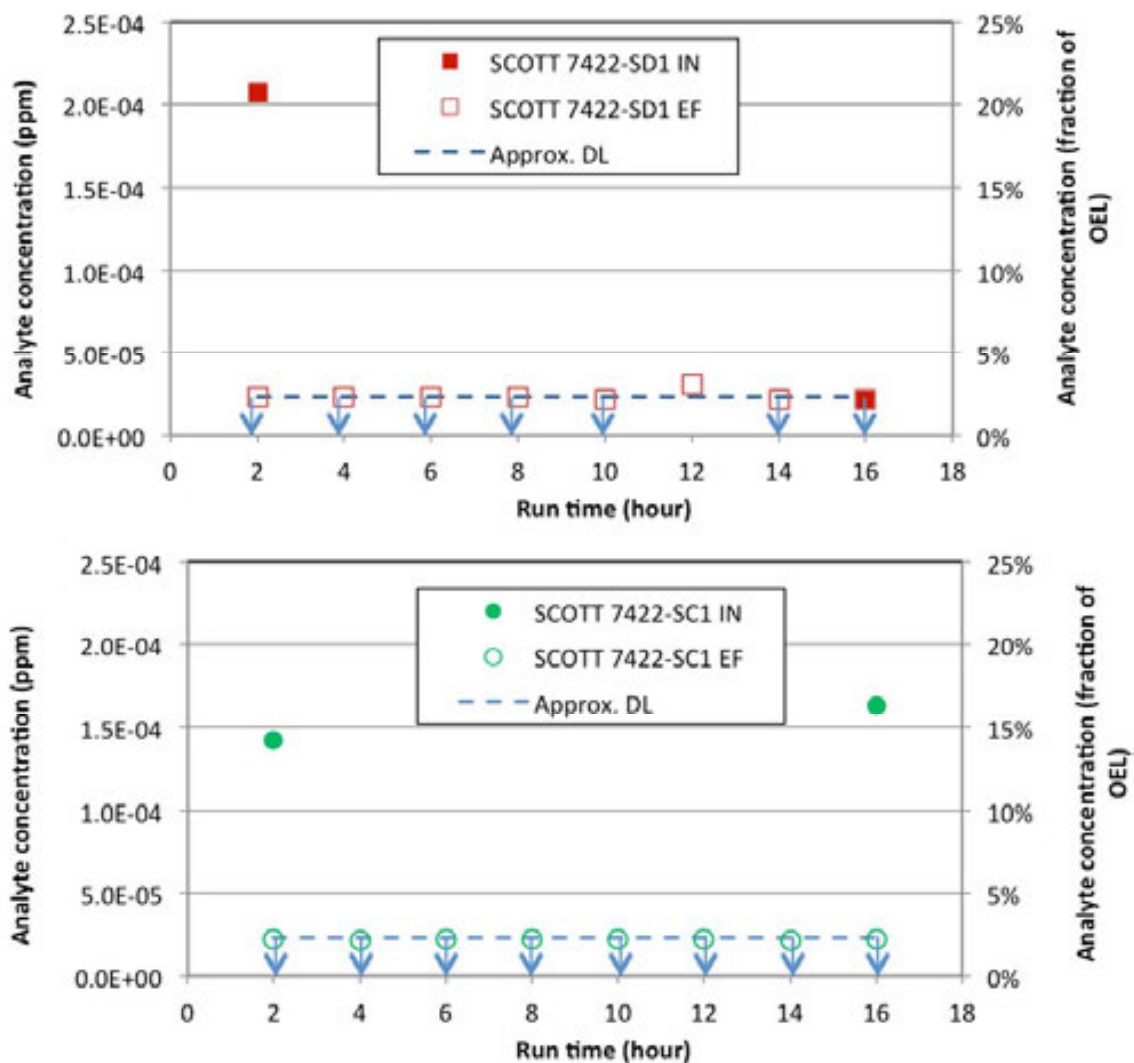
<sup>1</sup> An outlet concentration at the 12-hour period was not recorded for the SCOTT 7422-SD1 test because of either a broken sorbent tube or analytical laboratory malfunction.

**2,3-Dihydrofuran** (see Figure 6) – The DL for 2,3-Dihydrofuran corresponds to approximately 1.8% of the OEL. All of the respirator outlet measurements were below analytical DLs. For both respirator cartridges, two of the four inlet values were greater than the DL (up to 74.5% of the OEL). The first inlet concentration measured for SCOTT 7422-SD1 was 74.5% of the OEL, and the second, after 16 hours, was less than the DL, which could either indicate a change in inlet concentration or an error in the latter measurement. The first inlet concentration for SCOTT 7422-SC1 was less than the DL, whereas the second inlet concentration after 16 hours measured 70.0% of the OEL. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.



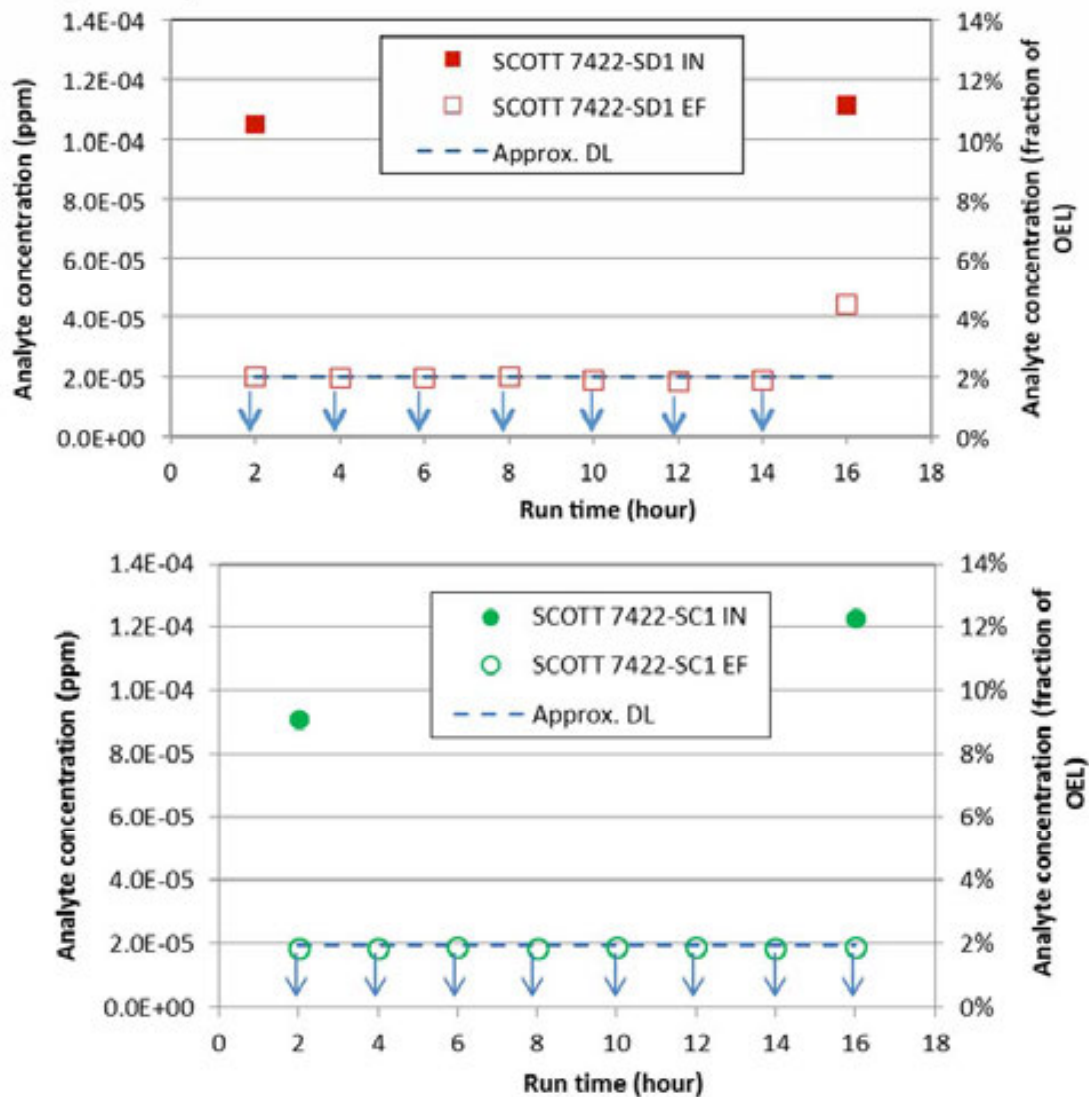
**Figure 6.** Plot of Measured 2,3-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

**2,5-Dihydrofuran** (see Figure 7) – The DL for 2,5-Dihydrofuran corresponds to approximately 2.3% of the OEL. Outlet values were consistently below the DL with one exception for SCOTT 7422-SD1 where the 12-hour sample measured 3.09% of the OEL (0.03 ppb). For both respirator cartridges, three of the four inlet values were greater than the DL (up to 20.7% of the OEL). The first inlet concentration measured for SCOTT 7422-SD1 was 20.7% of the OEL and the second, after 16 hours, was less than the DL, which could either indicate a change in inlet concentration or an error in the latter measurement. Inlet concentrations for SCOTT 7422-SC1 were 14.2% and 16.3% of the OEL for the first and second inlet samples, respectively. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.



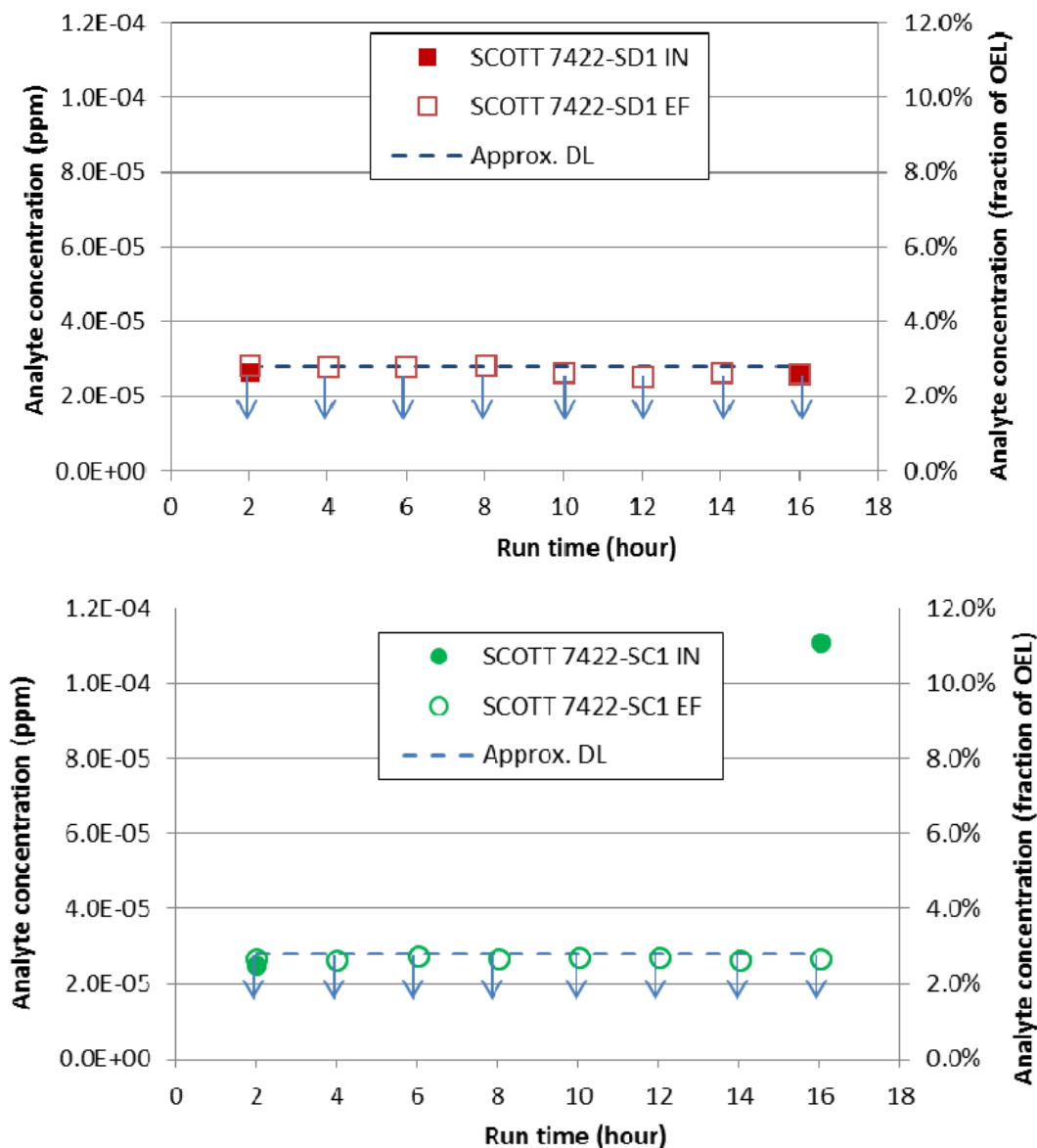
**Figure 7.** Plot of Measured 2,5-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

**2-Methylfuran** (see Figure 8) – The DL for 2-Methylfuran corresponds to approximately 2.0% of the OEL. Outlet values were consistently below the DL, with the exception of the final measurement at the 16-hour mark for SCOTT 7422-SD1, where a concentration of 4.4% of the OEL (0.04 ppb) was observed. The inlet values for both cartridges ranged from 9.12% to 12.3% of the OEL. Based on the outlet measurements, there is no evidence of breakthrough for the SCOTT 7422-SC1 cartridge. The last elevated outlet concentration for the SCOTT 7422-SD1 cartridge could indicate the beginning of breakthrough, or analytical variation.



**Figure 8.** 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 DL or RL.

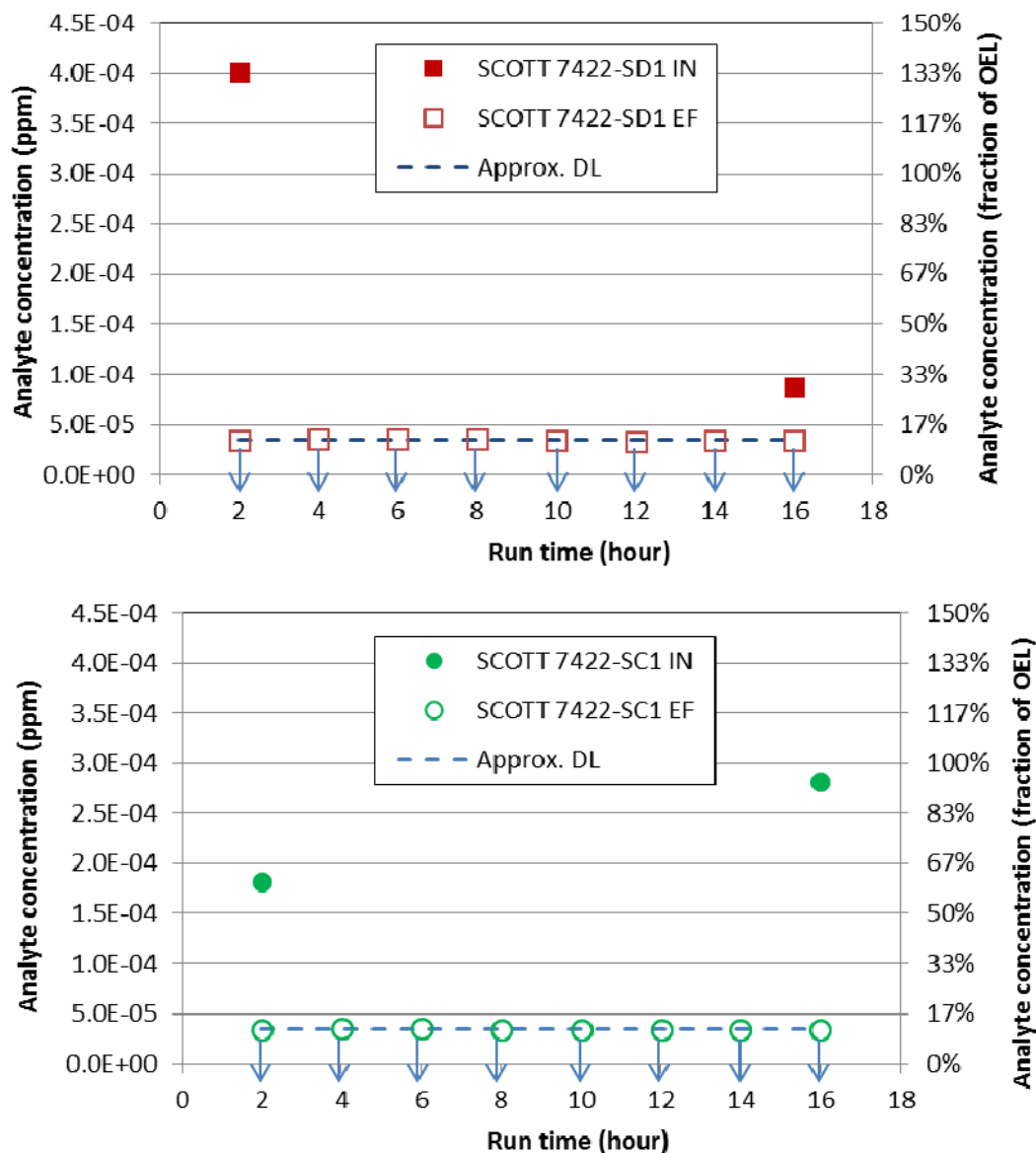
**2-Propylfuran** (see Figure 9) – The DL for 2-Propylfuran corresponds to approximately 2.8% of the OEL. All of the respirator outlet measurements were below analytical DLs. For both respirator cartridges, only one inlet value, the final measured inlet concentration for SCOTT 7422-SC1, was greater than the DL (up to 11.1% of the OEL). Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.



**Figure 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 DL or RL.



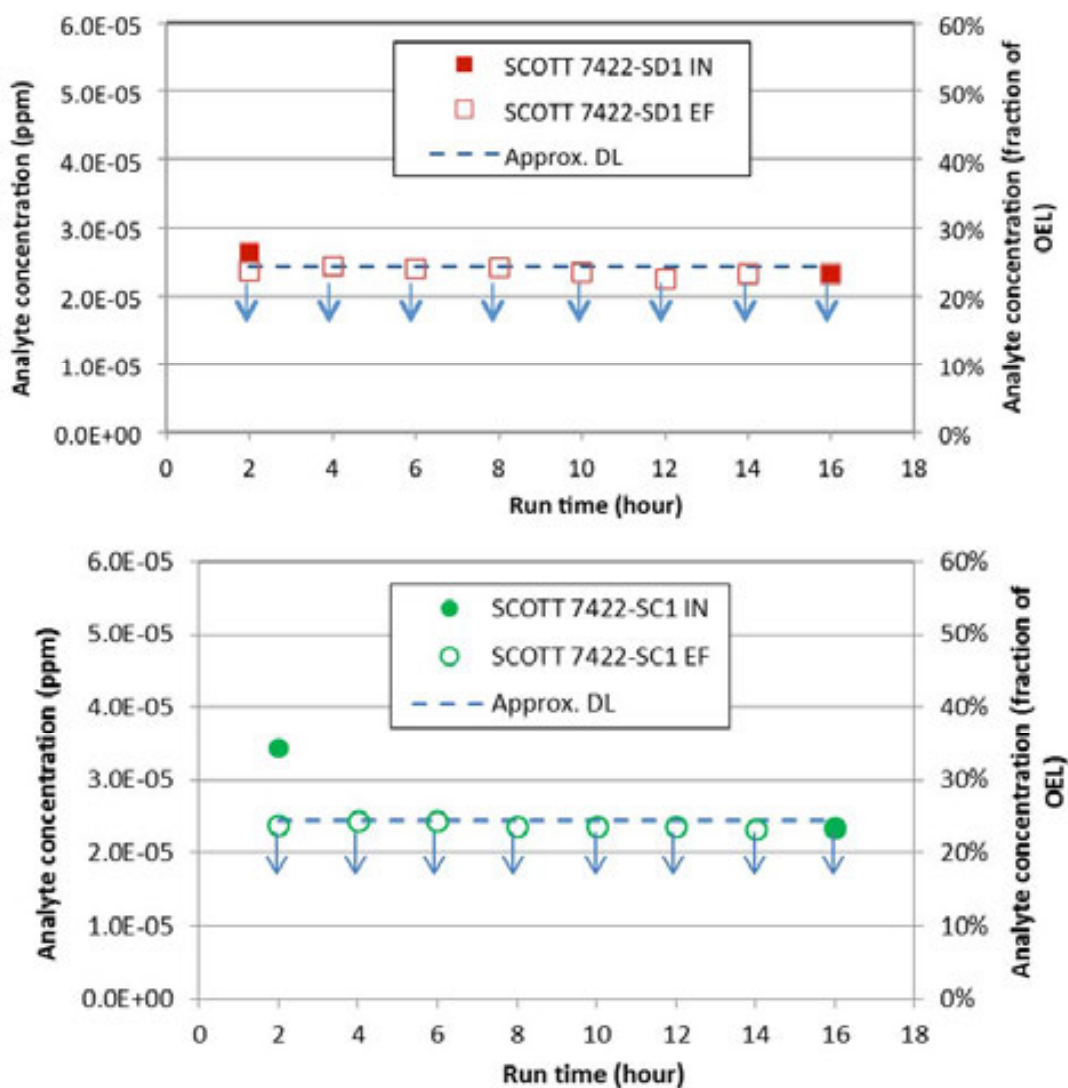
*N-Nitrosodimethylamine* (see Figure 10) – The DL for NDMA corresponds to approximately 11.7% of the OEL. All of the respirator outlet measurements were below analytical DLs. For both respirator cartridges, all of the four inlet values were greater than the DL (up to 134% of the OEL). The first inlet concentration measured for SCOTT 7244-SD1 was 134% of the OEL and the second, after 16 hours, was lower at 29.3% of the OEL. Inlet concentrations for SCOTT 7244-SC1 were at 60.6% of the OEL and 94% of the OEL for the first and second inlet samples, respectively. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.



**Figure 10.** 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 DL or RL.

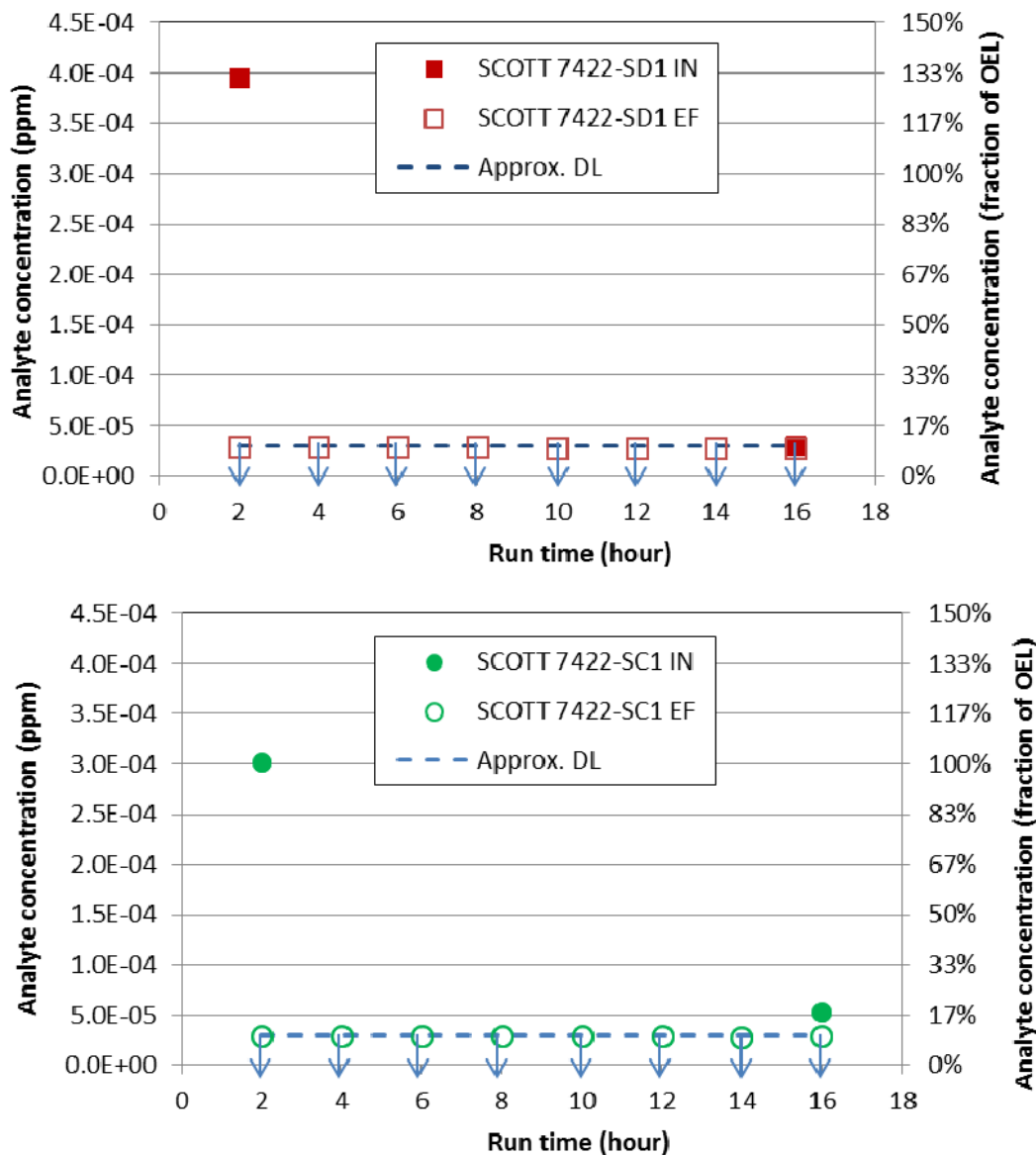


***N-Nitrosodiethylamine*** (see Figure 11) – The DL for NDEA corresponds to approximately 24.4% of the OEL. All of the respirator outlet measurements were below analytical DLs. For both respirator cartridges, the first inlet values were greater than the DL, up to 26.5% and 34.5% of the OEL for SCOTT 7244-SD1 and SC1, respectively. The final inlet concentrations after 16 hours for both cartridges were less than the DL. Because the DL is greater than 10%, it is recommended that this current NDEA DL (~24% of OEL) be used for making respirator performance determinations. Based on the outlet measurements there is no evidence of breakthrough over the measured time period for either cartridge tested.



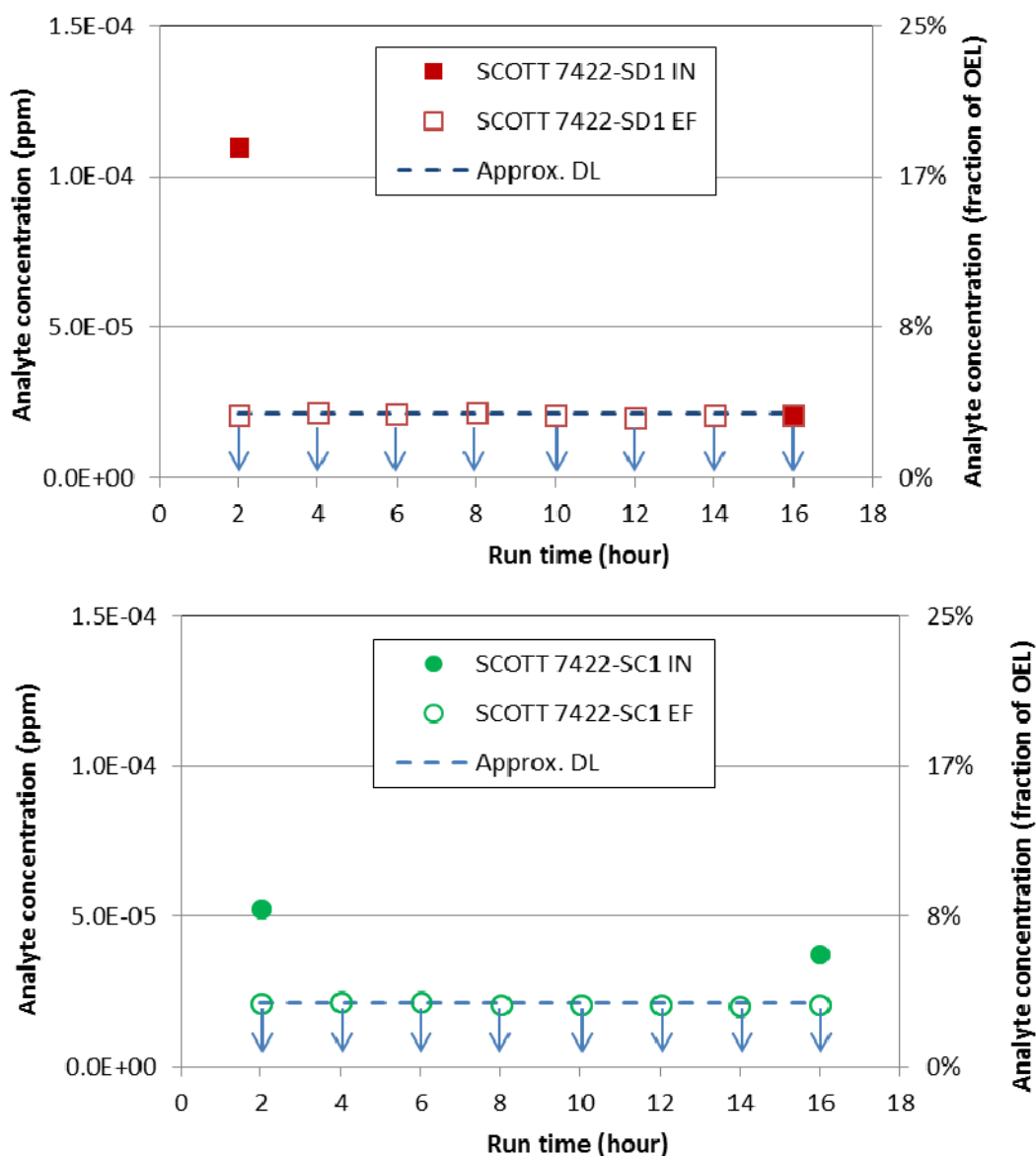
**Figure 11.** Plot of Measured N-Nitrosodiethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

*N-Nitrosomethylethylamine* (see Figure 12) – The DL for NMEA corresponds to approximately 9.9% of the OEL. All of the respirator outlet measurements were below analytical DLs. For both respirator cartridges, the first inlet values were greater than the OEL, up to 132% and 101% of the OEL for SCOTT 7244-SD1 and SC1, respectively. The final inlet concentrations for both cartridges were substantially lower, at 10.2% and 17.7% of the OEL, respectively. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.



**Figure 12.** 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 DL or RL.

***N-Nitrosomorpholine*** (see Figure 13) – The DL for N-Nitrosomorpholine corresponds to approximately 3.6% of the OEL. All of the respirator outlet measurements were below the analytical DL. For both respirator cartridges, all four inlet values were greater than the DL (up to 18.3% of the OEL). The first inlet concentration measured for SCOTT 7422-SD1 was 18.3% of the OEL and the second, after 16 hours, was near the DL (0.02 ppb), which could either indicate a change in inlet concentration or an error in the latter measurement. Inlet concentrations for SCOTT 7422-SC1 were 8.74% and 6.25% of the OEL for the first and second inlet samples, respectively. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.



**Figure 13.** 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 DL or RL.



## 6.0 Factoring in Historical Concentration Data

To fully assess respirator cartridge performance for COPC removal, historical data were reviewed to determine if the recent inlet measurements were representative of typical values. Historical BY-108 data from the Tank Waste Information Network System 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 shown 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 BY-108 headspace at concentrations above 10% of their respective OELs and above analytical RLs. These COPCs include ammonia, nitrous oxide, mercury, 1,3-butadiene, 1-butanol, acetaldehyde, furan, 2-heptylfuran, NDMA, and 2-fluoropropene. Of these ten COPCs:

- Ammonia, mercury, and N-Nitrosodimethylamine (NDMA) average and maximum inlet concentrations measured in this cartridge study were generally consistent<sup>1</sup> with historic headspace measurements. 1,3-Butadiene average and maximum inlet concentrations were 30% and 59% lower than historic headspace concentrations, respectively.
- Furan maximum inlet concentrations from cartridge testing were measured at approximately 4.5% of OEL, which is significantly lower than historical headspace analysis where reported concentrations exceeded 1000% of OEL. Historic measurements of other furan-based compounds (i.e., substituted furans) have been consistently less than the RL, except for 2-heptylfuran where several pre-2006 measurements reported a maximum of more than 6000% of the OEL.
- 1-Butanol and acetaldehyde average and maximum inlet concentrations were a factor of 5 and 10 lower than historical concentrations, respectively. In more recent headspace sampling results, 1-butanol concentrations averaged approximately 19% of the OEL, compared to average cartridge inlet concentrations of 3.7% of the OEL. Recent acetaldehyde concentrations were measured at 11% of the OEL, compared to cartridge testing inlet concentrations of 1% of the OEL.
- 2-Fluoropropene is a TIC with a single, historic analysis result from pre-2006 BY-108 headspace sampling that measured 530% of OEL. No recent analysis results for this COPC are available, and it was not detected in the inlet during this cartridge study.

In addition to the 10 COPCs listed above with historic concentrations exceeding 10% of their OELs, four additional COPCs were detected in this study at concentrations near or exceeding 10% of OEL. NDEA, NMEA, N-Nitrosomorpholine, and formaldehyde average and maximum inlet concentrations in this study were higher than the single previous measurements of these COPCs in BY-108 headspace. The cartridge maximum inlet values were 35%, 132%, and 18% of OEL for NDEA, NMEA, and N-Nitrosomorpholine, respectively, compared to approximately 8% of the OEL from the prior measurement. Similarly, formaldehyde average and maximum inlet concentrations of 5.3% and 8.6% of OEL, respectively, were higher than the previous average and maximum of 1.3%.

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<sup>1</sup> Inlet concentrations were considered generally consistent if they were within a factor of 2 (–50% to +100%) of historic maximum and average headspace concentrations. Maximum inlet concentrations for these COPCs were 26% lower to 70% higher than historic maxima, and average inlet concentrations ranged from 33% lower to 1% higher than the historic average.

Historic concentrations of 3-Buten-2-one in BY-108 headspace were all less than the RL, whereas this study measured inlet concentrations as high as 23.5% of OEL. However, RLs for the prior analyses appear to have been substantially higher than the DLs used in the current cartridge study, making a direct comparison of results more difficult.

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 1000% of OEL. A single, more recent headspace analysis result reported a concentration of only 3.6% of OEL.

**Table 2.** Historical Tank BY-108 Headspace Data for COPCs with Boiling Points less than 70°C (158°F)

COPC Number and Name	CAS Number	Boiling Point (°F)	Occupational Exposure Limit (OEL)	Historical Measurements <sup>1</sup>					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 40	1.8 831	1.8 545	3.6% 1662%	3.6% 1090%	Not Measured	
1 Ammonia	7664-41-7	-28	25 ppm	1	644	644	2576%	2576%	1915%	1912%
50 2-Fluoropropene	1184-60-7	-11	0.1 ppm	0 1	n/a 0.53	n/a 0.53	n/a 530%	n/a 530%	Not Detected - TIC	
14 Formaldehyde	50-00-0	-6	0.3 ppm	1	0.00381	0.00381	1.3%	1.3%	8.6%	0.85%
53 Methyl nitrite	624-91-9	10	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC	
4 1,3-Butadiene	106-99-0	24	1 ppm	2 31	3.38 3.38	1.7 0.174*	338% 338%	170% 17%*	138%	268%
42 Ethylamine	75-04-7	62	5 ppm	1	<RL	<RL	<RL	<RL	3.6%	0.10% (RL) <sup>2</sup>
15 Acetaldehyde	75-07-0	69	25 ppm	1	2.82	2.82	11%	11%	1.1%	0.78%
19 Furan	110-00-9	88	1 ppb	5 6	<RL 547	23.1* 110*	<RL 54700%	2310%* 11000%*	4.9%	1.3%
59 Methyl Isocyanate	624-83-9	103	20 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC	
20 2,3-Dihydrofuran	1191-99-7	130	1 ppb	1	<RL	<RL	<RL	<RL	74.5%	1.8% (DL)
22 2-Methylfuran	534-22-5	147	1 ppb	5	<RL	<RL	<RL	<RL	12.3%	4.4%
8 Methanol	67-56-1	148	200 ppm	1	<RL	<RL	<RL	<RL	Not Measured	
21 2,5-Dihydrofuran	1708-29-8	152	1 ppb	5	<RL	<RL	<RL	<RL	20.7%	3.1%

<sup>1</sup> Historical data from TWINS industrial hygiene vapor database and SWIH database; see text for links 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 level

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

Italics mean that the pre-2006 TWINS headspace data were also included.

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

<sup>2</sup> "(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 tube.

## 7.0 Conclusions

Testing was conducted during the July 15–17, 2016, period using headspace vapors from Hanford tank BY-108 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 SCOTT 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 BY-108 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 66 to 91°F, and the average relative humidity ranged from 34 to 86%. 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 BY-108, four COPCs—ammonia, 1,3-Butadiene, NDMA, and NMEA—exceeded their OELs. Eight additional COPCs—mercury, 3-Buten-2-one, 2,3-dihydrofuran, 2,5-dihydrofuran, 2-methylfuran, 2-propylfuran, N-Nitrosodiethylamine (NDEA), and N-Nitrosomorpholine—had inlet concentrations greater than 10% of their corresponding OEL.
- Ammonia inlet concentrations during the testing reached 479 ppm, comparable to BY-108 headspace measurements previously obtained.<sup>1</sup> The apparent breakthrough for both respirator cartridges occurred quickly during the testing—less than 2 hours. Direct reading instrument measurements taken at intervals during the first 90 minutes of testing of SCOTT 7422-SC1 indicate that breakthrough for that cartridge occurred after 40 minutes. This breakthrough is consistent with expectations, considering the high inlet concentrations.
- 1,3-Butadiene measurements were almost 60% lower than previous maximum headspace measurements,<sup>1</sup> but did appear to exhibit breakthrough for both of the cartridges tested. The observed breakthrough time for the SCOTT 7422-SD1 cartridge was after 2 hours and the breakthrough time for the SCOTT 7422-SC1 cartridge was after 4 hours.
- Outlet concentrations for mercury, 3-Buten-2-one, 2,5-Dihydrofuran, and 2-Methylfuran were above DLs for one or more measurements. Mercury exceeded 10% of the OEL at the end of testing on one cartridge, but was less than the DL for all other outlet measurements. Outlet measurements for the other COPCs never exceeded 10% of OELs. These observations do not conclusively indicate breakthrough for any of these COPCs.
- All other COPCs had outlet concentrations less than detection levels, suggesting no breakthrough at the measured levels.

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<sup>1</sup> Comparison was made to the most recent BY-108 sampling and analysis (2008–2009) available from the SWIH database at the time of this report.

- Despite the breakthrough of both ammonia and 1,3-Butadiene, no breakthrough was observed through 14 hours of testing for any of the other COPCs with inlet concentrations that exceeded 10% of their OEL, including nitrosamines, furan and substituted furans, and mercury.



## 8.0 Recommendations

- Based on the measurements taken for this study, breakthrough occurred early in the test sequence for ammonia and 1,3-Butadiene. The ammonia breakthrough alone was less than 2 hours for both cartridges tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Because outlet measurements from laboratory analysis are unavailable between time zero and 2 hours, and inlet ammonia concentrations exceed NIOSH recommendations for APR use,[19] identification of an acceptable change-out frequency is not possible or recommended for the use of these cartridges in similar concentration environments..
- Additional recommendations related to NDMA and NDEA DLs, TICs, further data assessment, and future testing documented in PNNL-25860<sup>1</sup> for respirator cartridge testing on a slipstream from the Hanford AP tank exhaustor are also relevant to BY-108. BY-108 headspace provided higher concentrations of several COPCs than other tanks or exhaustors used in respirator cartridge testing to date<sup>2</sup> (e.g., ammonia, 1,3-Butadiene, 2,3-Dihydrofuran, and NMEA). Future testing and multi-tank analysis of cartridge performance with a wider range of COPC concentrations and test conditions should help improve understanding of overall cartridge performance.

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

<sup>2</sup> At the time of this report, analysis of results of cartridge testing on the AP exhaustor and headspace from tanks SY-102, A-101, and BY-108 have been performed.



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## 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 that 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. Sampling of the exhaust gas was performed every 2 hours, but this timing can be modified as necessary.

Figure A.1 provides 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 through each sorbent tube are set and controlled/maintained using manual flow control valves on the outlet of each rotameter, and rotameters were calibrated against DryCal 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 that 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-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 <sup>a</sup>	Instrument Used <sup>b</sup>	Analysis Location <sup>c</sup>
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, (Parts A and 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-226-01 offsite	1000	NIOSH-1613	GC-FID	ALS

Analyte	Media	Flow Rate (mL/min)	Analytical Method <sup>a</sup>	Instrument Used <sup>b</sup>	Analysis Location <sup>c</sup>
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

<sup>a</sup> Analytical Method

NIOSH: National Institute of Occupation Safety and Health

EPA: U.S. Environmental Protection Agency

OSHA: Occupational Safety and Health Administration

<sup>b</sup> 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

<sup>c</sup> 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

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## Description

This appendix includes raw data of flow rate, temperature, pressure, and humidity, and analytical data for the BY-108 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. Comments on that conversion are provided below:

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 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, Columbia Basin Analytical Laboratory, 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 RLs 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).

'5982' designations correspond to testing with the SCOTT 7422-SD1 respirator cartridge, whereas '5983' 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 16-05982-5-A1 corresponds to the first cartridge survey (16-05982), 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 'BY Farm 7-15 7-16.xlsx and BY Farm 7-16 7-17.xlsx.' The information is shown in the tables below.

WRPS provided the temperature and humidity information in files 'BY-108 DRI July 15-16.xls and BY-108 DRI July 16-17.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-Pentyfuran, Furan, Tetrafurane
- 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 (7/15-7/16) BY-108

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	3.9222	4.2076	3.7164	4.1801	4.068	3.828	3.6198	3.9078	3.96	3.948	4.056	3.876
VOC	B	4.1615	4.0114	4.2239	3.7704	3.888	3.894	3.804	3.8159	3.954	3.936	3.8271	1.308
Furans	C	3.9209	3.901	3.9978	3.7884	3.816	3.84	3.774	3.9326	3.978	3.894	3.8952	1.298
Ethylamine	D	12.404	12.876	12.543	12.814	11.778	11.928	11.418	12.004	12.186	12.234	24.21	11.946
Acetonitrile	E	11.744	12.172	12.313	12.061	12.54	12.468	12.108	11.712	11.91	12.294	12.066	12.048
Mercury	F	30.45	29.558	30.125	30.703	30.385	30.972	29.55	29.705	30.12	29.928	29.982	29.676
Ammonia	G	24.949	23.95	24.379	23.727	24.294	24.294	23.946	23.917	24.432	23.838	23.858	23.646
Aldehyde	H	24.336	24.194	23.921	23.735	24.576	24.918	24.426	23.828	23.898	24	23.562	23.886
1,3-Butadiene	I	24.188	24.663	24.013	24.526	24.042	24.012	23.172	23.391	23.55	23.796	23.736	23.586
Pyridine	J	125.28	126.54	123	124.2	124.8	125.4	123	124.2	123.6	119.94	120	118.8
Nitrosamines	K	238.98	250.74	238.8	247.2	240.6	242.4	240.6	243.6	246	241.2	238.8	241.2

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	32.685	35.064	30.97	34.835	33.9	31.9	30.165	32.565	33	32.9	33.8	32.3
VOC	B	34.68	33.428	35.199	31.42	32.4	32.45	31.7	31.8	32.95	32.8	31.893	10.9
Furans	C	32.674	32.509	33.315	31.57	31.8	32	31.45	32.772	33.15	32.45	32.46	10.817
Ethylamine	D	103.37	107.3	104.53	106.79	98.15	99.4	95.15	100.04	101.55	101.95	201.75	99.55
Acetonitrile	E	97.869	101.43	102.61	100.51	104.5	103.9	100.9	97.6	99.25	102.45	100.55	100.4
Mercury	F	253.75	246.32	251.05	255.86	253.21	258.1	246.25	247.55	251	249.4	249.85	247.3
Ammonia	G	207.91	199.58	203.16	197.73	202.45	202.45	199.55	199.31	203.6	198.65	198.82	197.05
Aldehyde	H	202.8	201.62	199.35	197.79	204.8	207.65	203.55	198.57	199.15	200	196.35	199.05
1,3-Butadiene	I	201.57	205.53	200.11	204.39	200.35	200.1	193.1	194.93	196.25	198.3	197.8	196.55
Pyridine	J	1044	1054.5	1025	1035	1040	1045	1025	1035	1030	999.5	1000	990
Nitrosamines	K	1991.5	2089.5	1990	2060	2005	2020	2005	2030	2050	2010	1990	2010

Second Cartridge, or Survey 2 (7/16-7/17) BY-108

Volumes Air Collected (L)

Sample Box Number		Mach.	Mach.										
Analyte	Line	Base 1	Base 2	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2
SVOC	A	4.026	4.0937	3.9761	4.2718	4.122	4.122	3.8454	3.8028	3.837	3.8033	3.8706	3.895
VOC	B	4.1732	4.026	4.2101	3.9197	3.816	3.9503	3.6845	3.8772	3.84	3.93	3.8628	3.2718
Furans	C	4.11	3.954	4.236	3.9804	3.996	3.918	4.0028	3.9156	3.876	3.906	3.8382	3.8226
Ethylamine	D	12.474	13.062	13.324	14.012	12.378	12.39	12.449	11.988	11.895	11.964	11.958	11.801
Acetonitrile	E	12.432	12.606	13.163	12.989	12.294	12.072	12.095	11.844	11.857	11.867	11.762	12.244
Mercury	F	30.162	30.408	31.234	31.583	30.588	30.468	30.619	30.08	30.004	30.09	29.91	29.992
Ammonia	G	24.294	24.984	24.312	26.077	24.612	24.186	24.152	23.874	23.808	24.012	23.748	24.15
Aldehyde	H	24.744	25.17	26.745	25.724	24.168	23.766	23.778	23.688	24.044	23.778	23.568	23.628
1,3-Butadiene	I	24.39	25.008	25.315	26.486	24.726	24.546	24.603	23.64	23.853	23.724	24.084	23.539
Pyridine	J	125.4	122.4	129.58	123.88	131.4	119.16	120.78	119.4	117.6	118.2	117	121.2
Nitrosamines	K	243.6	241.2	252.34	246.76	239.4	241.8	248.88	246	244.2	246	241.8	243

Flow Rates (ml/min)

Sample Box Number		Mach.	Mach.										
Analyte	Line	Base 1	Base 2	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2
SVOC	A	33.55	34.114	32.065	34.45	34.35	34.35	31.52	31.69	31.975	31.694	32.255	32.458
VOC	B	34.777	33.55	33.953	31.611	31.8	32.919	30.201	32.31	32	32.75	32.19	27.265
Furans	C	34.25	32.95	34.161	32.1	33.3	32.65	32.81	32.63	32.3	32.55	31.985	31.855
Ethylamine	D	103.95	108.85	107.46	113	103.15	103.25	102.04	99.9	99.125	99.7	99.65	98.34
Acetonitrile	E	103.6	105.05	106.16	104.75	102.45	100.6	99.14	98.7	98.81	98.89	98.02	102.04
Mercury	F	251.35	253.4	251.89	254.7	254.9	253.9	250.98	250.67	250.03	250.75	249.25	249.93
Ammonia	G	202.45	208.2	202.6	210.3	205.1	201.55	197.97	198.95	198.4	200.1	197.9	201.25
Aldehyde	H	206.2	209.75	215.69	207.45	201.4	198.05	194.91	197.4	200.36	198.15	196.4	196.9
1,3-Butadiene	I	203.25	208.4	204.15	213.6	206.05	204.55	201.66	197	198.78	197.7	200.7	196.16
Pyridine	J	1045	1020	1045	999	1095	993	990	995	980	985	975	1010
Nitrosamines	K	2030	2010	2035	1990	1995	2015	2040	2050	2035	2050	2015	2025

First Cartridge, or Survey 1 - BY-108 - 28 L/min through main respirator

Influent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	76.3	83.7	87	88.2	87.4	76.6	70.9	71	65.5
Pressure	Torr	738.5	719.7	720.6	721.8	722	720	734.1	723.6	721.2
Relative Humidity	%	38.4	86	49.8	47.5	48.4	63.6	75.2	73.5	81.2
NH3	ppm									
VOC	ppm									
Influent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	82.9	87.4	88.3	88.1	87.4	70.7	70.7	68	66
Pressure	Torr	736.6	719	719.7	721.3	722	721	734.3	723.5	721.4
Relative Humidity	%	34.4	48.9	48	48	48.4	74.8	76.3	78.6	76.9
NH3	ppm		99+	99+	99+	99+	99+	99+	99+	99+
VOC	ppm		24.3	27.7	28.1	24.9	26.1	9.8	22.6	9.6
Effluent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	75.6	81.9	87.2	91.2	89.3	78	71.8	69.6	66.4
Pressure	Torr	373.6	386.9	383.8	400.4	401.1	389.6	394.1	383.8	395
Relative Humidity	%	45.2	74	45.6	43	43.4	47.2	49.4	52.6	56.4
NH3	ppm									
VOC	ppm									
Effluent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	81.2	88.6	92.1	90.8	89.3	72.5	69.4	67.8	66
Pressure	Torr	401.7	406.4	404.9	406.6	401	400.6	401	398.6	400.2
Relative Humidity	%	40.4	44.8	42.9	43.3	43.4	52.2	52	56.3	56.9
NH3	ppm		99+	99+	99+	99+	99+	99+	99+	99
VOC	ppm		8.7	17.6	22.3	21.5	25.2	9.8	10.6	17.1

Second Cartridge, or Survey 2 - BY-108 - 28 L/min through main respirator

Influent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	76.1	83.1	87.8	89.2	90.7	83.9	80.3	74.6	72.9
Pressure	Torr	735.8	719.4	726.2	720	720.2	718.2	719.2	720	718
Relative Humidity	%	60.7	59.5	49.6	47.6	45.2	53.6	59.6	67.9	71.3
NH3	ppm									
VOC	ppm									
Influent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	82.9	89	91.3	91.1	84.1	79.6	74.8	72.7	71.2
Pressure	Torr	735.7	718.9	725.3	719	720	718	719.4	720.8	718.1
Relative Humidity	%	51.3	48.7	45.5	45.8	53	60.4	68.4	71.3	74.8
NH3	ppm									
VOC	ppm									
Effluent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	75.9	82.6	88.4	90.7	91.4	85.3	83.2	75.7	73.4
Pressure	Torr	399.5	393.2	397.7	395.4	395	395.2	395	398.6	399.2
Relative Humidity	%	47.3	43	43.4	41.1	40.8	41.9	43.1	47	48.6
NH3	ppm									
VOC	ppm									
Effluent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	82.2	90.3	94.9	94.6	87	83.4	76.4	73.5	71.8
Pressure	Torr	409.5	410.8	410.5	412	410.1	407	406.6	403.5	404.9
Relative Humidity	%	43.1	43.6	39.8	39.9	41.8	43.7	47.7	49.7	51.8
NH3	ppm		99+							
VOC	ppm		21.7							

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-A1  
 Customer Sample ID: 16-05982-1-A1

Sample	R	MI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rac %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021061			3891-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021061			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021061			105-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021061			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021061			78-46-6	Diethyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021061			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021061			112-40-3	Dodecane	NGS	90	<0.81	61	n/a	n/a	n/a	n/a	0.81	n/a	E
S16T021061			544-78-3	Hexadecane	NGS	88	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021061			629-59-4	Tetradecane	NGS	87	<1.2	6.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021061			125-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021061			629-50-5	Tridecane	NGS	95	<0.50	18	n/a	n/a	n/a	n/a	0.48	n/a	
S16T021061			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021061			629-02-9	Pentadecane	NGS	88	<2.8	7.6	n/a	n/a	n/a	n/a	2.8	n/a	J

*Handwritten signature and date 8/11/16*

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-A2  
 Customer Sample ID: 16-05982-1-A2

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Det Err %	Qual Flags
VAPOR-TDU SVOA #2															
S161021062			3081-98-3	2,5,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S161021062			85-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S161021062			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021062			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S161021062			78-46-6	Diethyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S161021062			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S161021062			112-40-3	Dodecane	NGS	90	<0.81	42	n/a	n/a	n/a	n/a	0.81	n/a	
S161021062			544-76-3	Hexadecano-	NGS	88	<1.9	2.6	n/a	n/a	n/a	n/a	1.9	n/a J	
S161021062			528-59-4	Tetradecano	NGS	87	<1.2	4.3	n/a	n/a	n/a	n/a	1.2	n/a J	
S161021062			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S161021062			528-50-5	Tridecane	NGS	95	<0.50	13	n/a	n/a	n/a	n/a	0.46	n/a	
S161021062			528-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S161021062			529-62-9	Pentadecane	NGS	88	<2.8	5.1	n/a	n/a	n/a	n/a	2.8	n/a J	

E - Outside Calibration Range  
 N - Narrowed TIC  
 B - Blank Contamination  
 T - Tentatively Identified Compound  
 J - Estimated  
 NA - Not Analyzed, ND = Not Detected

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-B1  
 Customer Sample ID: 16-05982-1-B1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021063			3691-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021063			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021063			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021063			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021063			78-46-6	Diethyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021063			84-86-2	Diethylthiobate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021063			112-40-3	Dodecane	NGS	90	<0.81	70	n/a	n/a	n/a	n/a	0.81	n/a	E
S16T021063			544-76-3	Hexadecane	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021063			529-59-4	Tetradecane	NGS	87	<1.2	5.1	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021063			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021063			529-50-5	Tridecane	NGS	95	<0.50	18	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021063			529-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021063			529-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-BLANK  
 Customer Sample ID: 16-05982-1-BLANK

Sample#	R	AP	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVQA #2															
S16T021064			3891-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021064			95-48-7	2-Methylphenol	NGS	88	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021064			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021064			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021064			78-46-6	Diethyl vinylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021064			94-86-2	Diethylthiophthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021064			112-40-3	Dodecane	NGS	90	<0.81	<0.81	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021064			544-76-3	Hexadecane	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021064			529-59-4	Tetradecane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021064			126-73-8	Tributyl phosphite	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021064			529-50-5	Tridecane	NGS	95	<0.50	<0.50	n/a	n/a	n/a	n/a	0.50	n/a	
S16T021064			529-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021064			529-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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



Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-C1  
 Customer Sample ID: 16-05982-1-C1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR:TDU SVOA #2															
S161021065			3891-93-3	2,5,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S161021065			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S161021065			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021065			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S161021065			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S161021065			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S161021065			112-40-3	Dodecane	NGS	90	<0.81	81	n/a	n/a	n/a	n/a	0.81	n/a	E
S161021065			544-76-3	Hexadecane	NGS	86	<1.9	6.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S161021065			829-59-4	Tetradecane	NGS	87	<1.2	8.5	n/a	n/a	n/a	n/a	1.2	n/a	J
S161021065			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S161021065			829-50-5	Tridecane	NGS	95	<0.59	36	n/a	n/a	n/a	n/a	0.46	n/a	
S161021065			829-78-7	Heptadecane	NGS	100	<5.2	6.2	n/a	n/a	n/a	n/a	5.2	n/a	J
S161021065			829-62-9	Pentadecane	NGS	88	<2.8	10	n/a	n/a	n/a	n/a	2.8	n/a	

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-D1  
 Customer Sample ID: 16-05982-1-D1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021066			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021066			55-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021066			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021066			32-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021066			78-46-5	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021066			34-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021066			112-40-3	Dodecane	NGS	90	<0.81	40	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021066			544-76-3	Hexadecane	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021066			528-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021066			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021066			529-50-5	Tridecane	NGS	95	<0.50	11	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021066			529-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021066			529-62-9	Pentadecane	NGS	88	<2.8	3.5	n/a	n/a	n/a	n/a	2.8	n/a	J

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

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-E1  
 Customer Sample ID: 16-05982-1-E1

Sample#	R	AF	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TOU SNOA #2															
S16T021067			3891-98-3	2,6,10-Trimethyldecane	NGS	83	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021067			55-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021067			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021067			52-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021067			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021067			54-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021067			112-40-3	Dodecane	NGS	90	<0.81	34	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021067			544-76-3	Hexadecane	NGS	88	<1.9	2.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021067			529-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021067			126-73-8	Triethyl phosphite	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021067			529-50-5	Tridecane	NGS	95	<0.50	8.3	n/a	n/a	n/a	n/a	0.46	n/a	J
S16T021067			529-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021067			529-62-8	Pentadecane	NGS	88	<2.8	4.5	n/a	n/a	n/a	n/a	2.8	n/a	J

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-EFF-BASE  
 Customer Sample ID: 16-05982-1-EFF-BASE

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TOU SVQA #2															
S16T021069			3891-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021069			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021069			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021069			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021069			78-45-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021069			94-66-2	Dichlorophthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021069			112-40-3	Dodecane	NGS	90	<0.81	31	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021069			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021069			529-59-4	Tetradecane	NGS	87	<1.2	3.2	n/a	n/a	n/a	n/a	1.2	n/a J	
S16T021069			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021069			529-50-5	Tridecane	NGS	96	<0.50	12	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021069			529-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021069			529-62-9	Pentadecane	NGS	88	<2.8	3.2	n/a	n/a	n/a	n/a	2.8	n/a J	

E - Outside Calibration Range  
 N - Named TIC  
 B - Blank Contamination  
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 J - Estimated  
 NA = Not Analyzed, ND = Not Detected

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-F1  
 Customer Sample ID: 16-05982-1-F1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVQA #2															
S16T021070			3691-98-3	2,5,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021070			95-48-7	2-Methylphenol	NGS	88	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021070			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021070			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021070			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021070			94-66-2	Dicetylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021070			112-40-3	Dodecane	NGS	90	<0.81	27	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021070			544-76-3	Hexadecane	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021070			529-59-4	Tetradecane	NGS	87	<1.2	1.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021070			126-73-8	Tributyl phosphite	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021070			529-50-5	Tridecane	NGS	95	<0.50	6.6	n/a	n/a	n/a	n/a	0.46	n/a	J
S16T021070			529-76-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021070			529-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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 J - Estimated

T - Tentatively Identified Compound

B - Blank Contamination

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 N - Named TIC

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-H1  
 Customer Sample ID: 16-05982-1-H1

Sample#	R	M	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cst Err %	Qual Flags
VAPOR-TDU SVQA #2															
S161021072			3691-99-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S161021072			95-48-7	2-Methylphenol	NGS	88	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S161021072			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021072			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S161021072			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S161021072			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S161021072			112-40-3	Dodecane	NGS	90	<0.81	37	n/a	n/a	n/a	n/a	0.81	n/a	
S161021072			544-76-3	Hexadecane	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S161021072			529-59-4	Tetradecane	NGS	87	<1.2	2.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S161021072			126-73-8	Triethyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S161021072			529-50-5	Tridecane	NGS	95	<0.90	14	n/a	n/a	n/a	n/a	0.46	n/a	
S161021072			529-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S161021072			529-52-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089  
SDG Number:  
Customer Sample ID: 16-05982-1-H2  
Customer Sample ID: 16-05982-1-H2

Sample#	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR:TDU SVOA #2															
S161021073			3891-99-3	2,6,10-Trimethyldecane	NGS	98	<1.1	<10	n/a	n/a	n/a	n/a	1.1	n/a	
S161021073			95-48-7	2-Methylphenol	NGS	90	<3.4	<10	n/a	n/a	n/a	n/a	3.4	n/a	
S161021073			108-39-4M	Cresol (m & p)	NGS	96	<2.4	<10	n/a	n/a	n/a	n/a	2.4	n/a	
S161021073			92-82-4	Biphenyl	NGS	93	<2.0	<10	n/a	n/a	n/a	n/a	2.0	n/a	
S161021073			78-48-6	Dibutyl butylphosphonate	NGS	100	<2.9	<10	n/a	n/a	n/a	n/a	2.9	n/a	
S161021073			84-66-2	Diethylphthalate	NGS	78	<2.8	<10	n/a	n/a	n/a	n/a	2.8	n/a	
S161021073			112-40-3	Dodecane	NGS	92	1.0	27	n/a	n/a	n/a	n/a	0.81	n/a B	
S161021073			544-76-3	Hexadecane	NGS	92	<1.9	<10	n/a	n/a	n/a	n/a	1.9	n/a	
S161021073			529-59-4	Tetradecane	NGS	97	<1.2	<10	n/a	n/a	n/a	n/a	1.2	n/a J	
S161021073			126-73-8	Tributyl phosphate	NGS	130	<6.0	<10	n/a	n/a	n/a	n/a	6.0	n/a	
S161021073			829-50-5	Tridecane	NGS	89	1.8	<10	n/a	n/a	n/a	n/a	0.46	n/a BJ	
S161021073			829-78-7	Heptadecane	NGS	120	<5.2	<10	n/a	n/a	n/a	n/a	5.2	n/a	
S161021073			829-82-9	Pentadecane	NGS	98	<2.8	<10	n/a	n/a	n/a	n/a	2.8	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-IN-BASE  
 Customer Sample ID: 16-05982-1-IN-BASE

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cent Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021203			3851-98-3	2,6,10-Trimethyldodecane	NGS	98	<1.1	<10	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021203			55-48-7	2-Methylphenol	NGS	90	<3.4	<10	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021203			108-39-4M	Cresol (m & p)	NGS	96	<2.4	<10	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021203			32-52-4	Biphenyl	NGS	93	<2.0	<10	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021203			78-46-5	Dibutyl butylphosphonate	NGS	100	<2.9	<10	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021203			94-66-2	Diethylphthalate	NGS	78	<2.8	<10	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021203			112-40-3	Dodecane	NGS	92	1.0	55	n/a	n/a	n/a	n/a	0.81	n/a	BE
S16T021203			544-76-3	Hexadecane	NGS	92	<1.9	<10	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021203			529-59-4	Tetradecane	NGS	97	<1.2	<10	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021203			126-73-8	Tributyl phosphate	NGS	100	<6.0	<10	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021203			529-50-5	Tridecane	NGS	89	1.8	13	n/a	n/a	n/a	n/a	0.46	n/a	B
S16T021203			529-78-7	Heptadecane	NGS	100	<5.2	<10	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021203			529-62-9	Pentadecane	NGS	96	<2.8	<10	n/a	n/a	n/a	n/a	2.8	n/a	J

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*James*  
 12/5/14

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-A1  
 Customer Sample ID: 16-05982-1-A1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RSD %	Spike Rec %	Det Limit	Crit Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021061			3891-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021061			83-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021061			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021061			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021061			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021061			84-86-2	Diethylphthalide	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021061			112-40-3	Dodecane	NGS	90	<0.81	61	n/a	n/a	n/a	n/a	0.81	n/a E	
S16T021061			544-76-3	Hexadecane	NGS	88	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a J	
S16T021061			629-59-4	Tetradecane	NGS	87	<1.2	6.3	n/a	n/a	n/a	n/a	1.2	n/a J	
S16T021061			126-73-8	Triethyl phosphite	NGS	110	<8.0	<8.0	n/a	n/a	n/a	n/a	8.0	n/a	
S16T021061			629-50-5	Tridecane	NGS	95	<0.50	18	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021061			629-76-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021061			629-62-9	Pentadecane	NGS	88	<2.8	7.6	n/a	n/a	n/a	n/a	2.8	n/a J	

AMENDED REPORT

Please see Comments  
 12/5/14

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-A2  
 Customer Sample ID: 16-05982-1-A2

Sample#	R	AS	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spl Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR:TCU SVOA #2															
S16T021062			8891-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021062			85-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021062			105-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021062			82-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021062			78-46-6	Diethyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021062			94-86-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021062			112-40-3	Dodecane	NGS	90	<0.81	42	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021062			544-76-3	Hexadecane	NGS	88	<1.9	2.6	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021062			629-59-4	Tetradecane	NGS	87	<1.2	4.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021062			126-73-8	Triethyl phosphite	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021062			629-50-5	Tridecane	NGS	96	<0.90	13	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021062			629-75-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021062			629-62-9	Pentadecane	NGS	88	<2.8	5.1	n/a	n/a	n/a	n/a	2.8	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-B1  
 Customer Sample ID: 16-05982-1-B1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVON #2															
S16T021063			3691-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021063			95-48-7	2-Methylphenol	NGS	88	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021063			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021063			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021063			78-46-6	Diethyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021063			94-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021063			112-40-3	Dodecane	NGS	90	<0.81	70	n/a	n/a	n/a	n/a	0.81	n/a	E
S16T021063			544-76-3	Heaodocane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021063			629-59-4	Tetradecane	NGS	87	<1.2	5.1	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021063			128-73-8	Tributyl phosphato	NGS	110	<8.0	<8.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021063			629-50-5	Tridecane	NGS	95	<0.50	18	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021063			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021063			629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-BLANK  
 Customer Sample ID: 16-05982-1-BLANK

Sample#	R	Alt	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOL #2															
S16T021064			3691-98-3	2,6,10-Trinitroethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021064			95-48-7	2-Methylphenol	NGS	85	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021064			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021064			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021064			78-46-6	Diethyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021064			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021064			112-40-3	Dodecane	NGS	90	<0.81	<0.81	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021064			544-76-3	Heaodocane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021064			829-59-4	Tetradecane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021064			126-73-8	Tributyl phosphite	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021064			829-59-5	Tridecane	NGS	96	<0.50	<0.50	n/a	n/a	n/a	n/a	0.50	n/a	
S16T021064			829-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021064			829-82-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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

T - Tentatively Identified Compound

N - Named TIC

E - Outside Calibration Range  
 B - Blank Contamination

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-C1  
 Customer Sample ID: 16-05982-1-C1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU SVDA #2															
S16T021065			3391-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021065			95-49-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021065			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021065			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021065			78-46-6	Diethyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021065			84-69-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021065			112-40-3	Dodecane	NGS	90	<0.81	81	n/a	n/a	n/a	n/a	0.81	n/a E	
S16T021065			544-76-3	Hexadecane-	NGS	88	<1.9	6.1	n/a	n/a	n/a	n/a	1.9	n/a J	
S16T021065			829-59-4	Tetradecane	NGS	87	<1.2	8.5	n/a	n/a	n/a	n/a	1.2	n/a J	
S16T021065			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021065			829-50-5	Tridecane	NGS	95	<0.50	36	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021065			829-78-7	Heptadecane	NGS	100	<5.2	6.2	n/a	n/a	n/a	n/a	5.2	n/a J	
S16T021065			829-62-9	Pentadecane	NGS	88	<2.8	10	n/a	n/a	n/a	n/a	2.8	n/a	

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 B - Blank Contamination  
 N - Named TIC  
 T - Tentatively Identified Compound  
 J - Estimated  
 NA = Not Analyzed, ND = Not Detected

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-D1  
 Customer Sample ID: 16-05982-1-D1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021066			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021066			95-43-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021066			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021066			32-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021066			78-46-6	Diethyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021066			94-86-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021066			112-40-3	Dodecane	NGS	90	<0.81	40	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021066			544-76-3	Hexadecane	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021066			529-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021066			126-73-8	Tributyl phosphite	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021066			529-50-5	Tridecane	NGS	85	<0.50	11	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021066			529-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021066			529-62-9	Peridodecane	NGS	88	<2.8	3.5	n/a	n/a	n/a	n/a	2.8	n/a	J

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089  
 SDG Number:  
 Customer Sample ID: 16-05982-1-E1  
 Customer Sample ID: 16-05982-1-E1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR:TDU SVOA #2															
S161021067			3891-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S161021067			95-48-7	2-Methylphenol	NGS	88	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S161021067			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S161021067			82-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S161021067			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S161021067			84-66-2	Diethyl phthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S161021067			112-40-3	Dodecane	NGS	90	<0.81	34	n/a	n/a	n/a	n/a	0.81	n/a	
S161021067			544-76-3	Hexadecane	NGS	88	<1.9	2.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S161021067			625-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S161021067			126-73-8	Tri-n-yl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S161021067			628-50-5	Tridecane	NGS	95	<0.50	9.3	n/a	n/a	n/a	n/a	0.46	n/a	J
S161021067			628-76-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S161021067			628-62-0	Pentadecane	NGS	88	<2.8	4.5	n/a	n/a	n/a	n/a	2.8	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-EFF-BASE

Customer Sample ID: 16-05982-1-EFF-BASE

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021069			3891-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021069			85-48-7	2-Methylphenol	NGS	85	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021069			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021069			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021069			78-46-6	Diethyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021069			84-68-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021069			112-40-3	Dodecane	NGS	90	<0.81	31	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021069			544-76-3	Heaodecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021069			629-59-4	Tetradecane	NGS	87	<1.2	3.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021069			128-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021069			629-50-5	Tridecane	NGS	95	<0.50	12	n/a	n/a	n/a	n/a	0.45	n/a	
S16T021069			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021069			629-62-9	Pentadecane	NGS	88	<2.8	3.2	n/a	n/a	n/a	n/a	2.8	n/a	

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

T - Tentatively Identified Compound

N - Named TIC

E - Outside Calibration Range  
 B - Blank Contamination



Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089  
SDG Number:  
Customer Sample ID: 16-05982-1-F1  
Customer Sample ID: 16-05982-1-F1

Sample#	IR	Alt	CAS#	Analysis	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021070			3891-98-3	2,6,10-Trinitroethyldodecane	NGS	89	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021070			95-48-7	2-Methylphenol	NGS	95	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021070			108-39-4M	Cresol (m & p)	NGS	90	<3.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021070			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021070			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021070			94-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021070			112-40-3	Octadecane	NGS	90	<0.81	27	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021070			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021070			529-59-4	Tetradecane	NGS	87	<1.2	1.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021070			126-73-8	Tributyl phosphite	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021070			529-50-5	Tridecane	NGS	95	<0.90	6.5	n/a	n/a	n/a	n/a	0.46	n/a	J
S16T021070			529-76-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021070			529-62-9	Pentadecane	NGS	85	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162069  
 SDG Number:  
 Customer Sample ID: 16-05982-1-H1  
 Customer Sample ID: 16-05982-1-H1

Sample#	R	AI#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVQA #2															
S16T021072			3891-98-3	2,6,10-Trimethyldecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021072			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021072			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021072			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021072			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021072			84-56-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021072			112-40-3	Dodecane	NGS	90	<0.81	37	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021072			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021072			529-59-4	Tetradecane	NGS	87	<1.2	2.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021072			126-73-8	Tributyl phosphite	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021072			529-50-5	Tridecane	NGS	95	<0.50	14	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021072			529-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021072			529-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-H2

Customer Sample ID: 16-05982-1-H2

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spt Rec %	Det Limit	Cel Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021073			3891-98-3	2,6,10-Trimethyldecane	NGS	98	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021073			95-48-7	2-Methylphenol	NGS	90	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021073			108-39-4M	Cresol (m & p)	NGS	96	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021073			92-52-4	Biphenyl	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021073			76-46-6	Dibutyl butylphosphonate	NGS	100	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021073			84-56-2	Diethylphthalate	NGS	78	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021073			112-40-3	Dodecane	NGS	92	1.0	2.7	n/a	n/a	n/a	n/a	0.81	n/a B	
S16T021073			544-76-3	Hexadecane-	NGS	92	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021073			829-59-4	Tetradecane	NGS	97	<1.2	2.3	n/a	n/a	n/a	n/a	1.2	n/a J	
S16T021073			128-73-8	Tributyl phosphite	NGS	130	<5.0	<5.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021073			828-50-5	Tridecane	NGS	89	1.8	8.0	n/a	n/a	n/a	n/a	0.48	n/a BJ	
S16T021073			829-78-7	Heptadecane	NGS	120	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021073			829-62-9	Pentadecane	NGS	95	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-IN-BASE

Customer Sample ID: 16-05982-1-IN-BASE

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Resist	Duplicate	Average	RPD %	Spk Rec %	Dat Limit	Cal Err %	Qual Flags
VAPOR-TDU SVDA #2															
S16T021203			3991-99-3	2,6,10-Trimethyldecane	NGS	98	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021203			95-48-7	2-Methylphenol	NGS	90	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021203			108-39-4M	Cresol (m & p)	NGS	96	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021203			92-52-4	Biphenyl	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021203			78-46-6	Obutyl butylphosphonate	NGS	100	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021203			94-65-2	Diethylphthalate	NGS	78	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021203			112-40-3	Dodecane	NGS	92	1.0	55	n/a	n/a	n/a	n/a	0.81	n/a	BE
S16T021203			544-76-3	Heaodecane-	NGS	92	<1.9	3.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021203			629-59-4	Tetradecane	NGS	97	<1.2	6.0	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021203			126-73-8	Tridecyl phosphate	NGS	130	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021203			629-50-5	Tridecane	NGS	89	1.8	13	n/a	n/a	n/a	n/a	0.46	n/a	B
S16T021203			629-78-7	Heptadecane	NGS	120	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021203			629-62-9	Pentadecane	NGS	96	<2.8	6.4	n/a	n/a	n/a	n/a	2.8	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-A1

Customer Sample ID: 16-05982-1-A1

Sample#	R	Ad	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021061				Ethylene Glycol	107-21-1	3.38	NGS	2.7E+03	JNT
S16T021061				Undecanal, 2-methyl-	110-41-8	4.18	NGS	53	JNT
S16T021061				Unknown-1	-	4.27	NGS	39	JT
S16T021061				Cyclotetrasiloxane, octamethyl	556-87-2	4.39	NGS	300	JNT
S16T021061				Phenol	108-95-2	4.46	NGS	37	JNT
S16T021061				1-Hexene, 3,5-dimethyl-	7423-69-0	4.85	NGS	63	JNT
S16T021061				Tetrasiloxane, decamethyl-	141-82-8	5.00	NGS	48	JNT
S16T021061				Undecane	1120-21-4	5.07	NGS	82	JNT
S16T021061				hydroxylamine, O-decyl-	20812-79-1	5.12	NGS	48	JNT
S16T021061				N-Benzoyloxy-2,2-bis(trifluoromethyl)-1-octanol	55734-40-2	5.21	NGS	49	JNT
S16T021061				2-Hexyl-1-octanol	19780-79-1	5.39	NGS	48	JNT
S16T021061				2,6-Dimethyldecane	13150-81-7	5.46	NGS	150	JNT
S16T021061				Decane, 2,4,6-trimethyl-	62105-27-4	5.51	NGS	16	JNT
S16T021061				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	56	JNT
S16T021061				Ethanol, 2-phenoxy-	122-99-6	6.57	NGS	72	JNT
S16T021061				Benzothiazole	95-16-9	6.63	NGS	62	JNT
S16T021061				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	48	JNT
S16T021061				Dodecamethylcyclotetrasiloxane	540-97-6	7.08	NGS	43	JNT
S16T021061				Dodecane, 2,6,11-trimethyl-	31295-56-4	7.27	NGS	32	JNT
S16T021061				Dodecane, 2,6,10-trimethyl-	3891-95-3	7.35	NGS	26	JNT
S16T021061				Propanoic acid, 2-methyl-, 1-(	74381-40-1	9.20	NGS	26	JNT

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J - Estimated  
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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-A2

Customer Sample ID: 16-05982-1-A2

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021062				Formamide	75-12-7	2.65	NGS	203 JNT	
S16T021062				Tetrachloroethene	127-18-4	2.83	NGS	110 JNT	
S16T021062				Propanoic acid, 2,2-dimethyl-	75-98-9	3.26	NGS	120 JNT	
S16T021062				2,5,6-Trimethyldecane	62105-23-0	3.66	NGS	28 JNT	
S16T021062				Decane, 2,6,8-trimethyl-	62105-28-3	3.72	NGS	72 JNT	
S16T021062				2,2,7,7-Tetramethyloctane	1071-31-4	4.22	NGS	26 JNT	
S16T021062				Cyclotetrasiloxane, octamethyl	558-67-2	4.39	NGS	520 JNT	
S16T021062				Phenol	108-95-2	4.43	NGS	100 JNT	
S16T021062				Hexane, 2,2-dimethyl-	500-73-8	4.51	NGS	500 JNT	
S16T021062				1-Octanol, 2-butyl-	3913-02-8	4.60	NGS	29 JNT	
S16T021062				Heptane, 4-ethyl-2,2,6,6-tetra	62105-31-0	4.78	NGS	72 JNT	
S16T021062				1-Pentanol, 2-ethyl-4-methyl-	106-67-2	4.85	NGS	130 JNT	
S16T021062				3,3-Dimethylhexane	563-18-6	4.89	NGS	300 JNT	
S16T021062				1,1,1,3,5,5,5-Heptamethyltrisil	1873-88-7	5.00	NGS	43 JNT	
S16T021062				Decane, 2,5,9-trimethyl-	62105-22-8	5.15	NGS	93 JNT	
S16T021062				Acetophenone	98-86-2	5.20	NGS	40 JNT	
S16T021062				2-Hexyl-1-octanol	19780-79-1	5.38	NGS	52 JNT	
S16T021062				2,6-Dimethyldecane	13150-81-7	5.45	NGS	200 JNT	
S16T021062				Undecane, 2,6-dimethyl-	17301-23-4	5.51	NGS	15 JNT	
S16T021062				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	65 JNT	
S16T021062				Heptanoic acid, 2-ethyl-	3274-29-1	5.82	NGS	27 JNT	
S16T021062				Benzoisazole	85-16-9	6.62	NGS	60 JNT	
S16T021062				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	55 JNT	
S16T021062				Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	43 JNT	
S16T021062				Dodecane, 2,6,11-trimethyl-	31295-56-4	7.27	NGS	34 JNT	
S16T021062				Propanoic acid, 2-methyl-, 1-1	74381-40-1	9.20	NGS	45 JNT	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-B1

Customer Sample ID: 16-05982-1-B1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SYDA #2									
S16T021063				Propenoic acid, 2,2-dimethyl-	75-98-9	3.30	NGS	31	JNT
S16T021063				Cyclooctasiloxane, octamethyl	558-67-2	4.39	NGS	210	JNT
S16T021063				Phenol	108-95-2	4.45	NGS	49	JNT
S16T021063				1-Perlanol, 2-ethyl-4-methyl-	106-67-2	4.51	NGS	80	JNT
S16T021063				Isocetanol	26952-21-8	4.86	NGS	71	JNT
S16T021063				1-Octene, 3,7-dimethyl-	4984-01-4	4.91	NGS	67	JNT
S16T021063				5-Methyl-1-heptanol	7212-53-5	4.98	NGS	25	JNT
S16T021063				Tetrasiloxane, decamethyl-	141-62-8	5.00	NGS	32	JNT
S16T021063				Acetophenone	96-86-2	5.20	NGS	27	JNT
S16T021063				2-Hexyl-1-octanol	19780-79-1	5.38	NGS	41	JNT
S16T021063				2,6-Dimethyldecane	13150-91-7	5.45	NGS	140	JNT
S16T021063				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	16	JNT
S16T021063				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	50	JNT
S16T021063				Benothiazole	95-16-9	6.63	NGS	71	JNT
S16T021063				Unknown-1	--	6.68	NGS	28	JT
S16T021063				Octane, 2,3,6,7-tetramethyl-	52570-34-5	6.91	NGS	47	JNT
S16T021063				Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	36	JNT
S16T021063				Decane, 2,4,6-trimethyl-	52105-27-4	7.23	NGS	6.1	JNT
S16T021063				Dodecane, 2,7,10-trimethyl-	74845-98-0	7.27	NGS	33	JNT

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-C1

Customer Sample ID: 16-05982-1-C1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021065				Propionic acid, 2,2-dimethyl-	75-98-9	3.23	NGS	30	NT
S16T021065				Cyclopentasiloxane, octamethyl	556-67-2	4.39	NGS	240	NT
S16T021065				Phenol	108-95-2	4.44	NGS	46	NT
S16T021065				Isododecane	26553-21-6	4.85	NGS	42	NT
S16T021065				Decane, 2,4,6-trimethyl-	82108-27-4	5.07	NGS	36	NT
S16T021065				Undecane	1120-21-4	5.45	NGS	110	NT
S16T021065				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	14	NT
S16T021065				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	58	NT
S16T021065				Benzoethiazole	95-16-9	6.63	NGS	94	NT
S16T021065				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	56	NT
S16T021065				Dodecamethylcyclotetrasiloxane	540-97-6	7.08	NGS	40	NT
S16T021065				Undecane, 3,7-dimethyl-	17301-29-0	7.27	NGS	39	NT
S16T021065				2,6-Dimethyldodecane	13150-81-7	7.35	NGS	26	NT

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-D1

Customer Sample ID: 16-05982-1-D1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021065				Propanoic acid, 2,2-dimethyl-	75-98-9	3.26	NGS	43	JNT
S16T021065				Cyclohexanone, octamethyl	555-87-2	4.35	NGS	180	JNT
S16T021065				Phenol	108-95-2	4.44	NGS	35	JNT
S16T021065				2,2-Dimethylpropionic acid, ds	215667-81-7	4.51	NGS	39	JNT
S16T021065				Isocitral	26852-21-6	4.86	NGS	58	JNT
S16T021065				2,6-Dimethyldecane	13150-81-7	5.07	NGS	32	JNT
S16T021065				Decane, 2,4,6-trimethyl-	82109-27-4	5.45	NGS	79	JNT
S16T021065				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	57	JNT
S16T021065				Decothiazole	95-16-9	6.62	NGS	71	JNT
S16T021065				Dodecane, 2,7,10-trimethyl-	74845-98-0	6.91	NGS	37	JNT
S16T021065				Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.08	NGS	31	JNT
S16T021065				2,2,4-Trimethyl-1,3-pentanedio	6848-50-0	9.20	NGS	43	JNT

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-E1

Customer Sample ID: 16-05982-1-E1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TOU SVDA #2									
S16T021067				Formamide	75-12-7	2.67	NGS	94	JNT
S16T021067				Propionic acid, 2,2-dimethyl-	75-98-9	3.23	NGS	34	JNT
S16T021067				Cyclotetrasiloxane, octamethyl	558-67-2	4.36	NGS	150	JNT
S16T021067				Phenol	108-95-2	4.43	NGS	28	JNT
S16T021067				2-Octyl-1-ol	20739-58-6	4.87	NGS	30	JNT
S16T021067				2,6-Dimethyldecane	13150-81-7	5.45	NGS	59	JNT
S16T021067				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	58	JNT
S16T021067				Benzo[1,2-b]thiazole	95-16-9	6.61	NGS	73	JNT
S16T021067				Dodecane, 2,7,10-trimethyl-	74645-58-0	6.90	NGS	35	JNT

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-EFF-BASE

Customer Sample ID: 16-05982-1-EFF-BASE

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Min/Sec)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021069				Cyclotetrasiloxane, octamethyl	558-67-2	4.39	NGS	140	JNT
S16T021069				Phenol	108-95-2	4.43	NGS	35	JNT
S16T021069				1-Hexane, 3,5-dimethyl-	7423-69-0	4.85	NGS	32	JNT
S16T021069				1-Octane, 3,7-dimethyl-	4984-01-4	4.91	NGS	29	JNT
S16T021069				Decane, 2,4,6-trimethyl-	62105-27-4	5.07	NGS	20	JNT
S16T021069				2,6-Dimethyldodecane	13150-81-7	5.45	NGS	50	JNT
S16T021069				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	37	JNT
S16T021069				Benzothiazole	95-16-9	6.62	NGS	43	JNT
S16T021069				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	32	JNT
S16T021069				Undecane, 2-methyl-	7045-71-8	7.27	NGS	21	JNT

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-F1

Customer Sample ID: 16-05982-1-F1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021070				Formamide	75-12-7	2.69	NGS	31	JNT
S16T021070				Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	120	JNT
S16T021070				Phenol	108-95-2	4.43	NGS	45	JNT
S16T021070				2,2,7,7-Tetramethylfocane	1071-31-4	4.50	NGS	100	JNT
S16T021070				1-Pentanol, 2-ethyl-4-methyl-	106-67-2	4.85	NGS	38	JNT
S16T021070				3,3-Dimethylfocane	563-16-6	4.89	NGS	82	JNT
S16T021070				Heptadecane, 2,6-dimethyl-	54105-67-8	5.06	NGS	46	JNT
S16T021070				Decane, 2,6,8-trimethyl-	62108-26-3	5.15	NGS	17	JNT
S16T021070				2,6-Dimethylfocane	13150-81-7	5.45	NGS	57	JNT
S16T021070				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	15	JNT
S16T021070				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	52	JNT
S16T021070				Benzothiazole	96-16-9	6.61	NGS	59	JNT
S16T021070				Dichloroacetic acid, 2-tetrahy	4697-00-1	9.19	NGS	28	JNT

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-H1

Customer Sample ID: 16-05982-1-H1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021072				Butane, 1-(ethoxyoxy)-3-methyl-	39762-36-2	2.65	NGS	32	NT
S16T021072				Undecanal, 2-methyl-	110-41-8	3.58	NGS	28	NT
S16T021072				2-Heptanone, 6-methyl-	928-68-7	4.16	NGS	27	NT
S16T021072				Cyclotetrasiloxane, octamethyl	555-87-2	4.36	NGS	180	NT
S16T021072				Phenol	105-95-2	4.43	NGS	49	NT
S16T021072				1-Hexene, 3,5-dimethyl-	7423-66-0	4.84	NGS	27	NT
S16T021072				1-Octene, 3,7-dimethyl-	4984-01-4	4.90	NGS	30	NT
S16T021072				2,6-Dimethyldecane	13150-51-7	5.06	NGS	26	NT
S16T021072				Decane, 2,4,6-trimethyl-	82108-27-4	5.45	NGS	68	NT
S16T021072				Decamethylcyclopentasiloxane	541-02-8	5.72	NGS	45	NT
S16T021072				Benzothiazole	96-16-9	6.61	NGS	51	NT

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-H2

Customer Sample ID: 16-05982-1-H2

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021073				Unknown-1		4.36	NGS	99 JT	
S16T021073				Acetophenone	98-85-2	5.19	NGS	11 JNT	
S16T021073				Undecane	1120-21-4	5.45	NGS	48 JNT	
S16T021073				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	56 JNT	
S16T021073				Benzothiazole	95-15-9	6.60	NGS	43 JNT	
S16T021073				Dodecane, 2,6,11-trimethyl-	31255-56-4	6.90	NGS	16 JNT	
S16T021073				Dodecane, 2,6,10-trimethyl-	3951-96-3	7.26	NGS	12 JNT	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162089

SDG Number:

Customer Sample ID: 16-05982-1-IN-BASE

Customer Sample ID: 16-05982-1-IN-BASE

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021203				Propanoic acid, 2,2-dimethyl-	75-85-9	3.22	NGS	38 JNT	
S16T021203				2-Butoxyethanol	111-76-2	3.72	NGS	23 JNT	
S16T021203				Unknown-1		4.39	NGS	230 JT	
S16T021203				Phenol	108-95-2	4.44	NGS	43 JNT	
S16T021203				Decane, 2,4,6-trimethyl-	82108-27-4	5.12	NGS	5.9 JNT	
S16T021203				Acetophenone	88-66-2	5.20	NGS	14 JNT	
S16T021203				Undecane, 3,7-dimethyl-	17301-23-0	5.45	NGS	85 JNT	
S16T021203				Undecane, 2,6-dimethyl-	17301-23-4	5.51	NGS	27 JNT	
S16T021203				Decane ethylcyclopentasiloxane	541-02-6	5.72	NGS	62 JNT	
S16T021203				Benzo[h]azole	85-16-9	6.63	NGS	86 JNT	
S16T021203				Unknown-2		6.68	NGS	20 JT	
S16T021203				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.91	NGS	48 JNT	
S16T021203				Dodecamethylcyclotrihexasiloxane	540-97-6	7.08	NGS	50 JNT	
S16T021203				Dodecane, 2,7,10-trimethyl-	74845-08-0	7.27	NGS	36 JNT	

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Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162090  
 SDG Number:  
 Customer Sample ID: 16-05983-1-A1  
 Customer Sample ID: 16-05983-1-A1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TOU SVQA #2															
S16T021076			3591-98-3	2,6,10-Triethyldecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021076			95-48-7	2-Methylphenol	NGS	76	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021076			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021076			92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021076			78-46-6	Diethyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021076			94-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021076			112-40-3	Dodecane	NGS	92	<0.55	96	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021076			544-76-3	Hexadecane-	NGS	110	<3.3	4.2	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021076			829-59-4	Tetradecane	NGS	110	<3.9	5.3	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021076			126-71-8	Triethyl phosphite	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021076			829-50-5	Tridecane	NGS	93	<1.6	3.2	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021076			829-76-7	Heptadecane	NGS	94	<2.4	3.3	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021076			829-63-9	Pentadecane	NGS	110	<3.0	7.1	n/a	n/a	n/a	n/a	3.0	n/a	J

*Open Drug*  
 8/18/16

J - Estimated  
 E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
 T - Tentatively Identified Compound



Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-A2

Customer Sample ID: 16-05983-1-A2

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021077			3691-98-3	2,6,10-Termyldecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021077			95-46-7	2-Methylphenol	NGS	78	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021077			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021077			82-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021077			78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021077			94-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021077			112-40-3	Dodecane	NGS	82	<0.55	54	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021077			944-76-3	Hexadecane	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021077			829-59-4	Tetradecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021077			126-73-6	Triaryl phosphate	NGS	88	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021077			829-50-5	Tridecane	NGS	93	<1.6	16	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021077			829-78-7	Heptadecane	NGS	84	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021077			829-82-9	Pentadecane	NGS	110	<3.0	4.4	n/a	n/a	n/a	n/a	3.0	n/a	J

J - Estimated  
E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
T - Tentatively Identified Compound

# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-B1

Customer Sample ID: 16-05983-1-B1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc %	Qual Flags
VAPOR-TOU SVDA #2															
S16T021078			0591-06-3	2,6,10-Triethyldecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021078			95-48-7	2-Methylphenol	NGS	76	<4.9	5.6	n/a	n/a	n/a	n/a	4.9	n/a	J
S16T021078			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021078			92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021078			78-46-6	Diethyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021078			94-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021078			112-40-3	Dodecane	NGS	92	<0.55	94	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021078			544-76-3	Hexadecane	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021078			629-59-4	Tetradecane	NGS	110	<3.9	5.2	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021078			126-72-8	Triethyl phosphite	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021078			629-50-5	Tricetane	NGS	93	<1.6	25	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021078			629-76-7	Heptadecane	NGS	94	<2.4	3.9	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021078			629-62-9	Pentadecane	NGS	110	<3.0	4.9	n/a	n/a	n/a	n/a	3.0	n/a	J

J - Estimated  
 E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
 T - Tentatively Identified Compound

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05993-1-BLANK

Customer Sample ID: 16-05993-1-BLANK

Cartridge Evaluation  
 Data Summary of All Results

Sample	R	As	CAS #	Analyte	Unit	\$T0 %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU SVDA #2															
S16T021079			8991-98-3	2,6,10-Trimethyldecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021079			85-46-7	2-Methylphenol	NGS	79	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021079			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021079			92-52-4	Biphenyl	NGS	109	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021079			78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021079			84-66-2	Diethyl phosphite	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021079			112-40-3	Dodecane	NGS	92	<0.55	0.50	n/a	n/a	n/a	n/a	0.55	n/a	J
S16T021079			544-76-3	Hexadecane	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021079			829-59-4	Tetradecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021079			126-73-8	Tributyl phosphite	NGS	98	<5.8	<5.8	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021079			828-50-5	Tridecane	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021079			829-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021079			829-82-8	Pentadecane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

J - Estimated  
 E - Outside Calibration Range

N - Named TIC

O - Qualitative

NA = Not Analyzed, ND = Not Detected  
 T - Tentatively Identified Compound

Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-C1

Customer Sample ID: 16-05983-1-C1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RSD %	Spot Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVDA #2															
S16T021090			3691-98-3	2,6,10-Termedecane	NGS	110	<3.9	<3.5	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021090			95-48-7	2-Methylphenol	NGS	75	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021090			109-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021090			82-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021090			78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021090			84-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021090			112-40-3	Dodecane	NGS	82	<0.55	91	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021090			944-76-3	Hexadecane-	NGS	110	<3.3	5.6	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021090			829-59-4	Tetradecane	NGS	110	<3.9	7.3	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021090			126-73-6	Tributyl phosphate	NGS	88	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021090			829-50-5	Tridecane	NGS	93	<1.6	41	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			829-76-7	Heptadecane	NGS	94	<2.4	5.6	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021090			829-82-9	Pentadecane	NGS	110	<3.0	9.1	n/a	n/a	n/a	n/a	3.0	n/a	J

J - Estimated  
E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
T - Tentatively Identified Compound

# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-D1

Customer Sample ID: 16-05983-1-D1

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021081			3691-98-3	2,6,10-Tertridecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021081			96-46-7	2-Methylphenol	NGS	76	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021081			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021081			82-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021081			78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021081			84-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021081			112-40-3	Dodecane	NGS	92	<0.55	7.8	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021081			844-76-3	Hexadecane-	NGS	110	<3.3	5.1	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021081			829-59-4	Tetradecane	NGS	110	<3.9	4.2	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021081			126-73-6	Triaryl phosphite	NGS	88	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021081			829-50-5	Tridecane	NGS	93	<1.6	6.7	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021081			829-78-7	Heptadecane	NGS	94	<2.4	4.6	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021081			829-62-6	Pentadecane	NGS	110	<3.0	7.0	n/a	n/a	n/a	n/a	3.0	n/a	

J - Estimated  
 E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
 T - Tentatively Identified Compound

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-E1

Customer Sample ID: 16-05983-1-E1

Cartridge Evaluation  
 Data Summary of All Results

Sample	R	At	IAS #	Analyte	Unit	\$TD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR TDU SVDA #2															
S16T021082			9891-98-3	2,6,10-Trimethyldecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021082			95-48-7	2-Methylphenol	NGS	76	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021082			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021082			92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021082			76-45-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021082			94-68-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021082			112-40-3	Dodecane	NGS	92	<0.55	51	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021082			944-76-3	Hexadecane	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021082			629-59-4	Tetradecane	NGS	110	<3.9	4.6	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021082			126-73-8	Tributyl phosphite	NGS	98	<5.8	<5.8	n/a	n/a	n/a	n/a	5.8	n/a	
S16T021082			629-50-5	Tridecane	NGS	93	<1.6	14	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021082			629-78-7	Heptadecane	NGS	94	<2.4	2.8	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021082			629-62-9	Pentadecane	NGS	110	<3.0	5.6	n/a	n/a	n/a	n/a	3.0	n/a	J

J - Estimated  
 E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
 T - Tentatively Identified Compound

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-EFF-BASE

Customer Sample ID: 16-05983-1-EFF-BASE

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TOU SVDA #2															
S16T021083			3891-98-3	2,6,10-Trimethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021083			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021083			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021083			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021083			78-46-6	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021083			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021083			112-40-3	Dodecane	NGS	98	<0.55	78	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021083			544-76-3	Hexadecane	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021083			829-59-4	Tetradecane	NGS	95	<3.9	6.6	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021083			128-73-6	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021083			829-50-5	Tridecane	NGS	90	<1.6	15	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021083			829-76-7	Heptadecane	NGS	94	<2.4	2.8	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021083			929-82-9	Pentadecane	NGS	96	<3.0	6.0	n/a	n/a	n/a	n/a	3.0	n/a	J

J - Estimated  
 E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
 T = Tentatively Identified Compound

# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162050

SDG Number:

Customer Sample ID: 16-05983-1-F1

Customer Sample ID: 16-05983-1-F1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spot Rec %	Det Limit	Cnt Err %	Qual Flag
VAPOR-TDU SYDA #2															
S16T021094			3391-95-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021094			95-43-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021094			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021094			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021094			78-46-6	Di-n-yl butylphosphate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021094			94-56-2	Diethylstilbene	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021094			112-40-3	Dodecane	NGS	98	<0.55	48	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021094			944-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021094			629-59-4	Tetradecane	NGS	95	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021094			126-73-8	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021094			629-50-5	Tridecane	NGS	90	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021094			629-62-9	Pentadecane	NGS	96	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

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



# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-G1

Customer Sample ID: 16-05983-1-G1

Sample	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TOU SVDA #2															
S16T021085			8991-98-3	2,6,10-Trimethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021085			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021085			108-39-4M	Cresol (m & p)	NGS	96	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021085			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021085			78-46-6	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021085			94-69-2	Dibutyl phosphate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021085			112-40-3	Dodecane	NGS	98	<0.55	37	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021085			544-76-3	Tridecane	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021085			629-59-4	Tetradecane	NGS	95	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021085			126-73-8	Triethyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021085			629-50-5	Tridecane	NGS	90	<1.6	9.9	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021085			629-78-7	Tetradecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021085			629-62-9	Pentadecane	NGS	96	<3.0	3.7	n/a	n/a	n/a	n/a	3.0	n/a	

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Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-H1

Customer Sample ID: 16-05983-1-H1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	DW Limit	Conc Err %	Qual Flags
VAPOR-TOU SVDA #2															
S1610021086			891-98-3	2-E,10-Tetramethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S1610021086			5-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S1610021086			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S1610021086			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S1610021086			78-48-6	Diethyl butylphosphonate	NGS	95	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S1610021086			84-69-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S1610021086			112-40-3	Decane	NGS	98	<0.55	64	n/a	n/a	n/a	n/a	0.55	n/a	E
S1610021086			544-76-3	Hexadecane	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S1610021086			829-59-4	Tetradecane	NGS	95	<3.9	4.4	n/a	n/a	n/a	n/a	3.9	n/a	J
S1610021086			120-73-8	Triethyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S1610021086			829-50-5	Tridecane	NGS	90	<1.6	24	n/a	n/a	n/a	n/a	1.6	n/a	
S1610021086			829-79-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S1610021086			829-62-9	Pentadecane	NGS	96	<3.0	4.0	n/a	n/a	n/a	n/a	3.0	n/a	J

J - Estimated  
 E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
 T - Tentatively Identified Compound

# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-H2

Customer Sample ID: 16-05983-1-H2

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TDU SVQA #2															
S16T021087			3891-98-3	2,5,10-Trimethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021087			95-48-7	2-Methylheptal	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021087			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021087			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021087			78-46-6	Diethyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021087			94-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021087			112-40-3	Dodecane	NGS	98	<0.55	39	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021087			544-76-3	Hexadecane-	NGS	96	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021087			629-59-4	Tetradecane	NGS	95	<3.9	4.2	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021087			128-73-8	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021087			829-50-5	Tridecane	NGS	90	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021087			829-79-7	Heptadecane	NGS	94	<2.4	2.5	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021087			629-62-9	Pentadecane	NGS	95	<3.0	4.8	n/a	n/a	n/a	n/a	3.0	n/a	

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Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-IN-BASE

Customer Sample ID: 16-05983-1-IN-BASE

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Chk Err %	Qual Flags
VAPOR-TDU SVDA #2															
S16T021088			8901-88-3	2,5,10-Triethyldecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021088			95-48-7	2-Methylphenol	NGS	83	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021088			108-98-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021088			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021088			78-46-6	Diethyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021088			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021088			112-40-3	Decane	NGS	96	<0.55	72	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021088			944-76-3	Hexadecane	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021088			829-59-4	Tetradecane	NGS	95	<3.9	7.5	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021088			126-73-8	Tributyl phosphite	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021088			829-50-5	Tridecane	NGS	90	<1.8	30	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021088			829-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021088			829-62-9	Pentadecane	NGS	96	<3.0	7.2	n/a	n/a	n/a	n/a	3.0	n/a	

J - Estimated  
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# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-A1

Customer Sample ID: 16-05983-1-A1

Sample	R	AS	QC Type	Analyte	CAS No.	Reference Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVDA #2									
S16T021076				Ethylene Glycol	107-21-1	2.50	NGS	99 JNT	
S16T021076				3,5-Dimethyl-2-octanol	19781-09-0	2.63	NGS	54 JNT	
S16T021076				2,4,6-Tetramethyl-1-octadecane	59920-28-2	2.75	NGS	53 JNT	
S16T021076				Octane	111-65-9	2.79	NGS	110 JNT	
S16T021076				1-Butanol, 3,3-dimethyl-	824-95-3	3.22	NGS	200 JNT	
S16T021076				Hydroperoxide, hexyl	4312-76-9	3.41	NGS	160 JNT	
S16T021076				Hydroxylamine, O-decyl-	29812-79-1	3.55	NGS	51 JNT	
S16T021076				Pentanol, 2,4-dimethyl-	27944-78-2	3.58	NGS	61 JNT	
S16T021076				2-Ethyl-1-dodecanol	19780-33-7	3.67	NGS	230 JNT	
S16T021076				1-Octanol, 2-butyl-	3913-02-8	3.89	NGS	130 JNT	
S16T021076				2-Heptanone, 6-methyl-	928-69-7	4.16	NGS	140 JNT	
S16T021076				2-Dodecanol	10003-28-8	4.25	NGS	110 JNT	
S16T021076				1-Octene, 3,7-dimethyl-	4984-01-4	4.31	NGS	190 JNT	
S16T021076				Cyclohexylsiloxane, octamethyl	556-67-2	4.38	NGS	1000 JNT	
S16T021076				Pinene	108-95-2	4.44	NGS	83 JNT	
S16T021076				Unknown-1	-	4.49	NGS	110 JT	
S16T021076				Unknown-2	-	4.57	NGS	190 JT	
S16T021076				Decane, 2,6,7-trimethyl-	82108-26-2	4.77	NGS	100 JNT	
S16T021076				Acetic acid, trifluoro-, 3,7-d	28745-07-5	4.84	NGS	130 JNT	
S16T021076				Cyclopentane, 1-methyl-2,4-me	89553-50-2	4.91	NGS	97 JNT	
S16T021076				10-Heneicosane (C11)	85008-11-0	4.93	NGS	57 JNT	
S16T021076				Trimethyl(4-(1,1,3,3-tetramet	78721-87-6	5.01	NGS	79 JNT	
S16T021076				Decane, 2,4,6-trimethyl-	82108-27-4	5.07	NGS	220 JNT	
S16T021076				2,6-Dimethyldecane	13150-81-7	5.12	NGS	180 JNT	
S16T021076				2-Hexyl-1-octanol	19780-79-1	5.15	NGS	54 JNT	
S16T021076				2-Methyl-1-undecanol	10522-26-6	5.22	NGS	240 JNT	
S16T021076				1,15-Pentadecanediol	14722-60-8	5.29	NGS	44 JNT	

NA = Not Analyzed, ND = Not Detected

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Q - Qualitative

J - Estimated  
E - Outside Calibration Range

*Open for*  
8/18/14  
N - Named TIC

Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-A1

Customer Sample ID: 16-05983-1-A1

Sample	R	AE	QC Type	Analysis	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVDA #2									
S161021076				1-Pentadecane, 2-methyl-	29833-69-0	5.38	NGS	250	JNT
S161021076				Undecane	1120-21-4	5.46	NGS	850	JNT
S161021076				Dodecane, 2,8-dimethyl-	541-02-6	5.72	NGS	54	JNT
S161021076				Undecane, 2,8-dimethyl-	17301-23-4	6.42	NGS	18	JNT
S161021076				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	21	JNT
S161021076				Dodecane, 2,7,10-trimethyl-	540-97-6	7.08	NGS	38	JNT
S161021076				Propanoic acid, 2-methyl-, 1:1	74381-40-1	9.19	NGS	49	JNT

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T - Tentatively Identified Compound

# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-A2

Customer Sample ID: 16-05983-1-A2

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021077				Preparic acid, 2,2-dimethyl-	75-98-9	3.16	NGS	23	JNT
S16T021077				Cyclohexanone, octamethyl-	556-67-2	4.36	NGS	340	JNT
S16T021077				7-Ethyl-7-methylcyclohexanol	1565-75-9	5.37	NGS	43	JNT
S16T021077				Undecane	1120-21-4	5.45	NGS	100	JNT
S16T021077				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	160	JNT
S16T021077				Benzothiazole	95-18-9	6.61	NGS	75	JNT
S16T021077				Dodecane, 2,7,10-trimethyl-	7464-5-08-0	6.90	NGS	51	JNT
S16T021077				Dodecamethylcyclotetrasiloxane	540-97-6	7.06	NGS	81	JNT
S16T021077				Undecane, 3,7-dimethyl-	17301-29-0	7.27	NGS	38	JNT

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# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-B1

Customer Sample ID: 16-05983-1-B1

Sample	R	AM	QC Type	Analysis	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TOU SVOA #2									
S16T021078				Preanoic acid, 2,2-dimethyl-	75-98-9	3.21	NGS	68 JNT	
S16T021078				Cyclohexanone, octamethyl	556-67-2	4.38	NGS	280 JNT	
S16T021078				3-Ethylheptanoic acid	14272-47-0	4.55	NGS	31 JNT	
S16T021078				Isocetanol	26583-21-6	4.85	NGS	36 JNT	
S16T021078				1-Octene, 3,7-dimethyl-	4984-01-4	4.90	NGS	46 JNT	
S16T021078				Decane, 2,4,6-trimethyl-	82108-27-4	5.06	NGS	43 JNT	
S16T021078				Undecane	1120-21-4	5.11	NGS	19 JNT	
S16T021078				Acetophenone	98-86-2	5.19	NGS	26 JNT	
S16T021078				Benzonemethanol, 7,7-dimethyl-	817-94-7	5.37	NGS	55 JNT	
S16T021078				Undecane, 4-methyl-	2980-69-0	5.45	NGS	130 JNT	
S16T021078				Decamethylcyclopentasiloxane	341-02-6	5.72	NGS	150 JNT	
S16T021078				Undecane, 2,6-dimethyl-	17301-23-4	6.41	NGS	62 JNT	
S16T021078				Benzothiazole	95-16-9	6.62	NGS	82 JNT	
S16T021078				Ethylene diacrylate	2274-11-5	6.88	NGS	33 JNT	
S16T021078				Decane, 2,7,10-trimethyl-	74645-68-0	6.91	NGS	56 JNT	
S16T021078				Dodecamethylcyclotetrasiloxane	340-67-6	7.08	NGS	77 JNT	
S16T021078				Dodecane,4,6-dimethyl	81141-72-8	7.27	NGS	44 JNT	
S16T021078				Undecane, 3,7-dimethyl-	17301-29-0	7.34	NGS	28 JNT	

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T - Tentatively Identified Compound



**Cartridge Evaluation  
 Data Summary of All Results**

**Sample Group: 20162090**

**SDG Number:**

**Customer Sample ID: 16-05983-1-BLANK**

**Customer Sample ID: 16-05983-1-BLANK**

Sample	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TOU SVDA #2									
S16T021079				Cyclofridolone, hexamethyl-	541-05-9	2.85	NGS		25 JNT
S16T021079				Cyclofridolone, octamethyl-	556-07-2	4.35	NGS		30 JNT

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# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-C1

Customer Sample ID: 16-05983-1-C1

Sample	R	AP	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021060				Propenoic acid, 2,3-dimethyl-	75-85-9	3.23	NGS	77 JNT	
S16T021060				Propenoic acid, propyl-	816-62-6	3.67	NGS	26 JNT	
S16T021060				Cyclohexanone, octamethyl	356-67-2	4.36	NGS	280 JNT	
S16T021060				Phenol	108-95-2	4.43	NGS	30 JNT	
S16T021060				Decalin, 2,4,8-trimethyl-	82108-27-4	5.11	NGS	6.1 JNT	
S16T021060				3-Methyl-2-phenyl-pent-4-en	34432-17-8	5.37	NGS	41 JNT	
S16T021060				Undecane	1120-21-4	5.45	NGS	83 JNT	
S16T021060				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	17 JNT	
S16T021060				Decamethylcyclotetrasiloxane	541-02-6	5.72	NGS	170 JNT	
S16T021060				Benzothiazole	95-16-9	6.62	NGS	87 JNT	
S16T021060				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	59 JNT	
S16T021060				Undecane, 3,7-dimethyl-	17301-29-0	7.02	NGS	14 JNT	
S16T021060				Dodecamethylcyclotetrasiloxane	540-97-6	7.08	NGS	100 JNT	
S16T021060				Tetradecane, 1-octadecyl-	19216-94-1	7.27	NGS	46 JNT	
S16T021060				2,6-Dimethyldecane	13150-81-7	7.34	NGS	29 JNT	

J - Estimated  
E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
T - Tentatively Identified Compound

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-D1

Customer Sample ID: 16-05983-1-D1

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021081				Cycloetastoxane, octamethyl	555-87-2	4.36	NGS	360 JNT	
S16T021081				Undecane	1120-21-4	5.45	NGS	40 JNT	
S16T021081				Dodecathycyclopentastoxane	541-02-6	5.72	NGS	190 JNT	
S16T021081				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	23 JNT	
S16T021081				Dodecane, 4,8-dimethyl	81141-72-8	7.26	NGS	17 JNT	

J - Estimated  
 E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected

T - Tentatively Identified Compound

Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-E1

Customer Sample ID: 16-05983-1-E1

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021082				Cyclohexanone, octamethyl	556-67-2	4.35	NGS	250 JNT	
S16T021082				Undecane	1120-21-4	5.45	NGS	89 JNT	
S16T021082				Dodecamethylcyclotetrasiloxane	541-02-6	5.72	NGS	159 JNT	
S16T021082				Decane, 2,4,6-trimethyl	82108-27-4	6.00	NGS	5.8 JNT	
S16T021082				Benzothiazole	95-18-9	6.61	NGS	80 JNT	
S16T021082				Tetradecane, 1-iodo-	19219-04-1	6.90	NGS	44 JNT	
S16T021082				Dodecamethylcyclotetrasiloxane	540-97-6	7.07	NGS	59 JNT	
S16T021082				Undecane, 3,7-dimethyl-	17301-29-0	7.26	NGS	31 JNT	

J - Estimated  
E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected

T - Tentatively Identified Compound

Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162090  
SDG Number:

Customer Sample ID: 16-05983-1-EFF-BASE  
Customer Sample ID: 16-05983-1-EFF-BASE

Sample	R	AI	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021083				Ethylene Glycol	107-21-1	2.85	NGS	1.3E+03 JNT	
S16T021083				Hepta no. 2-bromo-	1974-04-5	3.27	NGS	180 JNT	
S16T021083				2-Heptanone, 5-methyl-	928-08-7	4.16	NGS	150 JNT	
S16T021083				2-Nonadecanol	26533-96-8	4.25	NGS	82 JNT	
S16T021083				1-Hexanol, 5-methyl-	827-88-5	4.31	NGS	91 JNT	
S16T021083				Cyclohexanone, octamethyl	556-67-2	4.39	NGS	830 JNT	
S16T021083				Pinenol	108-95-2	4.44	NGS	79 JNT	
S16T021083				Oxirane, [tetrahydro]methyl	38504-75-5	4.49	NGS	50 JNT	
S16T021083				2-Hexyl-1-octanol	19786-79-1	4.56	NGS	30 JNT	
S16T021083				1-Octanol, 2-butyl-	3913-02-8	4.60	NGS	50 JNT	
S16T021083				Hydroxanthine, O-decyl-	29812-79-1	4.77	NGS	50 JNT	
S16T021083				1-Hexanol, 2-ethyl-	104-76-7	4.84	NGS	130 JNT	
S16T021083				1-Heptanol, 6-methyl-	1663-40-3	4.90	NGS	49 JNT	
S16T021083				Methyl 4-(4-methylphenyl)acrylate	17928-28-8	5.00	NGS	31 JNT	
S16T021083				2,6-Dimethyldecane	13150-81-7	5.06	NGS	100 JNT	
S16T021083				2,3-Dimethyldecane	17312-44-6	5.11	NGS	60 JNT	
S16T021083				Acetophenone	98-06-2	5.20	NGS	44 JNT	
S16T021083				2-Methyl-1-undecanol	16522-26-6	5.21	NGS	49 JNT	
S16T021083				Cyclopentadecanone, 4-methyl-	34394-50-5	5.38	NGS	78 JNT	
S16T021083				Undecane	1120-21-4	5.45	NGS	370 JNT	
S16T021083				Dodecylcyclopentasiloxane	541-02-6	5.72	NGS	100 JNT	
S16T021083				Undecane, 2,6-dimethyl-	17301-23-4	6.41	NGS	7.9 JNT	
S16T021083				Permethrin	85-16-9	6.62	NGS	62 JNT	
S16T021083				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	41 JNT	
S16T021083				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.97	NGS	9.6 JNT	
S16T021083				Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	9.5 JNT	
S16T021083				Dodecamethylcyclotetrasiloxane	940-97-6	7.06	NGS	5.7 JNT	

NA = Not Analyzed, ND = Not Detected

J - Estimated  
E - Outside Calibration Range

N - Named TIC

Q - Qualitative

T - Tentatively Identified Compound

### Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-EFF-BASE

Customer Sample ID: 16-05983-1-EFF-BASE

Sample#	R	Ad	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
SI6T021083				Dodecane, 4,6-dimethyl	81145-72-8	7.27	NGS	30	JNT

J - Estimated  
 E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
 T - Tentatively Identified Compound

# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-F1

Customer Sample ID: 16-05983-1-F1

Sample	R	As	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021084				Cyclohexanone, octamethyl	856-67-2	4.35	NGS	100	JNT
S16T021084				Decane, 2,4,6-trimethyl-	62109-27-4	5.06	NGS	23	JNT
S16T021084				Acetophenone	98-86-2	5.18	NGS	14	JNT
S16T021084				Undecane	1120-21-4	5.45	NGS	69	JNT
S16T021084				Decamethylcyclopentadecane	541-02-6	5.72	NGS	140	JNT
S16T021084				Benzophenone	95-16-9	6.61	NGS	76	JNT
S16T021084				Dodecane, 4,6-dimethyl	61141-72-8	6.90	NGS	34	JNT
S16T021084				Dodecamethylcyclohexadecane	540-67-6	7.07	NGS	39	JNT
S16T021084				Dodecane, 2,6,11-trimethyl-	31295-66-4	7.25	NGS	28	JNT

J - Estimated  
E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
T - Tentatively Identified Compound

# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162030

SDG Number:

Customer Sample ID: 16-05983-1-G1

Customer Sample ID: 16-05983-1-G1

Sample	R	AE	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021085				Propane, 2-methyl-1-nitro-	825-74-1	3.12	NGS	65 JNT	
S16T021085				Cyclohexanone, octamethyl	556-67-2	4.35	NGS	310 JNT	
S16T021085				2,6-Dimethylcane	13150-81-7	5.06	NGS	34 JNT	
S16T021085				Acetophenone	98-06-2	5.18	NGS	15 JNT	
S16T021085				Undecane	1120-21-4	5.45	NGS	100 JNT	
S16T021085				Decane, 2,4,6-trimethyl-	82108-27-4	5.50	NGS	15 JNT	
S16T021085				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	140 JNT	
S16T021085				Benzotriazole	95-16-9	6.60	NGS	40 JNT	
S16T021085				Decane, 3,7-dimethyl-	17312-54-8	6.90	NGS	33 JNT	
S16T021085				Dodecane, 2,6,11-trimethyl-	31255-56-4	6.97	NGS	7.6 JNT	
S16T021085				Dodecamethylcyclotetrasiloxane	540-97-5	7.07	NGS	49 JNT	
S16T021085				Dodecane, 4,8-dimethyl-	51141728	7.26	NGS	24 JNT	
S16T021085				Undecane, 3,7-dimethyl-	17301-29-0	7.34	NGS	8.6 JNT	

J - Estimated  
E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected

T - Tentatively Identified Compound



Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-H1

Customer Sample ID: 16-05983-1-H1

Sample	R	Alt	GC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021086				Heptane, 2-bromo-	1574-04-5	3.24	NGS	110 JNT	
S16T021086				Hydroperoxide, heptyl	4312-76-9	3.37	NGS	50 JNT	
S16T021086				2-Methyl-1-undecanol	10522-26-6	3.98	NGS	48 JNT	
S16T021086				2-Heptanone, 6-methyl-	828-68-7	4.16	NGS	64 JNT	
S16T021086				1-Octanol, 2-butyl-	3913-02-8	4.25	NGS	36 JNT	
S16T021086				Cyclohexanone, octamethyl	555-67-2	4.35	NGS	560 JNT	
S16T021086				1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	64 JNT	
S16T021086				1-Hexanol, 2,4-dimethyl-, (2S)	18450-74-3	4.90	NGS	49 JNT	
S16T021086				2,6-Dimethyldecane	13150-81-7	5.06	NGS	57 JNT	
S16T021086				2,3-Dimethyldecane	17312-44-6	5.11	NGS	26 JNT	
S16T021086				Acetophenone	98-95-2	5.19	NGS	19 JNT	
S16T021086				Unknown-1	-	5.37	NGS	26 JNT	
S16T021086				Undecane	1120-21-4	5.45	NGS	180 JNT	
S16T021086				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	180 JNT	
S16T021086				Undecane, 2,6-dimethyl-	17301-23-4	6.40	NGS	67 JNT	
S16T021086				Benzenethiazole	95-16-9	6.61	NGS	76 JNT	
S16T021086				Decane, 3,7-dimethyl-	17312-54-8	6.90	NGS	43 JNT	
S16T021086				Dodecamethylcyclotetrasiloxane	540-67-6	7.07	NGS	72 JNT	
S16T021086				Dodecane, 4,6-dimethyl-	81141728	7.26	NGS	32 JNT	
S16T021086				Undecane, 3,7-dimethyl-	17301-29-0	7.33	NGS	93 JNT	

NA = Not Analyzed, ND = Not Detected

T = Tentatively Identified Compound

Q - Qualitative

N - Normal TIC

J - Estimated  
E - Outside Calibration Range

Sample Group: 20162090

SDG Number:

Customer Sample ID: 16-05983-1-H2

Customer Sample ID: 16-05983-1-H2

Cartridge Evaluation  
Data Summary of All Results

Sample	R	AP	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVQA #2									
S16T021087				Cyclohexasiloxane, octamethyl	556-67-2	4.35	NGS	160 JNT	
S16T021087				Acetophenone	98-96-2	5.19	NGS	11 JNT	
S16T021087				Undecane	1120-21-4	5.45	NGS	57 JNT	
S16T021087				Dodecamethylcyclotetrasiloxane	541-02-6	5.72	NGS	120 JNT	
S16T021087				Benzothiazole	95-15-9	6.60	NGS	42 JNT	
S16T021087				Undecane, 2-methyl-	7045-71-8	6.90	NGS	18 JNT	
S16T021087				Dodecamethylcyclotetrasiloxane	540-97-6	7.07	NGS	28 JNT	
S16T021087				Dodecane, 4,8-dimethyl-	51141720	7.26	NGS	14 JNT	

J - Estimated  
E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
T - Tentatively Identified Compound

**Cartridge Evaluation  
Data Summary of All Results**

**Sample Group: 20162090**

**SDG Number:**

**Customer Sample ID: 16-05983-1-IN-BASE**

**Customer Sample ID: 16-05983-1-IN-BASE**

Sample	R	AE	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TOU SVQA #2									
S16T021086				Propenoic acid, 2,3-dimethyl-	75-98-9	3.21	NGS	36 JNT	
S16T021086				Cyclohexanone, octamethyl	556-67-2	4.35	NGS	250 JNT	
S16T021086				Isocland	28852-1-6	4.84	NGS	30 JNT	
S16T021086				2,6-Dimethyldecane	13150-61-7	5.06	NGS	31 JNT	
S16T021086				Decane, 2,4,6-trimethyl-	82108-27-4	5.11	NGS	8.9 JNT	
S16T021086				Acetophenone	99-06-2	5.19	NGS	19 JNT	
S16T021086				Undecane	1120-21-4	5.45	NGS	79 JNT	
S16T021086				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	120 JNT	
S16T021086				Benzothiazole	95-16-9	6.01	NGS	52 JNT	
S16T021086				Decane, 3,7-dimethyl-	17312-54-8	6.90	NGS	43 JNT	
S16T021086				Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	9.7 JNT	
S16T021086				Dodecamethylcyclotrisiloxane	540-97-6	7.07	NGS	49 JNT	
S16T021086				Dodecane, 4,6-dimethyl-	81141-12-8	7.26	NGS	26 JNT	
S16T021086				Undecane, 2-methyl-	7045-71-8	7.34	NGS	19 JNT	

J - Estimated  
E - Outside Calibration Range

N - Named TIC

Q - Qualitative

NA = Not Analyzed, ND = Not Detected  
T - Tentatively Identified Compound

# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-A1  
 Customer Sample ID: 16-05982-2-A1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Ont Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021090			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021090			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021090			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021090			107-65-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			842-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021090			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021090			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021090			71-36-3	1-Butanol	NGS	93	<8.9	8.1E+03	n/a	n/a	n/a	n/a	8.9	n/a	ELY
S16T021090			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021090			71-23-8	1-Propanol	NGS	89	<3.0	2.0E+03	n/a	n/a	n/a	n/a	3.0	n/a	E
S16T021090			103-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021090			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021090			78-83-3	2-Butanone	NGS	83	<1.9	1.2E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021090			110-43-0	2-Heptanone	NGS	88	<1.6	160	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			591-78-6	2-Hexanone	NGS	86	<1.2	290	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021090			534-22-5	2-Methylfuran	NGS	89	<1.9	3.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021090			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021090			106-35-4	3-Heptanone	NGS	89	<1.5	120	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021090			105-42-0	4-Methyl-2-Hexanone	NGS	90	<1.3	24	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021090			103-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	130	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021090			87-64-1	Acetone	NGS	71	<4.3	4.4E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021090			75-65-8	Acetonitrile	NGS	88	<1.8	550	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021090			98-86-2	Acetophenone	NGS	93	<2.6	15	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021090			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021090			107-18-6	Allyl Alcohol	NGS	88	<3.9	7.0	n/a	n/a	n/a	n/a	3.9	n/a	J

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

J = Estimated  
 E = Outside Calibration Range

Y = Comment  
 T = Tentatively Identified Compound

L = LLS Outside Range  
 B = Blank Contamination

*Handwritten signature and date 8/14/2014*

# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-A1  
 Customer Sample ID: 16-05982-2-A1

Sample#	R	AP	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021090			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021090			71-43-2	Benzene	NGS	93	<1.2	34	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021090			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021090			123-72-8	Butadi	NGS	95	<2.1	230	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021090			109-74-0	Butanenitrile	NGS	90	<1.2	110	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021090			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			75-00-3	Chloroethane	NGS	87	<1.9	5.3	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021090			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			110-82-7	Cyclohexane	NGS	92	<1.8	53	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021090			124-18-5	Decane	NGS	92	<2.8	11	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021090			64-17-5	Ethanol	NGS	85	<7.4	2.6E+03	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021090			141-78-8	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			100-41-4	Ethylbenzene	NGS	93	<1.5	4.2	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			110-00-9	Furan	NGS	82	<1.6	51	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			110-54-3	Hexane	NGS	86	<1.7	1.5E+03	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021090			628-73-9	Hexanenitrile	NGS	92	<1.5	34	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			75-09-2	Methylens Chloride	NGS	85	3.4	6.2	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021090			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021090			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021090			110-59-8	Pentanenitrile	NGS	91	<1.6	44	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			107-12-0	Propanenitrile	NGS	90	<1.4	160	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021090			110-85-1	Pyridine	NGS	110	<3.8	34	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021090			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			127-18-4	Tetrahydroethene	NGS	93	<1.6	20	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			108-88-3	Toluene	NGS	92	<1.5	98	n/a	n/a	n/a	n/a	1.5	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-A1  
 Customer Sample ID: 16-05982-2-A1

Sample#	R	AS	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021090			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	560	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021090			10051-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021090			123-85-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021090			142-82-5	n-Heptane	NGS	90	<1.4	1.0E+03	n/a	n/a	n/a	n/a	1.4	n/a	E
S16T021090			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	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091  
SDG Number:  
Customer Sample ID: 16-05982-2-A2  
Customer Sample ID: 16-05982-2-A2

Sample#	R	AF	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Det Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021091			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021091			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021091			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021091			107-05-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			342-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021091			108-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021091			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021091			71-36-3	1-Butanol	NGS	93	<3.9	16	n/a	n/a	n/a	n/a	8.9	n/a	JLY
S16T021091			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021091			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021091			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021091			1708-28-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021091			76-93-3	2-Butanone	NGS	83	<1.9	3.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021091			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			591-75-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021091			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021091			76-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021091			106-35-4	3-Heptanone	NGS	89	<1.5	1.6	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021091			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021091			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021091			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	
S16T021091			67-64-1	Acetone	NGS	71	<4.3	27	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021091			75-05-8	Acetonitrile	NGS	88	<1.8	120	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021091			98-86-2	Acetophenone	NGS	93	<2.6	12	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021091			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021091			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-A2  
 Customer Sample ID: 16-05982-2-A2

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Residual	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021091			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021091			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021091			100-47-9	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021091			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021091			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021091			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021091			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021091			124-18-5	Decane	NGS	92	<2.8	3.2	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021091			84-17-5	Ethanol	NGS	85	<7.4	87	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021091			141-75-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			100-41-4	Ethylbenzene	NGS	93	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021091			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			110-54-3	Hexane	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021091			828-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			128-85-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			75-09-2	Methylene Chloride	NGS	85	3.4	8.0	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021091			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021091			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021091			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021091			110-85-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021091			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			127-18-4	Tetrachloroethene	NGS	93	<1.6	170	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			108-88-3	Toluene	NGS	92	<1.5	4.0	n/a	n/a	n/a	n/a	1.5	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-A2  
 Customer Sample ID: 16-05982-2-A2

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cent Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021091			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	2.0	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021091			10061-01-5	dis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021091			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021091			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021091			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	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-B1  
 Customer Sample ID: 16-05982-2-B1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU VOL #2															
S16T021092		79-34-5		1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021092		79-00-5		1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092		75-34-3		1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021092		75-35-4		1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021092		107-06-2		1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092		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	
S16T021092		108-46-7		1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021092		123-91-1		1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021092		71-36-3		1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021092		111-70-9		1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021092		71-23-8		1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021092		108-47-4		2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021092		1708-29-8		2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021092		76-93-3		2-Butanone	NGS	83	<1.9	3.2	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021092		110-43-0		2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092		591-78-8		2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021092		534-22-5		2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021092		76-94-4		3-Buten-2-one	NGS	87	<1.7	1.7	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021092		106-35-4		3-Heptanone	NGS	88	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092		108-68-3		3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021092		105-42-0		4-Methyl-2-Pentanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021092		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	
S16T021092		87-64-1		Acetone	NGS	71	<4.3	59	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021092		75-05-8		Acetonitrile	NGS	88	<1.8	2.7E+03	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021092		56-86-2		Acetophenone	NGS	93	<2.6	18	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021092		107-13-1		Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021092		107-18-6		Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
SDG Number:  
Customer Sample ID: 16-05982-2-B1  
Customer Sample ID: 16-05982-2-B1

Sample	R	AE	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Det Err %	Qual Flags
VAPOR-TDU VOA 12															
S16T021092			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021092			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021092			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021092			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021092			100-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021092			36-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			75-00-3	Chloroethane	NGS	87	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021092			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021092			124-18-5	Decane	NGS	92	<2.8	3.9	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021092			64-17-5	Ethanol	NGS	85	<7.4	620	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021092			141-76-8	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021092			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			128-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			75-09-2	Methylcyclohexane	NGS	85	3.4	4.2	n/a	n/a	n/a	n/a	2.7	n/a	B
S16T021092			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021092			38-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021092			110-59-8	Perfluorobenzene	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021092			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021092			100-42-5	Styrene	NGS	94	<1.6	1.9	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021092			127-18-4	Tetrachloroethene	NGS	93	<1.6	160	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			108-88-3	Toluene	NGS	92	<1.5	3.7	n/a	n/a	n/a	n/a	1.5	n/a	J

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-B1  
 Customer Sample ID: 16-05982-2-B1

Sample#	R	AF	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021092			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	1.4	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			10081-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021092			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021092			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021092			10081-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-BLANK  
 Customer Sample ID: 16-05982-2-BLANK

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021093			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021093			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			76-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021093			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021093			107-05-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			342-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021093			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021093			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021093			71-35-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021093			111-70-6	1-Hexanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021093			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021093			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021093			1706-29-8	2,5-Dihydrofuran	NGS	94	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021093			78-93-3	2-Butanone	NGS	83	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021093			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			591-75-6	2-Hexanone	NGS	85	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021093			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021093			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021093			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			106-85-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021093			105-42-0	4-Methyl-2-Pentanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021093			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	
S16T021093			87-64-1	Acetone	NGS	71	<4.3	5.2	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021093			75-05-8	Acetonitrile	NGS	88	<1.8	73	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021093			58-86-2	Acetophenone	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021093			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021093			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-BLANK

Customer Sample ID: 16-05982-2-BLANK

Sample#	R	M	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021093			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021093			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021093			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021093			123-72-8	Butanol	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021093			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021093			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			75-09-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021093			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021093			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021093			84-17-5	Ethanol	NGS	85	<7.4	17	n/a	n/a	n/a	n/a	7.4	n/a	J
S16T021093			141-79-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			110-54-3	Hexane	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021093			828-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			126-96-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			75-09-2	Methylcyclohexane	NGS	85	3.4	4.1	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021093			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021093			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021093			110-59-8	Nitrobenzotrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021093			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021093			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			127-18-4	Tetrachloroethene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			108-88-3	Toluene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

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N = Named TIC

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-BLANK

Customer Sample ID: 16-05982-2-BLANK

Sample#	R	AF	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021093			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			10081-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021093			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021093			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021093			10081-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-C1

Customer Sample ID: 16-05982-2-C1

Sample#	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021094			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021094			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021094			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021094			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			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	
S16T021094			108-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021094			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021094			71-36-3	1-Butanol	NGS	93	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021094			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021094			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021094			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021094			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021094			79-93-3	2-Butanone	NGS	83	<1.9	3.4	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021094			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021094			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021094			78-94-4	3-Buten-2-one	NGS	87	<1.7	1.9	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021094			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021094			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021094			109-10-1	4-Methyl-2-pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021094			57-84-1	Acetone	NGS	71	<4.3	37.0	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021094			75-05-8	Acetonitrile	NGS	88	<1.8	45.0	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021094			88-86-2	Acetophenone	NGS	93	<2.6	14	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021094			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021094			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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 E - Outside Calibration Range  
 NA = Not Analyzed, ND = Not Detected  
 N - Named THC



Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091  
SDG Number:  
Customer Sample ID: 16-05982-2-C1  
Customer Sample ID: 16-05982-2-C1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021094			107-05-1	Methyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021094			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021094			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021094			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021094			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021094			56-23-5	Carbon tetrachloride	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			75-00-3	Chloroethane	NGS	87	<1.9	4.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021094			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021094			124-18-5	Decane	NGS	92	<2.8	4.0	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021094			84-17-5	Ethanol	NGS	85	<7.4	1.8E+03	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021094			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021094			828-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			125-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			75-09-2	Methylene Chloride	NGS	85	3.4	3.8	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021094			81-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021094			88-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021094			110-59-6	Permethrin	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			107-12-0	Propanenitrile	NGS	90	<1.4	2.7	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021094			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021094			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			127-18-4	Tetrachloroethene	NGS	93	<1.6	130	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			108-88-3	Toluene	NGS	92	<1.5	3.6	n/a	n/a	n/a	n/a	1.5	n/a	

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J - Estimated  
E - Outside Calibration Range  
MA = Not Analyzed, NO = Not Detected  
N - Named TIC

# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-C1  
 Customer Sample ID: 16-05982-2-C1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021094			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	91	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021094			123-66-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021094			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021094			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	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-D1  
 Customer Sample ID: 16-05982-2-D1

Sample#	R	AS	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VOC #2															
S16T021095			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021095			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021095			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021095			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			54-2-75-9	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021095			108-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021095			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021095			71-36-3	1-Butanol	NGS	93	<3.9	16	n/a	n/a	n/a	n/a	8.9	n/a	JLY
S16T021095			111-70-6	1-Heptanol	NGS	85	<3.6	<3.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021095			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021095			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021095			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021095			78-93-3	2-Butanone	NGS	83	<1.9	3.0	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021095			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			591-78-6	2-Hexanone	NGS	85	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021095			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021095			78-94-4	3-Buten-2-one	NGS	87	<1.7	3.5	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021095			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021095			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021095			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	
S16T021095			87-84-1	Acetone	NGS	71	<4.3	1.3E+03	n/a	n/a	n/a	n/a	4.3	n/a	E
S16T021095			75-05-8	Acetonitrile	NGS	88	<1.8	680	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021095			88-86-2	Acetophenone	NGS	93	<2.6	10	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021095			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021095			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-D1  
 Customer Sample ID: 16-05982-2-D1

Sample#	R	AS	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021095			107-06-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021095			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021095			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021095			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021095			108-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021095			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			75-00-3	Chloroethane	NGS	87	<1.9	4.5	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021095			87-68-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021095			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021095			64-17-5	Ethanol	NGS	85	<7.4	2.4E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021095			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			110-00-9	Furan	NGS	82	<1.6	2.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021095			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021095			828-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			126-85-7	Methoxybenzotrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			75-09-2	Methylene Chloride	NGS	85	3.4	5.5	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021095			81-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021095			88-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021095			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			107-12-0	Propanenitrile	NGS	90	<1.4	1.3	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021095			110-85-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021095			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			127-18-4	Tetrachloroethene	NGS	93	<1.6	100	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			108-88-3	Toluene	NGS	92	<1.5	3.1	n/a	n/a	n/a	n/a	1.5	n/a	J

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 T - Tentatively Identified Compound  
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 NA = Not Analyzed, ND = Not Detected  
 N - Named TIC

# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-D1  
 Customer Sample ID: 16-05982-2-D1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TOU VOC R2															
S16T021095			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	250	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			10081-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021095			123-85-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021095			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021095			10081-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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

# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
SDG Number:  
Customer Sample ID: 16-05982-2-E1  
Customer Sample ID: 16-05982-2-E1

Sample#	R	Alt	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TOU VOX II2															
S16T021096			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021096			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			76-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021096			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021096			107-05-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021096			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	
S16T021096			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021096			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021096			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021096			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021096			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021096			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021096			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021096			78-83-3	2-Butanone	NGS	83	<1.9	2.2	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021096			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021096			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021096			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021096			78-94-4	3-Buten-2-one	NGS	87	<1.7	8.1	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021096			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			105-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021096			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021096			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	
S16T021096			87-64-1	Acetone	NGS	71	<4.3	2.1E+03	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021096			75-05-8	Acetonitrile	NGS	88	<1.8	540	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021096			98-86-2	Acetophenone	NGS	93	<2.6	5.2	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021096			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021096			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091  
SDG Number:  
Customer Sample ID: 16-05982-2-E1  
Customer Sample ID: 16-05982-2-E1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cent Err %	Qual Flags
VAPOR-TOU VOA #2															
S161021096			107-05-1	Allyl Chloride	NGS	86	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S161021096			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S161021096			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S161021096			123-72-8	Buralol	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S161021096			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S161021096			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021096			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021096			75-00-3	Chloroethane	NGS	87	<1.9	5.2	n/a	n/a	n/a	n/a	1.9	n/a J	
S161021096			87-68-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021096			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S161021096			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S161021096			84-17-5	Ethanol	NGS	85	<7.4	2.3E+03	n/a	n/a	n/a	n/a	7.4	n/a E	
S161021096			141-76-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021096			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021096			110-00-9	Furan	NGS	82	<1.6	5.4	n/a	n/a	n/a	n/a	1.6	n/a J	
S161021096			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S161021096			828-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S161021096			126-06-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021096			75-09-2	Methylene Chloride	NGS	85	3.4	89	n/a	n/a	n/a	n/a	2.7	n/a B	
S161021096			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S161021096			56-05-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S161021096			110-59-8	Permethrin	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021096			107-12-0	Propanenitrile	NGS	90	<1.4	40	n/a	n/a	n/a	n/a	1.4	n/a	
S161021096			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S161021096			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S161021096			127-18-4	Tetrachloroethene	NGS	93	<1.6	82	n/a	n/a	n/a	n/a	1.6	n/a	
S161021096			108-88-3	Toluene	NGS	92	<1.5	3.0	n/a	n/a	n/a	n/a	1.5	n/a J	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-E1  
 Customer Sample ID: 16-05982-2-E1

Sample#	R	AF	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TDU VOX #2															
S16T021096			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	590	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021096			10081-61-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021096			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021096			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021096			10081-62-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-EFF-BASE  
 Customer Sample ID: 16-05982-2-EFF-BASE

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021097			79-34-5	1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021097			79-00-5	1,1,2-Trichloroethane	NGS	110	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021097			76-34-3	1,1-Dichloroethane	NGS	97	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021097			75-35-4	1,1-Dichloroethane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021097			107-05-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021097			642-75-6	1,3-Dichloropropene (Total)	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097			106-46-7	1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021097			123-91-1	1,4-Dioxane	NGS	100	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021097			71-36-3	1-Butanol	NGS	110	<4.3	4.7	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021097			111-70-6	1-Hexanol	NGS	110	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021097			71-23-8	1-Propanol	NGS	110	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021097			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021097			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021097			76-93-3	2-Butanone	NGS	95	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021097			110-43-0	2-Heptanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021097			591-78-6	2-Hexanone	NGS	98	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021097			534-22-5	2-Methylfuran	NGS	97	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021097			78-94-4	3-Suben-2-one	NGS	95	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021097			106-35-4	3-Heptanone	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021097			106-68-3	3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021097			105-42-0	4-Methyl-2-hexanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021097			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	
S16T021097			67-64-1	Acetone	NGS	88	3.0	14	n/a	n/a	n/a	n/a	2.8	n/a	B
S16T021097			75-05-8	Acetonitrile	NGS	100	<1.6	27	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021097			98-86-2	Acetophenone	NGS	100	<8.2	9.9	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021097			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021097			107-18-6	Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-EFF-BASE  
 Customer Sample ID: 16-05982-2-EFF-BASE

Sample#	R	AF	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU VQA #2															
S16T021097			107-05-1	Allyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021097			71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021097			100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021097			123-72-8	Benzal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021097			109-74-0	Benzonitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021097			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021097			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021097			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021097			87-66-3	Chloroform	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097			110-82-7	Cyclohexane	NGS	100	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021097			124-18-5	Decane	NGS	110	<3.3	4.1	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021097			84-17-5	Ethanol	NGS	110	5.4	14	n/a	n/a	n/a	n/a	3.7	n/a	BJ
S16T021097			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097			100-41-4	Ethylbenzene	NGS	120	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021097			110-00-9	Furan	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021097			110-64-3	Hexane	NGS	95	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021097			628-73-9	Hexanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021097			128-98-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097			75-09-2	Methylene Chloride	NGS	110	5.8	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	L
S16T021097			81-20-3	Naphthalene	NGS	110	<3.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021097			86-85-3	Nitrobenzene	NGS	100	<4.7	5.1	n/a	n/a	n/a	n/a	4.7	n/a	J
S16T021097			110-59-8	Permethrin	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021097			107-12-0	Propenenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097			110-86-1	Pyridine	NGS	110	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021097			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021097			127-18-4	Tetrachloroethene	NGS	100	<1.8	250	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097			108-88-3	Toluene	NGS	120	<2.2	5.3	n/a	n/a	n/a	n/a	2.2	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-EFF-BASE  
 Customer Sample ID: 16-05982-2-EFF-BASE

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TDU VOC #2															
S16T021097			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021097			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021097			10081-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097			123-86-4	n-Butyl acetate	NGS	97	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021097			142-82-5	n-Heptane	NGS	110	<1.6	3.4	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021097			10081-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-G1  
 Customer Sample ID: 16-05982-2-G1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cent Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021099		79-34-5		1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021099		79-00-5		1,1,2-Trichloroethane	NGS	110	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021099		75-34-3		1,1-Dichloroethane	NGS	97	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021099		75-35-4		1,1-Dichloroethene	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021099		107-06-2		1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021099		542-75-6		1,3-Dichloropropene (Total)	NGS	110	<1.8	12	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099		106-46-7		1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021099		123-91-1		1,4-Dioxane	NGS	100	<2.0	5.8	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021099		71-38-3		1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021099		111-70-6		1-Heptanol	NGS	110	<8.1	<8.1	n/a	n/a	n/a	n/a	8.1	n/a	
S16T021099		71-23-6		1-Propanol	NGS	110	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021099		108-47-4		2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021099		1708-29-3		2,5-Dihydrofuran	NGS	110	<2.2	4.4	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021099		78-93-3		2-Butanone	NGS	95	<3.1	4.2	n/a	n/a	n/a	n/a	3.1	n/a	J
S16T021099		110-43-0		2-Heptanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021099		501-78-6		2-Hexanone	NGS	98	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021099		534-22-5		2-Methylfuran	NGS	97	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021099		78-84-4		3-Buten-2-one	NGS	95	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021099		106-35-4		3-Heptanone	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021099		106-88-3		3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021099		105-42-0		4-Methyl-2-Heptanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021099		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	
S16T021099		57-84-1		Acetone	NGS	88	3.0	4.1E+03	n/a	n/a	n/a	n/a	2.8	n/a	BEY
S16T021099		75-05-8		Acetonitrile	NGS	100	<1.6	1.1E+03	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021099		98-86-2		Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021099		107-13-1		Acrylonitrile	NGS	100	<2.1	30	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021099		107-18-6		Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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 N - Named TIC

# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-G1  
 Customer Sample ID: 16-05982-2-G1

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	SPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021099			107-05-1	Allyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021099			71-43-2	Benzene	NGS	110	<1.5	2.2	n/a	n/a	n/a	n/a	1.5	n/a J	
S16T021099			100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021099			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021099			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021099			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021099			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021099			75-09-3	Chloroethane	NGS	110	<1.6	4.2	n/a	n/a	n/a	n/a	1.6	n/a J	
S16T021099			87-68-3	Chloroform	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			110-82-7	Cyclohexane	NGS	100	<1.4	46	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021099			124-18-5	Decane	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021099			84-17-5	Ethanol	NGS	110	5.4	2.2E+03	n/a	n/a	n/a	n/a	3.7	n/a BE	
S16T021099			141-75-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			100-41-4	Ethylbenzene	NGS	120	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021099			110-00-9	Furan	NGS	93	<1.6	33	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021099			110-54-3	Hexane	NGS	96	<1.3	10	n/a	n/a	n/a	n/a	1.3	n/a J	
S16T021099			628-73-9	Hexanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021099			128-90-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			75-09-2	Methylene Chloride	NGS	110	5.8	5.2	n/a	n/a	n/a	n/a	4.1	n/a B,L	
S16T021099			81-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021099			98-95-3	Nitrobenzene	NGS	100	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021099			110-59-8	Pentanenitrile	NGS	110	<2.6	6.1	n/a	n/a	n/a	n/a	2.6	n/a J	
S16T021099			107-12-0	Propanenitrile	NGS	100	<1.8	270	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			110-86-1	Pyridine	NGS	110	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a L	
S16T021099			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021099			127-18-4	Tetrachloroethene	NGS	100	<1.8	45	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			108-88-3	Toluene	NGS	120	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-G1  
 Customer Sample ID: 16-05982-2-G1

Sample#	R	AF	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TDU VOX #2															
S16T021099			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021099			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	2.4E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021099			10081-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	12	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			123-86-4	n-Butyl acetate	NGS	97	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021099			142-82-5	n-Heptane	NGS	110	<1.6	63	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021099			10081-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-H1  
 Customer Sample ID: 16-05982-2-H1

Sample#	R	Alt	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021100			79-34-5	1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021100			79-00-5	1,1,2-Trichloroethane	NGS	110	<2.3	6.9	n/a	n/a	n/a	n/a	2.3	n/a	J
S16T021100			75-34-3	1,1-Dichloroethane	NGS	97	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021100			75-35-4	1,1-Dichloroethane	NGS	94	<1.7	3.0	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021100			107-05-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021100			542-75-6	1,3-Dichloropropene (Total)	NGS	110	<1.8	4.7	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			106-46-7	1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021100			123-91-1	1,4-Dioxane	NGS	100	<2.0	4.3	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021100			71-35-3	1-Butanol	NGS	110	<4.3	3.7E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021100			111-70-6	1-Hexanol	NGS	110	<9.1	23	n/a	n/a	n/a	n/a	9.1	n/a	J
S16T021100			71-23-8	1-Propanol	NGS	110	<8.9	2.3E+03	n/a	n/a	n/a	n/a	8.9	n/a	E
S16T021100			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021100			1706-26-8	2,5-Dihydrofuran	NGS	110	<2.2	29	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021100			78-93-3	2-Butanone	NGS	95	<3.1	1.3E+03	n/a	n/a	n/a	n/a	3.1	n/a	E
S16T021100			110-43-0	2-Heptanone	NGS	100	<2.6	130	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021100			591-75-6	2-Hexanone	NGS	98	<2.5	240	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021100			534-22-5	2-Methylfuran	NGS	97	<1.3	4.8	n/a	n/a	n/a	n/a	1.3	n/a	J
S16T021100			78-94-4	3-Buten-2-one	NGS	95	<1.9	490	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021100			106-35-4	3-Heptanone	NGS	110	<2.7	72	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021100			106-65-3	3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021100			105-42-0	4-Methyl-2-hexanone	NGS	100	<2.6	23	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021100			108-10-1	4-Methyl-2-pentanone	NGS	110	<2.2	120	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021100			87-64-1	Acetone	NGS	88	3.0	4.0E+03	n/a	n/a	n/a	n/a	2.8	n/a	BEY
S16T021100			75-05-8	Acetonitrile	NGS	100	<1.6	850	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021100			98-86-2	Acetophenone	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021100			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021100			107-18-6	Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-H1  
 Customer Sample ID: 16-05982-2-H1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Ont Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021100			107-05-1	Alyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021100			71-43-2	Benzene	NGS	110	<1.5	47	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021100			100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021100			123-72-8	Butanal	NGS	100	<3.0	360	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021100			109-74-0	Butanenitrile	NGS	110	<2.1	190	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021100			36-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021100			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021100			75-60-3	Chloroethane	NGS	110	<1.6	4.8	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021100			37-68-3	Chloroform	NGS	110	<1.8	2.2	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			110-82-7	Cyclohexane	NGS	100	<1.4	150	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021100			124-18-5	Decane	NGS	110	<3.3	15	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021100			84-17-5	Ethanol	NGS	110	5.4	2.3E+03	n/a	n/a	n/a	n/a	3.7	n/a	BE
S16T021100			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			100-41-4	Ethylbenzene	NGS	120	<2.4	2.7	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021100			110-60-9	Furan	NGS	93	<1.6	83	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021100			110-54-3	Hexane	NGS	96	<1.3	1.7E+03	n/a	n/a	n/a	n/a	1.3	n/a	E
S16T021100			828-73-9	Hexanenitrile	NGS	110	<2.6	23	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021100			126-59-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			75-69-2	Methylene Chloride	NGS	110	5.8	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	L
S16T021100			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021100			98-55-3	Nitrobenzene	NGS	100	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021100			110-59-8	Pentanitrile	NGS	110	<2.6	140	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021100			107-12-0	Propanenitrile	NGS	100	<1.8	190	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			110-85-1	Pyridine	NGS	110	<2.8	32	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021100			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021100			127-18-4	Tetrachloroethene	NGS	100	<1.8	9.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021100			108-88-3	Toluene	NGS	120	<2.2	81	n/a	n/a	n/a	n/a	2.2	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-H1  
 Customer Sample ID: 16-05982-2-H1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021100			75-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021100			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	710	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021100			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	
S16T021100			123-66-4	n-Butyl acetate	NGS	97	<2.4	18	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021100			142-82-5	n-Heptane	NGS	110	<1.6	830	n/a	n/a	n/a	n/a	1.6	n/a	EY
S16T021100			10061-02-8	trans-1,3-Dichloropropene	NGS	110	<2.1	4.7	n/a	n/a	n/a	n/a	2.1	n/a	J

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-H2  
 Customer Sample ID: 16-05982-2-H2

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021101			79-34-5	1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021101			79-00-5	1,1,2-Trichloroethane	NGS	110	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021101			79-34-3	1,1-Dichloroethane	NGS	97	<1.7	3.8	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021101			75-35-4	1,1-Dichloroethene	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021101			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021101			642-75-6	1,3-Dichloropropene (Total)	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021101			108-46-7	1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021101			123-61-1	1,4-Dioxane	NGS	100	<2.0	13	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021101			71-35-3	1-Butanol	NGS	110	<4.3	17	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021101			111-70-6	1-Heptanol	NGS	110	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021101			71-23-8	1-Propanol	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021101			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021101			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	40	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021101			78-93-3	2-Butanone	NGS	95	<3.1	18	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021101			110-43-0	2-Heptanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021101			591-78-6	2-Hexanone	NGS	98	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021101			534-22-5	2-Methylfuran	NGS	97	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021101			78-94-4	3-Buten-2-one	NGS	95	<1.9	35	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021101			106-35-4	3-Heptanone	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021101			106-68-3	3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021101			105-42-0	4-Methyl-2-hexanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021101			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	
S16T021101			67-64-1	Acetone	NGS	88	3.0	4.2E+03	n/a	n/a	n/a	n/a	2.8	n/a	BEY
S16T021101			75-05-8	Acetonitrile	NGS	100	<1.6	1.4E+03	n/a	n/a	n/a	n/a	1.6	n/a	BEY
S16T021101			58-86-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021101			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021101			107-18-6	Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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 N - Named TIC

# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-H2  
 Customer Sample ID: 16-05982-2-H2

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021101			107-06-1	Methyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021101			71-43-2	Benzene	NGS	110	<1.5	2.9	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021101			100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021101			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021101			109-74-0	Butanenitrile	NGS	110	<2.1	3.4	n/a	n/a	n/a	n/a	2.1	n/a	J
S16T021101			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021101			108-96-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021101			75-00-3	Chloroethane	NGS	110	<1.6	5.6	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021101			67-56-3	Chloroform	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021101			110-82-7	Cyclohexane	NGS	100	<1.4	300	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021101			124-18-5	Decane	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021101			64-17-5	Ethanol	NGS	110	5.4	2.1E+03	n/a	n/a	n/a	n/a	3.7	n/a	BE
S16T021101			141-78-6	Ethyl acetate	NGS	96	<1.8	8.0	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021101			100-41-4	Ethylbenzene	NGS	120	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021101			110-00-9	Furan	NGS	93	<1.6	72	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021101			110-54-3	Hexane	NGS	96	<1.3	140	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021101			828-73-9	Hexanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021101			126-98-7	Methoxyformaldehyde	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021101			75-09-2	Methylene Chloride	NGS	110	5.8	14	n/a	n/a	n/a	n/a	4.1	n/a	BL
S16T021101			81-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021101			84-95-3	Nitrobenzene	NGS	100	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021101			110-59-8	Penanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021101			107-12-0	Propanenitrile	NGS	100	<1.8	450	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021101			110-86-1	Pyridine	NGS	110	<2.8	15	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021101			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021101			127-18-4	Tetrachloroethene	NGS	100	<1.8	38	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021101			108-85-3	Toluene	NGS	120	<2.2	2.3	n/a	n/a	n/a	n/a	2.2	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-H2  
 Customer Sample ID: 16-05982-2-H2

Sample#	R	AI#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021101			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021101			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	1.1E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021101			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	
S16T021101			123-85-4	n-Butyl acetate	NGS	97	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021101			142-82-5	n-Heptane	NGS	110	<1.6	83	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021101			10061-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-IN-BASE

Customer Sample ID: 16-05982-2-IN-BASE

Sample#	R	AI#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021102			79-34-5	1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021102			79-00-5	1,1,2-Trichloroethane	NGS	110	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021102			75-34-3	1,1-Dichloroethane	NGS	97	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021102			75-35-4	1,1-Dichloroethane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021102			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021102			542-75-6	1,3-Dichloropropene (Total)	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021102			106-46-7	1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021102			123-81-1	1,4-Dioxane	NGS	100	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021102			71-36-3	1-Butanol	NGS	110	<4.3	56	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021102			111-70-6	1-Heptanol	NGS	110	<8.1	<8.1	n/a	n/a	n/a	n/a	8.1	n/a	
S16T021102			71-23-8	1-Propanol	NGS	110	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021102			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021102			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021102			78-93-3	2-Butanone	NGS	95	<3.1	4.8	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021102			110-43-0	2-Heptanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021102			591-78-6	2-Hexanone	NGS	98	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021102			534-22-5	2-Methylfuran	NGS	97	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021102			78-94-4	3-Buten-2-one	NGS	95	<1.9	2.6	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021102			106-35-4	3-Heptanone	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021102			106-68-3	3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021102			105-42-0	4-Methyl-2-hexanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021102			108-10-1	4-Methyl-2-pentanone	NGS	110	<2.2	2.5	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021102			87-84-1	Acetone	NGS	88	3.0	53	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021102			75-05-8	Acetonitrile	NGS	100	<1.6	83	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021102			98-88-2	Acetophenone	NGS	100	<6.2	13	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021102			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021102			107-18-6	Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091  
SDG Number:  
Customer Sample ID: 16-05982-2-IN-BASE  
Customer Sample ID: 16-05982-2-IN-BASE

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
VAPOR-TDU VOA #2														
S16T021102			107-65-1	Allyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a
S16T021102			71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a
S16T021102			100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a
S16T021102			123-72-8	Butanal	NGS	100	<3.0	3.4	n/a	n/a	n/a	n/a	3.0	n/a J
S16T021102			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a
S16T021102			58-23-5	Carbon tetrachloride	NGS	100	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a J
S16T021102			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a
S16T021102			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a
S16T021102			57-68-3	Chloroform	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a
S16T021102			110-82-7	Cyclohexane	NGS	100	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a
S16T021102			124-18-5	Decane	NGS	110	<3.3	3.8	n/a	n/a	n/a	n/a	3.3	n/a J
S16T021102			54-17-5	Ethanol	NGS	110	5.4	45	n/a	n/a	n/a	n/a	3.7	n/a B
S16T021102			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a
S16T021102			100-41-4	Ethylbenzene	NGS	120	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a
S16T021102			110-00-9	Furan	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a
S16T021102			110-54-3	Hexane	NGS	96	<1.3	2.8	n/a	n/a	n/a	n/a	1.3	n/a J
S16T021102			828-73-9	Hexanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a
S16T021102			126-58-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a
S16T021102			75-09-2	Methylene Chloride	NGS	110	5.8	24	n/a	n/a	n/a	n/a	4.1	n/a BL
S16T021102			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a
S16T021102			98-95-3	Nitrobenzene	NGS	100	<4.7	9.6	n/a	n/a	n/a	n/a	4.7	n/a J
S16T021102			110-59-8	Pentanitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a
S16T021102			107-12-0	Propenenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a
S16T021102			110-86-1	Pyridine	NGS	110	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a L
S16T021102			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a
S16T021102			127-18-4	Tetrachloroethene	NGS	100	<1.8	12	n/a	n/a	n/a	n/a	1.8	n/a J
S16T021102			108-88-3	Toluene	NGS	120	<2.2	8.3	n/a	n/a	n/a	n/a	2.2	n/a J

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162091  
 SDG Number:  
 Customer Sample ID: 16-05982-2-IN-BASE  
 Customer Sample ID: 16-05982-2-IN-BASE

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021102			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021102			75-09-4	Trichlorofluoromethane	NGS	98	<1.9	9.5	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021102			10061-01-5	dis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021102			123-86-4	n-Butyl acetate	NGS	97	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021102			142-82-5	n-Heptane	NGS	110	<1.6	7.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021102			10061-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091

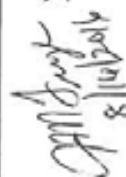
SDG Number:

Customer Sample ID: 16-05982-2-A1

Customer Sample ID: 16-05982-2-A1

Sample#	R	AS	OC Type	Analyte	CAS No.	Retention Time (Min:Sec)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021090				1,3-Butadiene	106-99-0	5.05	NGS	8.3	JNT
S16T021090				2-Methyl-1-butene	563-46-2	5.27	NGS	230	JNT
S16T021090				5-Methylazolidine	58328-22-6	5.35	NGS	180	JNT
S16T021090				Butane, 2-methyl-	78-78-4	5.61	NGS	750	JNT
S16T021090				Oxirane, trimethyl-	5076-19-7	6.24	NGS	2.0E+03	JNT
S16T021090				2-Pentene	109-88-2	6.55	NGS	130	JNT
S16T021090				2-Pentene, (E)-	646-04-8	6.80	NGS	75	JNT
S16T021090				Cyclobutane, 2,2,3-trimethyl	1449-49-6	6.92	NGS	300	JNT
S16T021090				1-Pentene	109-67-1	7.00	NGS	35	JNT
S16T021090				2-Propenol, 2-methyl-	75-65-0	7.16	NGS	280	JNT
S16T021090				Butane, 2,2-dimethyl-	75-83-2	7.51	NGS	42	JNT
S16T021090				1-Pentene, 4-methyl-	891-37-2	8.41	NGS	280	JNT
S16T021090				Cyclopentane	287-92-3	8.75	NGS	190	JNT
S16T021090				Pentane, 2-methyl-	107-83-5	8.88	NGS	1.4E+03	JNT
S16T021090				Pentane, 3-methyl-	96-14-0	9.54	NGS	270	JNT
S16T021090				1-Hexene	592-41-6	9.91	NGS	530	JNT
S16T021090				Acetic acid	64-19-7	10.23	NGS	10	JNT
S16T021090				2-Hexene	592-43-8	10.66	NGS	64	JNT
S16T021090				3-Hexen-1-ol	544-12-7	11.09	NGS	58	JNT
S16T021090				3-Hexene, (Z)-	7642-09-3	11.16	NGS	27	JNT
S16T021090				Cyclopropane, 1-ethyl-2-methyl	19751-68-1	11.42	NGS	60	JNT
S16T021090				Isobutanol	78-83-1	11.62	NGS	77	JNT
S16T021090				Hexane, 2,4-dimethyl-	539-43-5	11.71	NGS	60	JNT
S16T021090				Cyclobutane, ethyl-	4806-61-5	11.89	NGS	120	JNT
S16T021090				Tetrahydrofuran	109-99-9	11.94	NGS	660	JNT
S16T021090				3-Buten-1-ol	827-27-0	12.11	NGS	39	JNT
S16T021090				2-Methyl-5-hexen-3-ol	32815-70-6	12.36	NGS	88	JNT

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8/16/2016



# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-A1

Customer Sample ID: 16-05982-2-A1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021090				(2)-Hex-2-ene, 5-methyl-	13151-17-2	12.58	NGS	25	JNT
S16T021090				1-Hexene, 3-methyl-	3404-81-3	12.91	NGS	110	JNT
S16T021090				Hexane, 2-methyl-	591-78-4	13.42	NGS	630	JNT
S16T021090				Pentane, 2,3-dimethyl-	565-49-3	13.54	NGS	42	JNT
S16T021090				Hexane, 3-methyl-	589-34-4	13.73	NGS	980	JNT
S16T021090				1-Heptene	592-78-7	14.19	NGS	560	JNT
S16T021090				Ethylene Glycol	107-21-1	14.62	NGS	2.0E+03	JNT
S16T021090				Formamide	75-12-7	14.81	NGS	140	JNT
S16T021090				Propane, 2-methyl-1-nitro-	625-74-1	14.93	NGS	48	JNT
S16T021090				Cyclopentane, 1,2-dimethyl-, c	1192-18-3	15.04	NGS	63	JNT
S16T021090				2,4-Azeldisodione, 3,3-diethyl	89315-91-9	15.19	NGS	450	JNT
S16T021090				Oxirane, 2-(1,1-dimethylethyl)	53897-30-6	15.27	NGS	53	JNT
S16T021090				2-Butanone, 3-ethoxy-3-methyl-	36587-99-7	15.32	NGS	120	JNT
S16T021090				Cyclopentane, ethyl-	1640-89-7	15.42	NGS	87	JNT
S16T021090				Carbamic acid, methyl ester	598-55-0	15.52	NGS	29	JNT
S16T021090				Unknown-1	-	15.82	NGS	55	JT
S16T021090				1-Heptene, 6-methyl-	5026-76-8	15.91	NGS	260	JNT
S16T021090				1-Pentanol	71-41-0	15.98	NGS	81	JNT
S16T021090				Heptane, 2-methyl-	592-27-8	16.08	NGS	280	JNT
S16T021090				Heptane, 4-methyl-	599-53-7	16.13	NGS	97	JNT
S16T021090				Heptane, 3,4,5-trimethyl-	20278-89-1	16.25	NGS	99	JNT
S16T021090				2-Hexene, 5,5-dimethyl-, (2)-	39761-61-0	16.52	NGS	140	JNT
S16T021090				1-Octene	111-66-0	16.60	NGS	62	JNT
S16T021090				1-Octene, 6-methyl-	13151-10-5	16.71	NGS	25	JNT
S16T021090				Octane	111-65-9	16.77	NGS	250	JNT
S16T021090				Cyclohexene, 1,2-dimethyl-, tr	6876-23-9	16.94	NGS	31	JNT
S16T021090				Cycloisooctane, hexamethyl-	541-05-9	17.05	NGS	70	JNT

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-A1

Customer Sample ID: 16-05982-2-A1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021090				Pyridine, 4-methyl-	103-89-4	17.33	NGS	28 JNT	
S16T021090				Octane, 2-methyl-	3221-61-2	17.41	NGS	96 JNT	
S16T021090				Cyclohexane, ethyl-	1678-91-7	17.88	NGS	50 JNT	
S16T021090				1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	94 JNT	
S16T021090				Heptane, 4-propyl-	3178-29-8	18.27	NGS	45 JNT	
S16T021090				Nonane	111-84-2	18.83	NGS	59 JNT	
S16T021090				Octane, 3,6-dimethyl-	15469-94-0	19.66	NGS	27 JNT	
S16T021090				2-Heptanone, 6-methyl-	328-88-7	20.27	NGS	100 JNT	
S16T021090				Cyclohexanone, octamethyl	568-87-2	20.48	NGS	260 JNT	
S16T021090				Cyclohexane, 1,1,2,3-tetrameth	5783-92-2	20.84	NGS	37 JNT	
S16T021090				Cyclohexane, 1-methyl-5-(1-met	1461-27-4	22.61	NGS	31 JNT	
S16T021090				3,3-Dimethylhexane	563-16-6	22.71	NGS	37 JNT	
S16T021090				Decane, 2,4,6-trimethyl-	52108-27-4	23.00	NGS	150 JNT	
S16T021090				2,6-Dimethyldecane	13150-81-7	23.14	NGS	66 JNT	
S16T021090				Undecane	1120-21-4	23.73	NGS	33 JNT	
S16T021090				2,3-Dimethyldecane	17312-44-6	23.79	NGS	28 JNT	
S16T021090				Unknown-2	-	23.85	NGS	120 JT	
S16T021090				Dodecane	112-40-3	23.95	NGS	57 JNT	
S16T021090				Hydroxylamine, O-decyl-	28812-79-1	24.05	NGS	32 JNT	
S16T021090				Unknown-3	-	24.26	NGS	250 JT	
S16T021090				Undecane, 3-methyl-	1002-43-3	24.90	NGS	15 JNT	
S16T021090				Tridecane	829-50-5	25.27	NGS	55 JNT	
S16T021090				Acetic acid, tetrafluoro-, 3,7-d	28745-07-5	25.41	NGS	32 JNT	
S16T021090				Ethanol, 2-phenoxyl-	122-99-8	25.82	NGS	110 JNT	
S16T021090				1,2-Benzisothiazole	272-16-2	26.31	NGS	95 JNT	
S16T021090				Undecane, 2-methyl-	7045-71-8	26.43	NGS	64 JNT	
S16T021090				1,2,3,4,5-Cyclopentapentol	56772-25-9	26.63	NGS	28 JNT	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-A1

Customer Sample ID: 16-05982-2-A1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021050				1-iodo-2-methylundecane	73105-67-6	27.01	NGS	28 JNT	
S16T021050			BLNK	Unknown-1	-	8.24	NGS	30	

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DSR Jar v. 3.0.12

# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-A2

Customer Sample ID: 16-05982-2-A2

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021091				Formamide	75-12-7	14.05	NGS	44 JNT	
S16T021091				Propane, 2-methyl-1-nitro-	825-74-1	16.50	NGS	31 JNT	
S16T021091				Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	540 JNT	
S16T021091				Heptane, 2,2,4,6,6-pentamethyl	13475-82-6	21.52	NGS	170 JNT	
S16T021091				2,2,7,7-Tetramethyloctane	1071-31-4	22.16	NGS	37 JNT	
S16T021091				3,3-Dimethylthaxane	563-16-6	22.71	NGS	82 JNT	
S16T021091				Decane, 2,4,6-trimethyl-	82108-27-4	23.00	NGS	76 JNT	
S16T021091				Heptane, 5-ethyl-2,2,3-trimeth	82199-06-8	23.15	NGS	69 JNT	
S16T021091				Decane, 2,5,9-trimethyl-	82108-22-9	23.22	NGS	37 JNT	
S16T021091				Hydroxylamine, O-dodecyl-	29812-79-1	23.55	NGS	40 JNT	
S16T021091				Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	32 JNT	
S16T021091				2,6-Dimethyldodecane	13150-81-7	23.85	NGS	76 JNT	
S16T021091				Undecane	1120-21-4	23.94	NGS	59 JNT	
S16T021091				Unknown-1	-	24.26	NGS	520 JT	
S16T021091				Dodecane	112-40-3	25.27	NGS	47 JNT	
S16T021091				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	45 JNT	
S16T021091				Unknown-2	-	25.99	NGS	61 JT	
S16T021091				Methanamine	100-97-0	26.19	NGS	32 JNT	
S16T021091				1,2-Benzisothiazole	272-16-2	26.30	NGS	179 JNT	
S16T021091				Unknown-3	-	26.43	NGS	57 JT	
S16T021091				Propionic acid, 2-methyl-, 1-1	74381-40-1	26.55	NGS	47 JNT	
S16T021091				Silane, trimethyl-3-penten-2-y	53284-56-5	26.63	NGS	44 JNT	
S16T021091				Tetradecane, 1-iodo-	19218-94-1	27.01	NGS	28 JNT	
S16T021091			BLNK	Unknown-1	-	8.24	NGS	30	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-B1

Customer Sample ID: 16-05982-2-B1

Sample#	R	AE	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S161021092				Formamide	75-12-7	14.07	NGS	74 JNT	
S161021092				Propane, 2-methyl-1-nitro-	525-74-1	16.51	NGS	36 JNT	
S161021092				Cyclohexasiloxane, octamethyl	556-87-2	20.48	NGS	420 JNT	
S161021092				Decane, 2,4,6-trimethyl-	52108-27-4	23.00	NGS	100 JNT	
S161021092				2,6-Dimethyldecane	13150-81-7	23.14	NGS	42 JNT	
S161021092				Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	41 JNT	
S161021092				3,3-Dimethyldecane	563-16-6	23.85	NGS	98 JNT	
S161021092				Undecane, 5,7-dimethyl-	17312-83-3	23.94	NGS	74 JNT	
S161021092				Unknown-1	-	24.26	NGS	450 JT	
S161021092				1-Octanol, 2-butyl-	3913-02-3	24.85	NGS	44 JNT	
S161021092				Dodecane	112-40-3	25.28	NGS	56 JNT	
S161021092				1-Octene, 3,7-dimethyl-	4984-01-4	25.41	NGS	84 JNT	
S161021092				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.96	NGS	31 JNT	
S161021092				Unknown-2	-	26.01	NGS	100 JT	
S161021092				1,2-Benzisothiazole	272-16-2	26.32	NGS	150 JNT	
S161021092				Unknown-3	-	26.45	NGS	62 JT	
S161021092				Propanoic acid, 2-methyl-, 1-(	74381-40-1	26.57	NGS	52 JNT	
S161021092				1,2,3,4,5-Cyclopentapentol	56772-25-9	26.85	NGS	36 JNT	
S161021092				Undecane, 2-methyl-	7045-71-8	27.03	NGS	28 JNT	
S161021092				Unknown-1	-	8.24	NGS	30	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-BLANK

Customer Sample ID: 16-05982-2-BLANK

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR:TDU VOA #2									
S16T021093				Unknown-1	—	8.28	NGS	77 JT	
S16T021093				2,2,7,7-Tetramethylcyclohexane	1071-31-4	21.52	NGS	75 JNT	
S16T021093				3,3-Dimethylthioxane	563-15-6	22.71	NGS	29 JNT	
S16T021093				Undecane, 3-methyl-	1002-43-3	23.54	NGS	9.0 JNT	
S16T021093				Propanoic acid, 2-methyl-, 1-1	74-331-40-1	26.58	NGS	26 JNT	
S16T021093			BLNK	Unknown-1	—	8.24	NGS	30	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-C1

Customer Sample ID: 16-05982-2-C1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021094				Cyclobutylamine	2516-34-9	5.28	NGS	33 JNT	
S16T021094				2-Butene	107-01-7	5.35	NGS	27 JNT	
S16T021094				Formamide	75-12-7	14.09	NGS	96 JNT	
S16T021094				Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	400 JNT	
S16T021094				2,6-Dimethyldecane	13150-51-7	23.00	NGS	84 JNT	
S16T021094				Decane, 2,4,6-trimethyl-	52108-27-4	23.14	NGS	31 JNT	
S16T021094				Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	50 JNT	
S16T021094				Unknown-1	-	23.85	NGS	84 JT	
S16T021094				3,3-Dimethylhexane	563-16-8	23.95	NGS	50 JNT	
S16T021094				Unknown-2	-	24.26	NGS	530 JT	
S16T021094				Dodecane	112-40-3	25.27	NGS	100 JNT	
S16T021094				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	50 JNT	
S16T021094				Unknown-3	-	26.00	NGS	94 JT	
S16T021094				1,2-Benzisothiazole	272-16-2	26.32	NGS	220 JNT	
S16T021094				Octane, 2,3,6,7-tetramethyl-	52670-34-5	26.44	NGS	64 JNT	
S16T021094				Undecane, 2-methyl-	7045-71-8	26.57	NGS	13 JNT	
S16T021094				Dodecane, 2,6,11-trimethyl-	31295-56-4	26.59	NGS	18 JNT	
S16T021094				Silane, trimethyl(2-methylene-	97778-15-9	26.65	NGS	44 JNT	
S16T021094				Tetradecane, 1-iodo-	19218-94-1	27.03	NGS	31 JNT	
S16T021094			BLANK	Unknown-1	-	8.24	NGS	30	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-D1

Customer Sample ID: 16-05982-2-D1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR:TDU VOA #2									
S16T021095				Cyclobutylamine	2516-34-9	5.28	NGS	34 JNT	
S16T021095				Hydroxyacetic acid, hydrazide	3630-14-1	8.27	NGS	27 JNT	
S16T021095				Formamide	75-12-7	14.09	NGS	110 JNT	
S16T021095				Cyclohexanone, octamethyl	556-67-2	20.48	NGS	280 JNT	
S16T021095				Dodecane, 2,6,10-trimethyl-	3891-98-3	22.71	NGS	21 JNT	
S16T021095				Decane, 2,4,6-trimethyl-	52108-27-4	23.00	NGS	58 JNT	
S16T021095				2,6-Dimethyldecane	13150-81-7	23.14	NGS	31 JNT	
S16T021095				Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	27 JNT	
S16T021095				3,3-Dimethylhexane	583-16-6	23.85	NGS	62 JNT	
S16T021095				Undecane	1120-21-4	23.95	NGS	26 JNT	
S16T021095				Unknown-1	-	24.26	NGS	410 JT	
S16T021095				Tetradecane, 1-iodo-	19218-94-1	25.27	NGS	41 JNT	
S16T021095				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	30 JNT	
S16T021095				2-Propenoic acid, octyl ester	2489-59-4	26.00	NGS	46 JNT	
S16T021095				Methanaming	100-97-0	26.20	NGS	16 JNT	
S16T021095				1,2-Benzisothiazole	272-16-2	26.32	NGS	140 JNT	
S16T021095				Undecane, 2-methyl-	7045-71-3	26.45	NGS	50 JNT	
S16T021095				Stane, trimethyl/2-methylene-	97778-15-9	26.65	NGS	47 JNT	
S16T021095				Decane, 2,6,8-trimethyl-	52158-25-3	27.03	NGS	27 JNT	
S16T021095			BLNK	Unknown-1	-	8.24	NGS	30	

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L - LLS Outside Range  
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N - Named TIC



Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-E1

Customer Sample ID: 16-05982-2-E1

Sample#	R	AS	GC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021096				1,3-Butadiene	106-99-0	5.05	NGS	11 JNT	
S16T021096				2-Butene	107-01-7	5.35	NGS	26 JNT	
S16T021096				Formamide	75-12-7	14.12	NGS	150 JNT	
S16T021096				Cyclohexanone, octamethyl	556-67-2	20.46	NGS	230 JNT	
S16T021096				Decane, 2,4,6-trimethyl-	82108-27-4	23.00	NGS	54 JNT	
S16T021096				Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	25 JNT	
S16T021096				2,6-Dimethyldecane	13150-81-7	23.85	NGS	60 JNT	
S16T021096				Hexyl octyl ether	17071-54-4	23.94	NGS	39 JNT	
S16T021096				Unknown-1	-	24.26	NGS	340 JT	
S16T021096				Tetradecane, 1-iodo-	19218-94-1	25.27	NGS	40 JNT	
S16T021096				Methanamine	100-97-9	26.19	NGS	39 JNT	
S16T021096				1,2-Benzisothiazole	272-16-2	26.32	NGS	56 JNT	
S16T021096				Unknown-2	-	26.44	NGS	40 JT	
S16T021096				Propanoic acid, 2-methyl-, 1-	74381-40-1	26.56	NGS	53 JNT	
S16T021096				1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.64	NGS	28 JNT	
S16T021096				Undecane, 2-methyl-	7045-71-8	27.02	NGS	17 JNT	
S16T021096			BLNK	Unknown-1	-	8.24	NGS	30	

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Y - Comment  
T - Tentatively Identified Compound

L - LLS Outside Range  
B - Blank Contamination

Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-EFF-BASE

Customer Sample ID: 16-05982-2-EFF-BASE

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Min)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021097				Cyclohexane, hexamethyl-	541-05-9	16.86	NGS	34 JNT	
S16T021097				Cyclohexane, octamethyl-	556-67-2	20.20	NGS	530 JNT	
S16T021097				Decane, 2,4,6-trimethyl-	62108-27-4	22.78	NGS	53 JNT	
S16T021097				2,6-Dimethyldecane	13150-81-7	22.93	NGS	35 JNT	
S16T021097				Undecane	1120-21-4	23.55	NGS	28 JNT	
S16T021097				3,3-Dimethyldecane	563-16-6	23.66	NGS	66 JNT	
S16T021097				Dodecane	112-40-3	23.77	NGS	61 JNT	
S16T021097				Unknown-1	-	24.07	NGS	380 JT	
S16T021097				Undecane, 2,6-dimethyl-	17301-23-4	25.11	NGS	49 JNT	
S16T021097				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.26	NGS	33 JNT	
S16T021097				1,3-Benzisothiazole	272-16-2	26.17	NGS	88 JNT	
S16T021097				Undecane, 2-methyl-	7045-71-8	26.29	NGS	42 JNT	
S16T021097				1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.49	NGS	53 JNT	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-G1

Customer Sample ID: 16-05982-2-G1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021099				2-Butene, 2-methyl-	513-35-9	5.18	NGS	450 JNT	
S16T021099				2-Pentene	109-88-2	5.35	NGS	120 JNT	
S16T021099				Butane, 2-methyl-	78-78-4	5.52	NGS	1.1E+03 JNT	
S16T021099				2-Pentene, (E)-	946-04-8	5.48	NGS	130 JNT	
S16T021099				1,4-Pentadiene	561-83-5	6.61	NGS	38 JNT	
S16T021099				2-Methyl-1-butene	563-46-2	6.74	NGS	27 JNT	
S16T021099				1-Pentene	109-67-1	6.84	NGS	480 JNT	
S16T021099				Hydrogen acids	7782-79-8	7.14	NGS	110 JNT	
S16T021099				2,3-Diazabicyclo[2.2.1]hept-2	2721-32-6	8.33	NGS	59 JNT	
S16T021099				Cyclopentane	287-92-3	8.69	NGS	510 JNT	
S16T021099				Pentane, 2-methyl-	107-63-5	8.81	NGS	49 JNT	
S16T021099				Tetrahydrofuran	109-99-9	11.93	NGS	120 JNT	
S16T021099				Cyclohexanone, octamethyl	558-67-2	20.20	NGS	270 JNT	
S16T021099				Decane, 2,4,6-trimethyl-	52108-27-4	22.78	NGS	190 JNT	
S16T021099				2,6-Dimethyldecane	13150-81-7	22.92	NGS	67 JNT	
S16T021099				Undecane	1120-21-4	23.54	NGS	17 JNT	
S16T021099				3,3-Dimethylhexane	563-16-6	23.66	NGS	120 JNT	
S16T021099				Dodecane	112-40-3	23.75	NGS	52 JNT	
S16T021099				Unknown-1	-	24.05	NGS	270 JT	
S16T021099				Undecane, 2,6-dimethyl-	17301-23-4	25.10	NGS	28 JNT	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-H1

Customer Sample ID: 16-05982-2-H1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021100				2-Pentene, (E)-	546-04-8	5.19	NGS	130 JNT	
S16T021100				Butane, 2-methyl-	78-78-4	5.53	NGS	490 JNT	
S16T021100				2-Butene, 2-methyl-	513-35-9	6.49	NGS	87 JNT	
S16T021100				Cyclobutane, 2,2,3-trimethyl	1449-49-6	6.75	NGS	58 JNT	
S16T021100				Hydroxylamine, O-(2-methylprop	5618-62-2	7.45	NGS	40 JNT	
S16T021100				1-Pentene, 4-methyl-	591-37-2	8.34	NGS	320 JNT	
S16T021100				Cyclopentane	287-92-3	8.69	NGS	98 JNT	
S16T021100				Pentane, 2-methyl-	107-63-5	8.81	NGS	1.3E+03 JNT	
S16T021100				Pentane, 3-methyl-	96-14-0	9.48	NGS	230 JNT	
S16T021100				Cyclopropane, 1-ethyl-2-methyl	19781-68-1	10.62	NGS	33 JNT	
S16T021100				Cyclobutane, ethyl-	4605-61-5	11.39	NGS	54 JNT	
S16T021100				2H-Pyran-2-one, tetrahydro-6,6	2610-95-9	11.61	NGS	53 JNT	
S16T021100				Cyclopentane, methyl-	96-37-7	11.84	NGS	100 JNT	
S16T021100				Tetrahydrofuran	109-99-9	11.95	NGS	550 JNT	
S16T021100				Hydroperoxide, isoyl	4312-76-9	12.34	NGS	130 JNT	
S16T021100				(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.86	NGS	50 JNT	
S16T021100				Hexane, 3-methyl-	589-34-4	13.66	NGS	590 JNT	
S16T021100				Cyclopentane, 1,2-dimethyl-, e	1192-18-3	14.05	NGS	35 JNT	
S16T021100				1-Heptene	582-75-7	14.12	NGS	550 JNT	
S16T021100				DL-2,3-Butanediol	5982-25-8	14.26	NGS	53 JNT	
S16T021100				(Z)-3-Heptene	7842-10-6	14.55	NGS	30 JNT	
S16T021100				Ethylene Glycol	107-21-1	14.94	NGS	36 JNT	
S16T021100				Formamide	75-12-7	14.74	NGS	61 JNT	
S16T021100				2,4-Azobis(2-oxazoline), 3,3-dimethyl	89315-91-9	15.10	NGS	240 JNT	
S16T021100				2-Butanone, 3-ethoxy-3-methyl-	35687-99-7	15.22	NGS	39 JNT	
S16T021100				Cyclopentane, ethyl-	1640-89-7	15.34	NGS	33 JNT	
S16T021100				1-Heptene, 6-methyl-	5026-76-6	15.80	NGS	100 JNT	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-H1

Customer Sample ID: 16-05982-2-H1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021100				1-Pentanol	71-41-0	15.87	NGS	39 JNT	
S16T021100				Heptane, 2-methyl-	592-27-8	15.97	NGS	249 JNT	
S16T021100				Heptane, 4-methyl-	589-53-7	16.02	NGS	73 JNT	
S16T021100				Octane, 4-ethyl-	15889-85-0	16.40	NGS	57 JNT	
S16T021100				Octane	111-65-9	16.64	NGS	189 JNT	
S16T021100				Cyclohexane, hexamethyl-	541-05-9	16.89	NGS	30 JNT	
S16T021100				Octane, 2-methyl-	3021-61-2	17.25	NGS	52 JNT	
S16T021100				Cyclohexane, ethyl-	1678-91-7	17.52	NGS	26 JNT	
S16T021100				Cyclooctane, butyl-	16538-93-5	17.66	NGS	56 JNT	
S16T021100				Heptane, 3-ethyl-	15889-80-4	18.09	NGS	25 JNT	
S16T021100				Nonane	111-84-2	18.63	NGS	25 JNT	
S16T021100				Cyclooctasioxane, octamethyl	556-67-2	20.21	NGS	260 JNT	
S16T021100				Decane, 2,4,6-trimethyl-	52103-27-4	22.78	NGS	100 JNT	
S16T021100				2,6-Dimethyldecane	13150-81-7	22.92	NGS	32 JNT	
S16T021100				Undecane	1120-21-4	23.54	NGS	33 JNT	
S16T021100				Undecane, 5,7-dimethyl-	17312-83-3	23.66	NGS	58 JNT	
S16T021100				Hydroxylamine, O-decyl-	28812-79-1	23.75	NGS	38 JNT	
S16T021100				Undecene-1	-	24.05	NGS	130 JNT	
S16T021100				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	32 JNT	
S16T021100				1,2-Benzisothiazole	272-16-2	26.15	NGS	53 JNT	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-H2

Customer Sample ID: 16-05982-2-H2

Sample	R	AS	GC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021101				2-Pentene, (E)-	946-04-8	5.16	NGS	440 JNT	
S16T021101				2(3H)-Furanone, dihydro-3,5-di	5145-01-7	5.34	NGS	38 JNT	
S16T021101				Butane, 2-methyl-	76-78-4	5.50	NGS	1.5E+03 JNT	
S16T021101				1,2-Pentadiene	591-95-7	5.68	NGS	30 JNT	
S16T021101				Unknown-1	-	6.18	NGS	4.0E+03 JT	
S16T021101				2-Pentene	109-65-2	6.48	NGS	410 JNT	
S16T021101				Cyclopropane, ethylidene-	18631-83-8	6.60	NGS	56 JNT	
S16T021101				2-Butene, 2-methyl-	513-35-9	6.74	NGS	200 JNT	
S16T021101				Cyclopropane, 1,2-dimethyl-, e	930-18-7	6.84	NGS	530 JNT	
S16T021101				1-Pentene	109-67-1	6.93	NGS	31 JNT	
S16T021101				2-Methyl-1-butene	563-46-2	7.02	NGS	43 JNT	
S16T021101				1,4-Pentadiene	591-93-5	7.26	NGS	75 JNT	
S16T021101				Butane, 2,2-dimethyl-	75-83-2	7.44	NGS	73 JNT	
S16T021101				1,3-Pentadiene	504-80-9	7.70	NGS	26 JNT	
S16T021101				Cyanoic acid, 2-methylpropyl es	1765-25-8	8.35	NGS	370 JNT	
S16T021101				Cyclopentane	287-92-3	8.69	NGS	430 JNT	
S16T021101				Pentane, 2-methyl-	107-83-5	8.81	NGS	840 JNT	
S16T021101				Pentane, 3-methyl-	66-14-0	9.48	NGS	130 JNT	
S16T021101				Cyclopentane, methyl-	66-37-7	11.85	NGS	260 JNT	
S16T021101				Tetrahydrofuran	109-99-9	11.93	NGS	540 JNT	
S16T021101				Cyclohexane, octamethyl	566-67-2	20.21	NGS	190 JNT	
S16T021101				Undecane, 4-methyl-	2960-69-0	22.49	NGS	47 JNT	
S16T021101				Decane, 2,4,6-trimethyl-	62108-27-4	22.79	NGS	67 JNT	
S16T021101				2,6-Dimethyldecane	13150-81-7	22.96	NGS	57 JNT	
S16T021101				Heptane, 5-ethyl-2,3-dimeth	62199-06-8	23.02	NGS	28 JNT	
S16T021101				Undecane, 5,7-dimethyl-	17312-83-3	23.66	NGS	48 JNT	
S16T021101				Decane, 2,3,5,8-tetramethyl-	163823-15-7	23.76	NGS	32 JNT	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-H2

Customer Sample ID: 16-05982-2-H2

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TOU VOA #2									
S16T021101				Unknown-2	--	24.05	NGS	190 JT	
S16T021101				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	27 JNT	
S16T021101				1,2-Benzisothiazole	272-16-2	26.16	NGS	34 JNT	
S16T021101				Undecane, 2-methyl-	7045-71-8	26.25	NGS	13 JNT	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162091

SDG Number:

Customer Sample ID: 16-05982-2-IN-BASE

Customer Sample ID: 16-05982-2-IN-BASE

Sample#	R	Alt	GC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021102				Hexanal	66-25-1	16.70	NGS	34	JNT
S16T021102				Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	390	JNT
S16T021102				Octane, 2,3,6,7-tetramethyl-	52670-34-5	22.49	NGS	35	JNT
S16T021102				Decane, 2,4,6-trimethyl-	62103-27-4	22.79	NGS	130	JNT
S16T021102				2,6-Dimethyldecane	13150-81-7	22.93	NGS	53	JNT
S16T021102				3,3-Dimethyldecane	563-16-6	23.68	NGS	84	JNT
S16T021102				Dodecane	112-40-3	23.75	NGS	63	JNT
S16T021102				Benzaldehyde, 2,5-bis(trimeth	50114-69-3	24.05	NGS	330	JNT
S16T021102				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	48	JNT
S16T021102				Acetic acid, trifluoro-, 3,7-d	26745-07-5	25.23	NGS	55	JNT
S16T021102				Unknown-1	-	25.83	NGS	37	JT
S16T021102				1,2-Benzisothiazole	272-16-2	26.15	NGS	160	JNT
S16T021102				Undecane, 2-methyl-	7045-71-8	26.25	NGS	58	JNT
S16T021102				1,2,3,4,5-Cyclopentamethyl	56772-25-9	26.43	NGS	40	JNT
S16T021102				Hexadecane, 2,6,11,15-tetramet	504-44-9	26.81	NGS	31	JNT

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-A1  
 Customer Sample ID: 16-05983-2-A1

Sample#	R	Alt	CAS #	Analysis	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR: TOU VOA #2															
S16T021105			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021105			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021105			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021105			107-05-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105			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	
S16T021105			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021105			123-91-1	1,4-Dioxane	NGS	92	<1.7	5.4	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021105			71-35-3	1-Butanol	NGS	93	<8.9	1.0E+04	n/a	n/a	n/a	n/a	8.9	n/a	ELY
S16T021105			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021105			71-23-8	1-Propanol	NGS	89	<3.0	1.8E+03	n/a	n/a	n/a	n/a	3.0	n/a	E
S16T021105			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	17	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021105			1706-29-8	2,5-Dihydrofuran	NGS	94	<2.6	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021105			78-93-3	2-Butanone	NGS	83	<1.9	1.2E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021105			110-43-0	2-Heptanone	NGS	88	<1.6	110	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105			591-78-6	2-Heptanone	NGS	86	<1.2	260	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021105			534-22-5	2-Methylfuran	NGS	89	<1.9	4.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021105			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021105			106-33-4	3-Heptanone	NGS	89	<1.5	94	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021105			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	20	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021105			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	100	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021105			67-64-1	Acetone	NGS	71	<4.3	4.1E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021105			75-05-8	Acetonitrile	NGS	88	<1.8	900	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021105			98-86-2	Acetophenone	NGS	93	<2.6	5.2	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021105			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021105			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

NA = Not Analyzed, ND = Not Detected  
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Y = Comment  
 Q = Qualitative

L = LLS Outside Range  
 B = Blank Contamination

*Cartridge*  
 8/16/2016

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092  
 SOG Number:  
 Customer Sample ID: 16-05983-2-A1  
 Customer Sample ID: 16-05983-2-A1

Sample	R	As	CAS #	Analyte	Unit	STD %	Blank	Resid	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Col Err %	Qual Flags
VAPOR: TOU VOA #2															
S16T021105			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021105			71-43-2	Benzene	NGS	93	<1.2	53	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021105			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021105			123-72-8	Benzal	NGS	95	<2.1	24.0	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021105			109-74-0	Butanenitrile	NGS	90	<1.2	15.0	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021105			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			75-00-3	Chloroethane	NGS	87	<1.9	4.8	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021105			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			110-82-7	Cyclohexane	NGS	92	<1.8	71	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021105			124-18-5	Decane	NGS	92	<2.8	35	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021105			84-17-5	Ethanol	NGS	85	<7.4	2.5E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021105			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			100-41-4	Ethylbenzene	NGS	93	<1.5	3.1	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021105			110-00-9	Furan	NGS	82	<1.6	25	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105			110-54-3	Hexane	NGS	88	<1.7	2.1E+03	n/a	n/a	n/a	n/a	1.7	n/a	E
S16T021105			828-73-9	Hexanenitrile	NGS	92	<1.5	42	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105			75-09-2	Methylene Chloride	NGS	85	3.4	2.9	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021105			91-20-3	Napthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021105			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021105			110-59-8	Pentanenitrile	NGS	91	<1.6	83	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105			107-12-0	Propanenitrile	NGS	90	<1.4	100	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021105			110-85-1	Pyridine	NGS	110	<3.8	39	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021105			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105			127-18-4	Tetrachloroethene	NGS	93	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021105			108-88-3	Toluene	NGS	92	<1.5	89	n/a	n/a	n/a	n/a	1.5	n/a	

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 NA = Not Analyzed, ND = Not Detected

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-A1  
 Customer Sample ID: 16-05983-2-A1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cot Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021105			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			75-69-4	Trichlorofluoromethane	NGS	84	<1.5	430	n/a	n/a	n/a	n/a	1.5	n/a	E
S16T021105			10081-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021105			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021105			142-82-5	n-Heptane	NGS	90	<1.4	910	n/a	n/a	n/a	n/a	1.4	n/a	E
S16T021105			10081-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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 B - Blank Contamination

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-A2  
 Customer Sample ID: 16-05983-2-A2

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc %	Qual Flag
VAPOR-TDU VOA #2															
S16T021106			70-34-5	1,1,2,2-Tetrachloroethane	NGS	83	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021106			70-00-5	1,1,2,2-Tetrachloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021106			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021106			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			842-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021106			109-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021106			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021106			71-35-3	1-Butanol	NGS	93	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021106			111-70-8	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021106			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021106			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021106			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021106			78-93-3	2-Butanone	NGS	83	<1.9	4.2	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021106			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021106			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021106			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021106			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021106			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021106			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	
S16T021106			87-64-1	Acetone	NGS	71	<4.3	64	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021106			75-09-8	Acetonitrile	NGS	86	<1.8	300	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021106			98-86-2	Acetophenone	NGS	93	<2.6	4.0	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021106			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021106			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
SDG Number:  
Customer Sample ID: 16-05983-2-A2  
Customer Sample ID: 16-05983-2-A2

Sample#	R	AI	CAS #	Analysis	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR: TOU VOA #2															
S16T021106			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021106			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021106			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021106			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021106			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021106			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021106			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			110-82-7	Cyclohexane	NGS	92	<1.8	5.3	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021106			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021106			64-17-5	Ethanol	NGS	85	<7.4	30	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021106			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			110-54-3	Hexane	NGS	85	<1.7	2.4	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021106			623-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			75-09-2	Methylene Chloride	NGS	85	3.4	4.6	n/a	n/a	n/a	n/a	2.7	n/a	BU
S16T021106			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021106			98-95-3	Nitrobenzene	NGS	90	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021106			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			107-12-0	Propanenitrile	NGS	90	<1.4	3.0	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021106			110-95-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021106			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			127-18-4	Tetrachloroethene	NGS	93	<1.6	82	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			106-88-3	Toluene	NGS	92	<1.5	2.0	n/a	n/a	n/a	n/a	1.5	n/a	J

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NA = Not Analyzed, ND = Not Detected

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-A2  
 Customer Sample ID: 16-05983-2-A2

Sample#	R	MS	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Crit Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021106			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			79-89-4	Trichlorofluorethene	NGS	84	<1.6	6.7	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021106			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021106			123-85-4	n-Butyl acetate	NGS	88	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021106			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021106			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	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-B1  
 Customer Sample ID: 16-05983-2-B1

Sample#	R	Alt	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VDA #2															
S16T021107			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021107			79-00-5	1,1,2,2-Tetrachloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021107			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021107			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			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	
S16T021107			108-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021107			123-81-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021107			71-36-3	1-Buanol	NGS	93	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021107			111-70-6	1-Heptanol	NGS	85	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021107			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021107			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021107			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021107			78-93-3	2-Butanone	NGS	83	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021107			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021107			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021107			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021107			108-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			108-88-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021107			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021107			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	
S16T021107			87-64-1	Acetone	NGS	71	<4.3	82	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021107			75-05-8	Acetonitrile	NGS	88	<1.8	1.1E+04	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021107			98-86-2	Acetophenone	NGS	93	<2.6	16	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021107			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021107			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

L - LLS Outside Range  
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 J - Estimated  
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 E - Outside Calibration Range

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-B1  
 Customer Sample ID: 16-05983-2-B1

Sample#	R	Adj	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cert Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021107			107-05-1	Allyl Chloride	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021107			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021107			100-47-0	Benzonitrile	NGS	90	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021107			123-72-8	Butanal	NGS	95	<2.1	2.7	n/a	n/a	n/a	n/a	2.1	n/a	J
S16T021107			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021107			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			75-00-3	Chloroethane	NGS	87	<1.9	3.7	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021107			57-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			110-82-7	Cyclohexane	NGS	92	<1.8	3.1	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021107			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021107			64-17-5	Ethanol	NGS	85	<7.4	300	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021107			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			110-54-3	Hexane	NGS	86	<1.7	2.4	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021107			528-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			75-08-2	Methylene Chloride	NGS	85	3.4	56	n/a	n/a	n/a	n/a	2.7	n/a	B
S16T021107			51-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021107			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021107			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			107-12-0	Propanenitrile	NGS	90	<1.4	3.8	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021107			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021107			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			127-18-4	Tetrachloroethene	NGS	93	<1.6	8.7	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			108-88-3	Toluene	NGS	92	<1.5	4.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-B1  
 Customer Sample ID: 16-05983-2-B1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR: TOU VOA #2															
S16T021107			73-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	n/a	1.5	n/a
S16T021107			75-09-4	Trichlorofluoromethane	NGS	84	<1.6	8.9	n/a	n/a	n/a	n/a	n/a	1.6	n/a J
S16T021107			10061-01-5	dis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	n/a	1.3	n/a
S16T021107			123-85-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	n/a	1.4	n/a
S16T021107			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	n/a	1.4	n/a
S16T021107			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	n/a	1.2	n/a

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 T = Tentatively Identified Compound

Y = Comment  
 Q = Qualitative

L - LLS Outside Range  
 B - Blank Contamination

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-BLANK

Customer Sample ID: 16-05983-2-BLANK

Sample#	R	As	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021108		79-34-5		1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021108		79-00-5		1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108		79-34-3		1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021108		75-35-4		1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021108		107-06-2		1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108		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	
S16T021108		106-46-7		1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021108		123-81-1		1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021108		71-36-3		1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021108		111-70-6		1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021108		71-23-8		1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021108		108-47-4		2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021108		1703-29-8		2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021108		79-93-3		2-Butanone	NGS	83	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021108		110-43-0		2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108		591-78-6		2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021108		534-22-5		2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021108		78-94-4		3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021108		106-35-4		3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108		106-68-3		3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021108		105-42-0		4-Methyl-2-heptanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021108		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	
S16T021108		67-64-1		Acetone	NGS	71	<4.3	7.6	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021108		75-05-8		Acetonitrile	NGS	88	<1.8	5.6	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021108		98-86-2		Acetophenone	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021108		107-13-1		Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021108		107-18-6		Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

L - LLS Outside Range  
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 E - Outside Calibration Range

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-BLANK  
 Customer Sample ID: 16-05983-2-BLANK

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021108			107-05-1	Allyl Chloride	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021108			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021108			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021108			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021108			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021108			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021108			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021108			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021108			84-17-5	Ethanol	NGS	85	<7.4	8.9	n/a	n/a	n/a	n/a	7.4	n/a	J
S16T021108			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021108			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			75-09-2	Methylene Chloride	NGS	85	3.4	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021108			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021108			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021108			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021108			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021108			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			127-18-4	Tetrachloroethene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			106-88-3	Toluene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

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 E = Outside Calibration Range  
 J = Estimated  
 T = Tentatively Identified Compound  
 Y = Comment  
 Q = Qualitative  
 L - LLS Outside Range  
 B - Blank Contamination

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-BLANK  
 Customer Sample ID: 16-05983-2-BLANK

Sample#	R	Alt	CAS #	Analysis	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021108			79-01-5	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021108			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021108			142-62-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021108			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	

NA = Not Analyzed, ND = Not Detected  
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 E = Outside Calibration Range

J - Estimated  
 T - Tentatively Identified Compound

Y - Comment  
 Q - Qualitative

L - LLS Outside Range  
 B - Blank Contamination

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-C1  
 Customer Sample ID: 16-05983-2-C1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cent Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021109			79-34-5	1,1,2,2-Tetrachloroethane	NGS	83	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021109			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021109			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021109			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			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	
S16T021109			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021109			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021109			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021109			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021109			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021109			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021109			1706-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021109			79-93-3	2-Butanone	NGS	83	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021109			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021109			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021109			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021109			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021109			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021109			106-10-1	4-Methyl-2-pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021109			67-64-1	Acetone	NGS	71	<4.3	1.30	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021109			75-05-8	Acetonitrile	NGS	88	<1.8	1.1E+03	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021109			98-86-2	Acetophenone	NGS	93	<2.6	13	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021109			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021109			107-16-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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 N = Named TIC  
 E = Outside Calibration Range

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
SDG Number:  
Customer Sample ID: 16-05983-2-C1  
Customer Sample ID: 16-05983-2-C1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021109			107-66-1	Methyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021109			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021109			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021109			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021109			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021109			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			75-00-3	Chloroethane	NGS	87	<1.9	4.9	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021109			87-68-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			110-82-7	Cyclohexane	NGS	92	<1.8	1.9	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021109			124-19-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021109			84-17-5	Ethanol	NGS	85	<7.4	1.2E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021109			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			110-54-3	Hexane	NGS	86	<1.7	1.8	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021109			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			75-09-2	Methylene Chloride	NGS	85	3.4	4.3	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021109			81-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021109			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021109			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			107-12-0	Propanenitrile	NGS	90	<1.4	2.3	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021109			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021109			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			127-18-4	Tetrachloroethene	NGS	93	<1.6	89	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			108-88-3	Toluene	NGS	92	<1.5	2.9	n/a	n/a	n/a	n/a	1.5	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-C1  
 Customer Sample ID: 16-05983-2-C1

Sample#	R	Adj	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cent Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021109			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			75-08-4	Trichlorofluoromethane	NGS	84	<1.6	43	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021109			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021109			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021109			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	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-D1  
 Customer Sample ID: 16-05983-2-D1

Sample#	R	Alt	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Dist Limit	Conc Err %	Qual Flags
VAPOR-TOU VQA #2															
S16T021110			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021110			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021110			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021110			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			842-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021110			108-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	Q
S16T021110			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021110			71-38-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021110			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	Q
S16T021110			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021110			103-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021110			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021110			78-93-3	2-Butanone	NGS	83	<1.9	5.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021110			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			591-78-8	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021110			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021110			78-54-4	3-Buten-2-one	NGS	87	<1.7	2.3	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021110			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			106-69-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021110			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021110			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	
S16T021110			87-64-1	Acetone	NGS	71	<4.3	650	n/a	n/a	n/a	n/a	4.3	n/a	E
S16T021110			75-05-8	Acetonitrile	NGS	86	<1.8	1.0E+03	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021110			98-86-2	Acetophenone	NGS	93	<2.6	5.0	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021110			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021110			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-D1  
 Customer Sample ID: 16-05983-2-D1

Sample	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Con Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021110			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021110			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021110			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Q
S16T021110			123-72-8	Butadiene	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021110			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021110			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			75-00-3	Chloroethane	NGS	87	<1.9	4.7	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021110			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021110			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	Q
S16T021110			64-17-5	Ethanol	NGS	85	<7.4	2.1E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021110			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			110-54-3	Heptane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021110			528-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			126-98-7	Methoxybenzene	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			75-09-2	Methylene Chloride	NGS	85	3.4	3.8	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021110			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	Q
S16T021110			98-95-3	Nitrobenzene	NGS	90	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021110			110-59-8	Pentanitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			107-12-0	Propanenitrile	NGS	90	<1.4	6.0	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021110			110-85-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021110			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			127-18-4	Tetrachloroethene	NGS	93	<1.6	87	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			108-88-3	Toluene	NGS	92	<1.5	2.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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 E - Outside Calibration Range

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-D1  
 Customer Sample ID: 16-05983-2-D1

Sample#	R	Adj	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021110			79-01-6	Trichloroethane	NGS	52	<1.5	<1.5	n/a	n/a	n/a	n/a	n/a	1.5	n/a
S16T021110			75-09-4	Trichlorofluoromethane	NGS	84	<1.6	130	n/a	n/a	n/a	n/a	n/a	1.6	n/a
S16T021110			10051-01-5	cis-1,3-Dichloropropene	NGS	52	<1.3	<1.3	n/a	n/a	n/a	n/a	n/a	1.3	n/a
S16T021110			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	n/a	1.4	n/a
S16T021110			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	n/a	1.4	n/a
S16T021110			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	n/a	1.2	n/a

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 NA = Not Analyzed, ND = Not Detected  
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 E = Outside Calibration Range

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-E1  
 Customer Sample ID: 16-05983-2-E1

Sample#	R	Alt	CAS#	Analysis	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TOU VDA #2															
S16T021111			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021111			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021111			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021111			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			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	
S16T021111			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	Q
S16T021111			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021111			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021111			111-70-6	1-Heptanol	NGS	85	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	Q
S16T021111			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021111			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021111			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021111			78-93-3	2-Butanone	NGS	83	<1.9	3.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021111			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			591-78-6	2-Hexanone	NGS	85	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021111			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021111			78-94-4	3-Buten-2-one	NGS	87	<1.7	2.1	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021111			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			105-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021111			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021111			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	
S16T021111			87-64-1	Acetone	NGS	71	<4.3	1.3E+03	n/a	n/a	n/a	n/a	4.3	n/a	E
S16T021111			75-65-8	Acetonitrile	NGS	88	<1.8	1.7E+03	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021111			88-86-2	Acetophenone	NGS	93	<2.6	5.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021111			107-13-1	Acrylonitrile	NGS	89	<1.7	1.9	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021111			107-18-6	Allyl Alcohol	NGS	86	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-E1  
 Customer Sample ID: 16-05983-2-E1

Sample #	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Resist	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Col Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021111			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021111			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021111			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Q
S16T021111			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021111			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021111			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			75-00-3	Chloroethane	NGS	87	<1.9	5.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021111			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021111			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	Q
S16T021111			64-17-5	Ethanol	NGS	85	<7.4	2.7E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021111			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			110-00-9	Furan	NGS	82	<1.6	3.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021111			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021111			629-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			128-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			75-09-2	Methylene Chloride	NGS	85	3.4	4.1	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021111			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	Q
S16T021111			98-95-3	Nitrobenzene	NGS	90	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021111			110-59-8	Pentanitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			107-12-0	Propanenitrile	NGS	90	<1.4	21	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021111			110-85-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021111			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			127-18-4	Tetrachloroethene	NGS	90	<1.6	85	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			106-88-3	Toluene	NGS	92	<1.5	2.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-E1  
 Customer Sample ID: 16-05983-2-E1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Car Err %	Qual Flags
VAPOR-TDU VOA #2															
S18T021111			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S18T021111			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	360	n/a	n/a	n/a	n/a	1.6	n/a	
S18T021111			10051-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S18T021111			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S18T021111			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S18T021111			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	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
SDG Number:  
Customer Sample ID: 16-05983-2-EFF-BASE  
Customer Sample ID: 16-05983-2-EFF-BASE

Sample#	R	AB	CAS #	Analysis	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TOU VOA #2															
S16T021112		79-34-5		1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021112		79-00-5		1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112		75-34-3		1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021112		75-35-4		1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021112		107-05-2		1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112		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	
S16T021112		108-46-7		1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021112		123-91-1		1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021112		71-36-3		1-Butanol	NGS	93	<3.9	1.0E+03	n/a	n/a	n/a	n/a	8.9	n/a ELY	
S16T021112		111-70-6		1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021112		71-23-8		1-Propanol	NGS	89	<3.0	14	n/a	n/a	n/a	n/a	3.0	n/a J	
S16T021112		108-47-4		2,4-Dimethylpyridine	NGS	95	<3.3	6.3	n/a	n/a	n/a	n/a	3.3	n/a J	
S16T021112		1706-29-8		2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021112		78-93-3		2-Butanone	NGS	83	<1.9	32	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021112		110-43-0		2-Heptanone	NGS	88	<1.6	140	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112		591-78-6		2-Hexanone	NGS	85	<1.2	68	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021112		534-22-5		2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021112		78-94-4		3-Buten-2-one	NGS	87	<1.7	14	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021112		106-35-4		3-Heptanone	NGS	89	<1.5	100	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112		109-68-3		3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021112		105-42-0		4-Methyl-2-hexanone	NGS	92	<1.3	8.6	n/a	n/a	n/a	n/a	1.3	n/a J	
S16T021112		108-10-1		4-Methyl-3-Pentanone	NGS	88	<1.9	11	n/a	n/a	n/a	n/a	1.9	n/a J	
S16T021112		87-64-1		Acetone	NGS	71	<4.3	110	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021112		75-05-8		Acetonitrile	NGS	88	<1.8	50	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021112		98-86-2		Acetophenone	NGS	93	<2.6	13	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021112		107-13-1		Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021112		107-18-6		Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-EFF-BASE

Customer Sample ID: 16-05983-2-EFF-BASE

Sample#	R	Adj	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cst Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021112			107-05-1	Methyl Chloride	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021112			71-43-2	Benzene	NGS	93	<1.2	4.2	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021112			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021112			123-72-8	Butanal	NGS	95	<2.1	21	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021112			109-74-0	Butanenitrile	NGS	90	<1.2	6.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021112			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021112			57-86-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			110-82-7	Cyclohexane	NGS	92	<1.8	9.1	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021112			124-18-5	Decane	NGS	92	<2.8	85	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021112			84-17-5	Ethanol	NGS	85	<7.4	20	n/a	n/a	n/a	n/a	7.4	n/a	J
S16T021112			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			100-41-4	Ethylbenzene	NGS	93	<1.5	3.2	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021112			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			110-54-3	Hexane	NGS	85	<1.7	82	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021112			828-73-9	Hexanenitrile	NGS	92	<1.5	24	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			75-09-2	Methylene Chloride	NGS	85	3.4	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021112			81-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021112			88-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021112			110-59-8	Pentanitrile	NGS	91	<1.6	13	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			107-12-0	Propenenitrile	NGS	90	<1.4	2.2	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021112			110-85-1	Pyridine	NGS	110	<3.8	7.0	n/a	n/a	n/a	n/a	3.8	n/a	J
S16T021112			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			127-18-4	Tetrachloroethene	NGS	93	<1.6	7.0	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021112			108-88-3	Toluene	NGS	92	<1.5	26	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-EFF-BASE  
 Customer Sample ID: 16-05983-2-EFF-BASE

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Crit Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021112			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	8.6	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021112			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021112			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021112			142-82-5	n-Heptane	NGS	90	<1.4	180	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021112			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	

L - ILS Outside Range  
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 NA = Not Analyzed, ND = Not Detected  
 N - Named TIC  
 E - Outside Calibration Range



# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-F1  
 Customer Sample ID: 16-05983-2-F1

Sample#	R	Adj	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cri Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021113			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021113			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			76-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021113			76-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021113			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			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	
S16T021113			108-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	Q
S16T021113			123-81-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021113			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021113			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	Q
S16T021113			71-23-8	1-Propanol	NGS	89	<3.0	4.0	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021113			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021113			1703-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021113			78-93-3	2-Butanone	NGS	83	<1.9	3.8	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021113			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021113			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021113			78-94-4	3-Buten-2-one	NGS	87	<1.7	6.2	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021113			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021113			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021113			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	
S16T021113			57-84-1	Acetone	NGS	71	<4.3	2.9E+03	n/a	n/a	n/a	n/a	4.3	n/a	E
S16T021113			75-05-8	Acetonitrile	NGS	88	<1.8	3.3E+03	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021113			98-86-2	Acetophenone	NGS	93	<2.6	5.0	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021113			107-13-1	Acrylonitrile	NGS	89	<1.7	2.4	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021113			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-F1  
 Customer Sample ID: 16-05983-2-F1

Sample#	R	Alt	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR:TDU VOA #2															
S16T021113			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021113			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021113			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Q
S16T021113			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021113			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021113			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			75-00-3	Chloroethane	NGS	87	<1.9	5.5	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021113			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021113			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	Q
S16T021113			64-17-5	Ethanol	NGS	85	<7.4	2.4E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021113			141-78-6	Ethyl acetate	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			110-09-9	Furan	NGS	82	<1.6	6.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021113			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021113			828-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			75-09-2	Methylene Chloride	NGS	85	3.4	4.4	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021113			91-20-3	Naphthalene	NGS	96	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	Q
S16T021113			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021113			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			107-12-0	Propanenitrile	NGS	90	<1.4	50	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021113			110-85-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021113			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			127-18-4	Tetrachloroethene	NGS	93	<1.6	60	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			108-88-3	Toluene	NGS	92	<1.5	2.0	n/a	n/a	n/a	n/a	1.5	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-F1  
 Customer Sample ID: 16-05983-2-F1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021113			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			75-09-4	Trichlorofluoromethane	NGS	84	<1.6	630	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021113			10061-01-5	dis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021113			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021113			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021113			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	

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J = Estimated  
 T = Tentatively Identified Compound

Y = Comment  
 Q = Qualitative

L = ILS Outside Range  
 B = Blank Contamination

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-G1  
 Customer Sample ID: 16-05983-2-G1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flag
VAPOR-TDU VOA #2															
S16T021114		79-34-5		1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021114		79-00-5		1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114		75-34-3		1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021114		75-35-4		1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021114		107-06-2		1,2-Dichloroethane	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114		542-75-6		1,3-Dichloropropane (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021114		106-46-7		1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021114		123-91-1		1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021114		71-36-3		1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021114		111-70-6		1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021114		71-23-8		1-Propanol	NGS	89	<3.0	6.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021114		108-47-4		2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021114		1709-29-8		2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021114		78-93-3		2-Butanone	NGS	83	<1.9	4.6	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021114		110-43-0		2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114		591-78-6		2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021114		834-22-5		2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021114		78-94-4		3-Buten-2-one	NGS	87	<1.7	3.9	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021114		106-35-4		3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114		106-68-3		3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021114		105-42-0		4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021114		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	
S16T021114		67-64-1		Acetone	NGS	71	<4.3	3.9E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021114		75-05-8		Acetonitrile	NGS	88	<1.8	9.0	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021114		98-86-2		Acetophenone	NGS	93	<2.6	4.4	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021114		107-13-1		Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021114		107-16-6		Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-G1  
 Customer Sample ID: 16-05983-2-G1

Sample#	R	AS	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021114			107-65-1	Methyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021114			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021114			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021114			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021114			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021114			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			75-00-3	Chloroethane	NGS	87	<1.9	4.2	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021114			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			110-82-7	Cyclohexane	NGS	92	<1.8	3.8	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021114			124-18-5	Decane	NGS	92	<2.8	3.1	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021114			84-17-5	Ethanol	NGS	85	<7.4	2.4E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021114			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			110-00-9	Furan	NGS	82	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			110-54-3	Hexane	NGS	86	<1.7	2.6	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021114			828-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			75-09-2	Methylene Chloride	NGS	85	3.4	4.1	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021114			91-20-3	Napthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021114			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021114			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			107-12-0	Propanenitrile	NGS	90	<1.4	110	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021114			110-85-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021114			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			127-18-4	Tetrachloroethene	NGS	93	<1.6	35	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			108-88-3	Toluene	NGS	92	<1.5	1.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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 NA = Not Analyzed, ND = Not Detected  
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 E - Outside Calibration Range

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-G1  
 Customer Sample ID: 16-05983-2-G1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Det Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021114			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			75-09-4	Trichlorofluoromethane	NGS	84	<1.6	1.3E+03	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021114			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021114			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021114			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021114			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	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-H1  
 Customer Sample ID: 16-05983-2-H1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Out Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021115			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021115			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021115			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021115			107-06-2	1,2-Dichloroethane	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			542-75-6	1,3-Dichloropropane (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021115			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021115			123-81-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021115			71-36-3	1-Butanol	NGS	93	<8.9	1.1E+04	n/a	n/a	n/a	n/a	8.9	n/a	ELY
S16T021115			111-70-6	1-Heptanol	NGS	85	<5.5	<5.5	n/a	n/a	n/a	n/a	5.5	n/a	
S16T021115			71-23-8	1-Propanol	NGS	89	<3.0	7.30	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021115			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021115			1709-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021115			78-93-3	2-Butanone	NGS	83	<1.9	1.3E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021115			110-43-0	2-Heptanone	NGS	88	<1.6	73	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			591-78-6	2-Hexanone	NGS	86	<1.2	240	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021115			534-22-5	2-Methylfuran	NGS	89	<1.9	3.0	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021115			78-94-4	3-Buten-2-one	NGS	87	<1.7	420	n/a	n/a	n/a	n/a	1.7	n/a	E
S16T021115			106-35-4	3-Heptanone	NGS	89	<1.5	60	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021115			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	17	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021115			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	91	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021115			67-64-1	Acetone	NGS	71	<4.3	4.3E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021115			75-05-8	Acetonitrile	NGS	88	<1.8	610	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021115			86-86-2	Acetophenone	NGS	93	<2.6	4.7	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021115			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021115			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-H1  
 Customer Sample ID: 16-05983-2-H1

Sample#	R	AF	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Out Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021115			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021115			71-43-2	Benzene	NGS	93	<1.2	37	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021115			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021115			123-72-5	Butanal	NGS	95	<2.1	200	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021115			109-74-0	Butanenitrile	NGS	90	<1.2	110	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021115			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021115			57-86-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			110-82-7	Cyclohexane	NGS	92	<1.8	120	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021115			124-18-5	Decane	NGS	92	<2.8	22	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021115			84-17-5	Ethanol	NGS	85	<7.4	1.2E+03	n/a	n/a	n/a	n/a	7.4	n/a	EY
S16T021115			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			100-41-4	Ethylbenzene	NGS	93	<1.5	2.2	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021115			110-00-9	Furan	NGS	82	<1.6	30	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			110-54-3	Hexane	NGS	86	<1.7	1.9E+03	n/a	n/a	n/a	n/a	1.7	n/a	E
S16T021115			628-73-9	Hexanenitrile	NGS	92	<1.5	27	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			126-99-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			75-08-2	Methylene Chloride	NGS	85	3.4	3.2	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021115			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021115			56-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021115			110-89-8	Pentanenitrile	NGS	91	<1.6	61	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			107-12-0	Propanenitrile	NGS	90	<1.4	140	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021115			110-86-1	Pyridine	NGS	110	<3.8	24	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021115			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			127-18-4	Tetrachloroethene	NGS	93	<1.6	8.5	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021115			108-88-3	Toluene	NGS	92	<1.5	68	n/a	n/a	n/a	n/a	1.5	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-H1  
 Customer Sample ID: 16-05983-2-H1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Sys Rec %	Det Limit	Crt Err %	Qual Flags
VAPOR-TDU NOA #2															
S16T021115			79-01-8	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			75-59-4	Trichlorofluoromethane	NGS	84	<1.6	280	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			10061-61-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021115			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021115			142-82-5	n-Heptane	NGS	90	<1.4	960	n/a	n/a	n/a	n/a	1.4	n/a	E
S16T021115			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	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-H2  
 Customer Sample ID: 16-05983-2-H2

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021116		79-34-5		1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021116		79-00-5		1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116		75-34-3		1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116		75-35-4		1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021116		107-06-2		1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116		542-75-6		1,3-Dichloropropene (Total)	NGS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116		106-46-7		1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021116		123-91-1		1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021116		71-36-3		1-Butanediol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021116		111-70-6		1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021116		71-23-8		1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021116		108-47-4		2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021116		1708-29-8		2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021116		78-93-3		2-Butanone	NGS	83	<1.9	7.6	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021116		110-43-0		2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116		591-78-6		2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116		534-22-5		2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021116		78-94-4		3-Buten-2-one	NGS	87	<1.7	7.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021116		106-35-4		3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116		106-68-3		3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021116		105-42-0		4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021116		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	
S16T021116		67-64-1		Acetone	NGS	71	<4.3	5.5E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021116		75-05-8		Acetonitrile	NGS	88	<1.8	770	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021116		96-86-2		Acetophenone	NGS	93	<2.6	7.6	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021116		107-13-1		Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021116		107-18-6		Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-H2  
 Customer Sample ID: 16-05983-2-H2

Sample#	R	AI	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cal Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021116			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021116			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021116			123-72-5	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021116			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116			58-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021116			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			110-82-7	Cyclohexane	NGS	92	<1.8	11	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021116			124-18-5	Decane	NGS	92	<2.8	3.4	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021116			84-17-5	Ethanol	NGS	85	<7.4	1.1E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021116			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			110-00-9	Furan	NGS	82	<1.6	15	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			110-54-3	Hexane	NGS	86	<1.7	7.1	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021116			528-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			75-08-2	Methylene Chloride	NGS	85	3.4	3.6	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021116			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021116			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021116			110-59-8	Penanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			107-12-0	Propanenitrile	NGS	90	<1.4	260	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021116			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021116			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			127-18-4	Tetrachloroethene	NGS	93	<1.8	30	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021116			103-85-3	Toluene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-H2  
 Customer Sample ID: 16-05983-2-H2

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021116			79-01-8	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	1000	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021116			10081-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021116			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021116			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021116			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	

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Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092  
 SDG Number:  
 Customer Sample ID: 16-05983-2-IN-BASE  
 Customer Sample ID: 16-05983-2-IN-BASE

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
VAPOR:TDU VOA #2														
S16T021117			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a
S16T021117			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a
S16T021117			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a
S16T021117			75-35-4	1,1-Dichloroethane	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a
S16T021117			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a
S16T021117			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
S16T021117			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a
S16T021117			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a
S16T021117			71-35-3	1-Buanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a
S16T021117			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a
S16T021117			71-23-8	1-Propanol	NGS	89	<3.0	8.7	n/a	n/a	n/a	n/a	3.0	n/a
S16T021117			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a
S16T021117			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a
S16T021117			78-93-3	2-Butanone	NGS	83	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a
S16T021117			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a
S16T021117			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a
S16T021117			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a
S16T021117			78-94-4	3-Butanol-2-one	NGS	87	<1.7	4.3	n/a	n/a	n/a	n/a	1.7	n/a
S16T021117			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a
S16T021117			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a
S16T021117			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a
S16T021117			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
S16T021117			67-64-1	Acetone	NGS	71	<4.3	120	n/a	n/a	n/a	n/a	4.3	n/a
S16T021117			75-05-8	Acetonitrile	NGS	88	<1.8	55	n/a	n/a	n/a	n/a	1.8	n/a
S16T021117			98-96-2	Acetophenone	NGS	93	<2.6	9.3	n/a	n/a	n/a	n/a	2.6	n/a
S16T021117			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a
S16T021117			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162032  
 SDG Number:  
 Customer Sample ID: 16-05983-2-IN-BASE  
 Customer Sample ID: 16-05983-2-IN-BASE

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
S16T021117			107-05-1	Allyl Chloride	NGS	86	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021117			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021117			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021117			123-72-8	Butanal	NGS	95	<2.1	2.6	n/a	n/a	n/a	n/a	2.1	n/a	J
S16T021117			106-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021117			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021117			87-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			110-82-7	Cyclohexane	NGS	92	<1.8	1.6	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021117			124-18-5	Decane	NGS	92	<2.8	3.4	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021117			64-17-5	Ethanol	NGS	85	<7.4	25	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021117			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			110-54-3	Hexane	NGS	86	<1.7	6.1	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021117			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			75-09-2	Methylene Chloride	NGS	85	3.4	3.4	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021117			91-20-3	Naphthalene	NGS	96	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021117			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021117			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			107-12-0	Propanenitrile	NGS	90	<1.4	6.4	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021117			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021117			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			127-18-4	Tetrachloroethene	NGS	93	<1.6	120	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			108-88-3	Toluene	NGS	92	<1.5	2.4	n/a	n/a	n/a	n/a	1.5	n/a	J

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-IN-BASE

Customer Sample ID: 16-05983-2-IN-BASE

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021117			79-01-6	Trichloroethane	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021117			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021117			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021117			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	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-A1

Customer Sample ID: 16-05983-2-A1

Sample#	R	AM	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TOU VOA #2									
S16T021105				2-Methyl-1-butene	563-46-2	5.27	NGS	140 JNT	
S16T021105				5-Methyl-oxazolidine	58328-22-6	5.33	NGS	51 JNT	
S16T021105				Butane, 2-methyl-	78-78-4	5.51	NGS	720 JNT	
S16T021105				Cyclopropane, ethyl-	1191-86-4	6.02	NGS	2.1E+03 JNT	
S16T021105				Pentane	109-66-0	6.26	NGS	1.7E+03 JNT	
S16T021105				2-Pentene	109-68-2	6.55	NGS	260 JNT	
S16T021105				2-Pentene, (E)-	646-04-8	6.81	NGS	110 JNT	
S16T021105				Cyclobutane, 2,2,3-trimethyl	1449-49-6	6.92	NGS	340 JNT	
S16T021105				1-Pentene	109-67-1	7.00	NGS	76 JNT	
S16T021105				2-Propanol, 2-methyl-	75-65-0	7.16	NGS	290 JNT	
S16T021105				1-Pentene, 4-methyl-	691-37-2	8.41	NGS	480 JNT	
S16T021105				1-Pentene, 3-methyl-	760-20-3	8.45	NGS	140 JNT	
S16T021105				Cyclopentane	281-62-3	8.75	NGS	240 JNT	
S16T021105				Pentane, 2-methyl-	107-83-5	8.88	NGS	2.3E+03 JNT	
S16T021105				2,4-Hexadiene, (Z,Z)-	6108-61-8	9.17	NGS	37 JNT	
S16T021105				Pentane, 3-methyl-	96-14-0	9.54	NGS	520 JNT	
S16T021105				1-Hexene	592-41-6	9.92	NGS	900 JNT	
S16T021105				2-Hexene	592-43-8	10.66	NGS	79 JNT	
S16T021105				4-Penten-1-ol, 3-methyl-	51174-44-8	11.09	NGS	49 JNT	
S16T021105				2-Hexene, (E)-	4050-45-7	11.17	NGS	47 JNT	
S16T021105				Cyclopropane, 1-ethyl-2-methyl	19781-68-1	11.43	NGS	140 JNT	
S16T021105				Isobutanol	78-83-1	11.62	NGS	78 JNT	
S16T021105				5-Methyl-5-hexen-3-ol	87760-89-8	11.71	NGS	100 JNT	
S16T021105				Cyclopentane, methyl-	96-37-7	11.90	NGS	210 JNT	
S16T021105				Tetrahydrofuran	108-99-9	11.94	NGS	880 JNT	
S16T021105				3-Buten-1-ol	627-27-0	12.11	NGS	35 JNT	
S16T021105				Amylene Hydrate	75-85-4	12.36	NGS	130 JNT	

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8/16/2016



# Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-A1

Customer Sample ID: 16-05983-2-A1

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TOU VOA #2									
S16T021105				Cyclopentane, 1,3-dimethyl-, c	1192-19-3	12.58	NGS		22 JNT
S16T021105				(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.91	NGS		110 JNT
S16T021105				Hexane, 2-methyl-	591-78-4	13.42	NGS		480 JNT
S16T021105				Pentane, 2,3-dimethyl-	565-59-3	13.54	NGS		95 JNT
S16T021105				Hexane, 3-methyl-	589-34-4	13.73	NGS		850 JNT
S16T021105				Ethylcyclobutane	1528-21-8	13.93	NGS		52 JNT
S16T021105				Ethylene Glycol	107-21-1	14.02	NGS		490 JNT
S16T021105				Cyclopentane, 1,3-dimethyl-	2453-00-1	14.12	NGS		150 JNT
S16T021105				Hydroxylamine, O-(3-methylbutyl	19411-65-5	14.19	NGS		1.1E+03 JNT
S16T021105				2-Pentanol	8032-29-7	14.35	NGS		150 JNT
S16T021105				(Z)-3-Heptene	7042-10-6	14.52	NGS		39 JNT
S16T021105				3-Hexene, 2-methyl-, (Z)-	15840-80-5	14.62	NGS		54 JNT
S16T021105				Tetrahydrofuran, 2,2-dimethyl-	1003-17-4	14.80	NGS		75 JNT
S16T021105				1-Hexene, 3,5-dimethyl-	7423-69-0	14.86	NGS		42 JNT
S16T021105				Unknown-1	-	14.92	NGS		51 JT
S16T021105				Butane, 2-cyclopropyl-	5750-02-7	15.04	NGS		52 JNT
S16T021105				2,4-Azetinedione, 3,3-diallyl	69315-91-9	15.19	NGS		470 JNT
S16T021105				Quinane, 2-(1,1-dimethylethyl)	5397-30-6	15.25	NGS		61 JNT
S16T021105				2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15.31	NGS		180 JNT
S16T021105				Hexane, 2,4-dimethyl-	589-43-5	15.37	NGS		45 JNT
S16T021105				Cyclopropane, 1,1-dimethyl-	1003-19-6	15.42	NGS		94 JNT
S16T021105				Unknown-2	-	15.82	NGS		55 JT
S16T021105				1-Heptene, 6-methyl-	5026-76-6	15.91	NGS		210 JNT
S16T021105				1-Pentanol	71-41-0	15.97	NGS		120 JNT
S16T021105				Heptane, 2-methyl-	582-27-8	16.08	NGS		270 JNT
S16T021105				Heptane, 4-methyl-	589-53-7	16.13	NGS		72 JNT
S16T021105				Heptane, 3,4,5-trimethyl-	20278-89-1	16.25	NGS		73 JNT

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-A1

Customer Sample ID: 16-05983-2-A1

Sample#	R	Alt	OC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TOU VOA #2									
S16T021105				2-Hexano, 5,5-dimethyl-, (2Z)-	33761-61-0	16.51	NGS	180 JNT	
S16T021105				Octane	111-65-9	16.77	NGS	170 JNT	
S16T021105				Cyclohexane, 1,2-dimethyl-	583-57-3	16.95	NGS	56 JNT	
S16T021105				Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	74 JNT	
S16T021105				Octane, 2-methyl-	3221-61-2	17.41	NGS	72 JNT	
S16T021105				Cyclohexane, ethyl-	1678-91-7	17.68	NGS	82 JNT	
S16T021105				1,1,4-Trimethylcyclohexane	7084-27-1	17.83	NGS	120 JNT	
S16T021105				Ethyl, hexyl pentyl	32357-83-8	18.07	NGS	27 JNT	
S16T021105				Cyclohexane, 1,2,4-trimethyl-	2234-75-5	18.14	NGS	28 JNT	
S16T021105				Heptane, 4-propyl-	5178-29-8	18.27	NGS	29 JNT	
S16T021105				Cyclooctane, butyl-	16538-93-5	18.69	NGS	39 JNT	
S16T021105				Nonane	111-84-2	18.83	NGS	29 JNT	
S16T021105				Cyclohexane, 1-ethyl-2-methyl-	3728-54-9	18.89	NGS	51 JNT	
S16T021105				di-1-Ethyl-3-methyl-cyclohexa	18489-10-2	18.95	NGS	30 JNT	
S16T021105				Cyclooctane, methyl-	1502-38-1	19.13	NGS	29 JNT	
S16T021105				Cyclohexane, 1-methyl-2-propyl	4291-79-6	19.37	NGS	26 JNT	
S16T021105				10-Henicosene (c.1)	35008-11-0	19.42	NGS	44 JNT	
S16T021105				2,6-Dimethyldecane	13150-81-7	19.67	NGS	27 JNT	
S16T021105				1-Methylcyclooctene	833-11-9	19.72	NGS	32 JNT	
S16T021105				Cyclohexane, propyl-	1678-92-8	19.87	NGS	37 JNT	
S16T021105				Heptane, 3-ethyl-2-methyl-	14676-29-0	19.90	NGS	57 JNT	
S16T021105				2-Heptanone, 6-methyl-	928-68-7	20.27	NGS	130 JNT	
S16T021105				Cyclooctasiloxane, octamethyl	555-67-2	20.48	NGS	220 JNT	
S16T021105				Cyclohexane, 1,1,2,3-tetrameth	8763-92-2	20.84	NGS	75 JNT	
S16T021105				1-Cyclohexynone	114614-84-5	21.18	NGS	60 JNT	
S16T021105				1-Octanol, 2-butyl-	3913-02-8	21.26	NGS	73 JNT	
S16T021105				Unknown-3	-	21.38	NGS	28 JNT	

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

Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-A1

Customer Sample ID: 16-05983-2-A1

Sample	R	AS	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TOU VQA #2									
S16T021105				m-Menthane, (1S,3R)-(+)-	13837-65-6	21.72	NGS	28 JNT	
S16T021105				Decane, 2,6,7-trimethyl-	52108-25-2	22.00	NGS	91 JNT	
S16T021105				3-Octene, 2,2-dimethyl-	86869-76-3	22.26	NGS	38 JNT	
S16T021105				1-Cyclohexylheptane	114614-83-4	22.67	NGS	43 JNT	
S16T021105				Decane, 2,4,6-trimethyl-	52108-27-4	23.00	NGS	150 JNT	
S16T021105				Undecane	1120-21-4	23.14	NGS	75 JNT	
S16T021105				2-Methyl-1-undecanol	10522-26-6	23.20	NGS	26 JNT	
S16T021105				1-Ethyl-2,2,6-trimethylcyclohexane	71186-27-1	23.31	NGS	56 JNT	
S16T021105				Decalylidene-naphthalene	493-02-7	23.56	NGS	100 JNT	
S16T021105				2-Hexyl-1-octanol	10780-79-1	23.74	NGS	91 JNT	
S16T021105				Unknown-4	-	23.79	NGS	64 JT	
S16T021105				2,3-Dimethyldecane	17312-44-6	23.85	NGS	150 JNT	
S16T021105				1-Decanol, 2-hexyl-	2426-77-6	23.94	NGS	110 JNT	
S16T021105				Unknown-5	-	24.26	NGS	320 JT	
S16T021105				1-Heptadecyne	26186-00-5	24.45	NGS	26 JNT	
S16T021105				Unknown-6	-	24.58	NGS	88 JT	
S16T021105				Cyclotridecane	295-02-3	24.64	NGS	45 JNT	
S16T021105				Unknown-7	-	24.85	NGS	110 JT	
S16T021105				Dichloroacetic acid, tetradecyl	83005-02-1	24.90	NGS	63 JNT	
S16T021105				Unknown-8	-	25.02	NGS	80 JT	
S16T021105				7-Octadecyne, 2-methyl-	33354-38-2	25.13	NGS	54 JNT	
S16T021105				2-Piperidinone, N-(4-bromo-n-b	195194-60-0	25.26	NGS	45 JNT	
S16T021105				4-Chloro-3-n-hexyltetrahydroxy	66555-66-6	25.36	NGS	35 JNT	
S16T021105				Unknown-9	-	25.41	NGS	28 JT	
S16T021105				Undecane, 2,6-dimethyl-	17301-23-4	25.49	NGS	44 JNT	
S16T021105				Cyclotetradecane, 2-butyl-1,1,3-tri	54676-39-0	26.07	NGS	63 JNT	
S16T021105				Undecane, 2-methyl-	7045-71-8	26.45	NGS	92 JNT	

NA = Not Analyzed, ND = Not Detected  
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Y - Tentatively Identified Compound  
N - Narrowed TIC  
E - Outside Calibration Range

L - LLS Outside Range  
B - Blank Contamination

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-A1

Customer Sample ID: 16-05983-2-A1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021105				1,2,3,4,5-Cyclopentanepentol	58773-25-9	26.65	NGS	50 JNT	
S16T021105				Dodecane, 2,6,11-trimethyl-	31295-56-4	27.03	NGS	34 JNT	
S16T021105			BLNK	Unknown-1	-	8.24	NGS	30	

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N = Named TIC  
E = Outside Calibration Range

J - Estimated  
T - Tentatively Identified Compound

Y - Comment  
Q - Qualitative

L - LLS Outside Range  
B - Blank Contamination

Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-A2

Customer Sample ID: 16-05983-2-A2

Sample#	R	Ad	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021106				Formamide	75-12-7	14.02	NGS	32	JNT
S16T021106				Cyclotrisiloxane, octamethyl	556-67-2	20.48	NGS	550	JNT
S16T021106				Decane, 2,4,6-trimethyl-	52106-27-4	23.01	NGS	92	JNT
S16T021106				3,3-Dimethylhexane	563-16-6	23.14	NGS	40	JNT
S16T021106				2,3-Dimethyldecane	17312-44-6	23.79	NGS	27	JNT
S16T021106				Undecane	1120-21-4	23.85	NGS	100	JNT
S16T021106				Dodecane	112-40-3	23.95	NGS	64	JNT
S16T021106				1-Octanol, 2-butyl-	3913-02-8	24.06	NGS	26	JNT
S16T021106				Unknown-1	-	24.26	NGS	830	JT
S16T021106				Unknown-2	-	24.85	NGS	25	JT
S16T021106				2,6-Dimethyldecane	13150-81-7	25.28	NGS	26	JNT
S16T021106				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	61	JNT
S16T021106				4-Undecene, 4-methyl-	81142-40-3	26.01	NGS	99	JNT
S16T021106				Methanamine	100-97-0	26.22	NGS	35	JNT
S16T021106				1,2-Benzisothiazole	272-16-2	26.33	NGS	42	JNT
S16T021106				Undecane, 2-methyl-	7045-71-8	26.46	NGS	89	JNT
S16T021106				1-Iodo-2-methylundecane	73165-67-6	26.58	NGS	28	JNT
S16T021106				Silane, trimethyl(2-methyl)-	97778-15-9	26.66	NGS	67	JNT
S16T021106				Octane, 2,3,6,7-tetramethyl-	52670-34-5	27.04	NGS	40	JNT
S16T021106			BLNK	Unknown-1	-	8.24	NGS	30	

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E = Outside Calibration Range

Y = Comment  
Q = Qualitative

L = LLS Outside Range  
B = Blank Contamination

J = Estimated  
T = Tentatively Identified Compound

Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-B1

Customer Sample ID: 16-05983-2-B1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021107				Formamide	75-12-7	14.05	NGS	57 JNT	
S16T021107				Propane, 2-methyl-1-nitro-	825-74-1	16.49	NGS	28 JNT	
S16T021107				Cyclostrasiloxane, octamethyl	556-87-2	20.48	NGS	260 JNT	
S16T021107				Decane, 2,4,6-trimethyl-	62108-27-4	23.01	NGS	75 JNT	
S16T021107				3,3-Dimethylhexane	563-16-6	23.14	NGS	32 JNT	
S16T021107				Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	34 JNT	
S16T021107				Undecane	1120-21-4	23.85	NGS	85 JNT	
S16T021107				Hexyl octyl ether	17071-54-4	23.95	NGS	72 JNT	
S16T021107				2,3-Dimethyldecane	17312-44-6	24.07	NGS	28 JNT	
S16T021107				Unknown-1	-	24.26	NGS	430 JT	
S16T021107				1-Octanol, 2-butyl-	3913-02-8	24.85	NGS	37 JNT	
S16T021107				Dodecane	112-40-3	25.28	NGS	61 JNT	
S16T021107				1-Octene, 3,7-dimethyl-	4984-01-4	25.41	NGS	71 JNT	
S16T021107				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.98	NGS	30 JNT	
S16T021107				Unknown-2	-	26.01	NGS	98 JT	
S16T021107				1,2-Benzisothiazole	272-16-2	26.33	NGS	130 JNT	
S16T021107				Unknown-3	-	26.45	NGS	100 JT	
S16T021107				Dodecane, 2,6,11-trimethyl-	31295-56-4	26.57	NGS	37 JNT	
S16T021107				Heptadecane, 2,6,10,15-tetrame	54833-48-6	26.66	NGS	47 JNT	
S16T021107				Tetradecane, 1-iodo-	19218-94-1	27.04	NGS	65 JNT	
S16T021107			BLNK	Unknown-1	-	8.24	NGS	30	

NA = Not Analyzed, ND = Not Detected  
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E = Outside Calibration Range

J - Estimated  
Y - Tentatively Identified Compound

L - LLS Outside Range  
B - Blank Contamination

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
SDG Number:  
Customer Sample ID: 16-05983-2-BLANK  
Customer Sample ID: 16-05983-2-BLANK

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VQA #2									
S16T021108				Unknown-1	-	8.24	NGS	57 JT	
S16T021108				2,2,7,7-tetramethyloctane	1071-31-4	21.52	NGS	55 JNT	
S16T021108				Dodecane, 2,6,10-trimethyl-	3681-85-3	22.71	NGS	26 JNT	
S16T021108				Undecane, 3-methyl-	1002-43-3	23.55	NGS	7.7 JNT	
S16T021108			BLNK	Unknown-1	-	8.24	NGS	30	

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

Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-C1

Customer Sample ID: 16-05983-2-C1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021109				Acetic anhydride	106-24-7	5.30	NGS	52 JNT	
S16T021109				Pentane	109-66-0	5.35	NGS	110 JNT	
S16T021109				Formamide	75-12-7	14.06	NGS	71 JNT	
S16T021109				Propene, 2-methyl-1-nitro-	625-74-1	16.52	NGS	39 JNT	
S16T021109				Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	250 JNT	
S16T021109				Decane, 2,4,6-trimethyl-	62108-27-4	23.01	NGS	59 JNT	
S16T021109				Undecane	1120-21-4	23.14	NGS	24 JNT	
S16T021109				Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	37 JNT	
S16T021109				Dodecane	112-40-3	23.85	NGS	67 JNT	
S16T021109				Tridecane	629-50-5	23.95	NGS	57 JNT	
S16T021109				Unknown-1	-	24.26	NGS	430 JT	
S16T021109				Tetradecane, 1-iodo-	16218-94-1	25.28	NGS	92 JNT	
S16T021109				Unknown-2	-	26.01	NGS	93 JT	
S16T021109				1,2-Benzisothiazole	272-16-2	26.32	NGS	160 JNT	
S16T021109				Undecane, 2-methyl-	7045-71-8	26.45	NGS	90 JNT	
S16T021109				Dodecane, 2,6,11-trimethyl-	31295-56-4	26.58	NGS	17 JNT	
S16T021109				2,6-Dimethyldodecane	13150-81-7	26.59	NGS	33 JNT	
S16T021109				Silane, trimethyl-3-penten-2-yl	53264-56-5	26.65	NGS	62 JNT	
S16T021109				Octane, 2,3,6,7-tetramethyl-	52670-34-5	27.03	NGS	52 JNT	
S16T021109		BLNK		Unknown-1	-	8.24	NGS	30	

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J - Estimated  
Y - Tentatively Identified Compound

Y - Comment  
Q - Qualitative

L - LLS Outside Range  
B - Blank Contamination



Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-D1

Customer Sample ID: 16-05983-2-D1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (minutes)	Unit	Result	Qual Flags
VAPOR-TDU VQA #2									
S16T021110				Cyclobutylamine	2516-34-9	5.23	NGS	37 JNT	
S16T021110				2-Butene	107-01-7	5.35	NGS	30 JNT	
S16T021110				4-Methoxy-1-pentene	56380-09-5	7.15	NGS	49 JNT	
S16T021110				Formamide	75-12-7	14.05	NGS	65 JNT	
S16T021110				Propane, 2-methyl-1-nitro-	555-74-1	16.49	NGS	53 JNT	
S16T021110				Cyclohexanone, octamethyl	555-67-2	20.48	NGS	1.5E+03 JNT	
S16T021110				1,1,1,3,5,5,5-Heptamethyl-1,3,5-trimethyl-	1873-83-7	22.50	NGS	27 JNT	
S16T021110				Decane, 2,4,6-trimethyl-	82108-27-4	23.00	NGS	210 JNT	
S16T021110				2,6-Dimethyldecane	13150-81-7	23.14	NGS	90 JNT	
S16T021110				2-Hexyl-1-octanol	18780-79-1	23.55	NGS	44 JNT	
S16T021110				3,3-Dimethylhexane	563-18-6	23.85	NGS	220 JNT	
S16T021110				Undecane, 2,6-dimethyl-	17301-23-4	23.94	NGS	100 JNT	
S16T021110				1-Bromo-4-bromomethyldecane	81638-11-0	24.07	NGS	110 JNT	
S16T021110				Unknown-1	-	24.26	NGS	2.5E+03 JT	
S16T021110				(2,2,6-Trimethyl-bicyclo[4.1.0]	78956-11-9	24.85	NGS	56 JNT	
S16T021110				Benzoic acid, 4-ethoxy-, ethyl	23576-09-7	25.07	NGS	76 JNT	
S16T021110				(R)-(-)-14-Methyl-3-hexadecyn-	84566-18-3	25.15	NGS	33 JNT	
S16T021110				3,7,11,15-Tetramethyl-2-hexadec-	102603-53-7	25.28	NGS	33 JNT	
S16T021110				2,6-Dimethyl-8-trifluoromethyl-	81686-67-2	25.41	NGS	80 JNT	
S16T021110				2-Dodecan-1-yl(-)leucidin anhydride	19780-11-1	25.96	NGS	43 JNT	
S16T021110				2-Propenoic acid, octyl ester	2499-39-4	26.00	NGS	75 JNT	
S16T021110				1,2-Benzothiazole	272-16-2	26.32	NGS	50 JNT	
S16T021110				Undecane, 2-methyl-	7045-71-8	26.44	NGS	310 JNT	
S16T021110				1-Iodo-2-methylundecane	73105-67-6	26.57	NGS	82 JNT	
S16T021110				Silane, trimethyl[2-methylene-	39778-15-9	26.65	NGS	260 JNT	
S16T021110				Tetraoctane, 3,5,24-trimethyl	55162-81-3	26.75	NGS	44 JNT	
S16T021110				2-Piperidine, N-14-bromo-n-b	195194-80-0	26.82	NGS	60 JNT	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-D1

Customer Sample ID: 16-05983-2-D1

Sample#	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021110				Dodecane	112-40-3	27.03	NGS	140 JNT	
S16T021110				Unknown-2	-	27.32	NGS	72 JT	
S16T021110			BLNK	Unknown-1	-	8.24	NGS	30	

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J - Estimated  
 T - Tentatively Identified Compound

Y - Comment  
 Q - Qualitative

L - LLS Outside Range  
 B - Blank Contamination

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-E1

Customer Sample ID: 16-05983-2-E1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR:TDU VOA #2									
S16T021111				Acetic anhydride	106-24-7	5.35	NGS	370 JNT	
S16T021111				Formamide	75-12-7	14.10	NGS	110 JNT	
S16T021111				Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	460 JNT	
S16T021111				Urea	57-13-6	20.86	NGS	76 JNT	
S16T021111				Decane, 2,4,6-trimethyl-	82108-27-4	23.00	NGS	86 JNT	
S16T021111				Undecane	1120-21-4	23.14	NGS	43 JNT	
S16T021111				Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	30 JNT	
S16T021111				2,6-Dimethyldecane	13150-81-7	23.85	NGS	120 JNT	
S16T021111				Octane, 2,3,6,7-tetramethyl-	52670-34-5	23.94	NGS	56 JNT	
S16T021111				1-Octanol, 2-butyl-	5913-02-8	24.06	NGS	40 JNT	
S16T021111				Unknown-1	-	24.26	NGS	830 JT	
S16T021111				Hydroxylamine, O-decyl-	23812-79-1	25.28	NGS	50 JNT	
S16T021111				1,2-Benzisothiazole	272-16-2	26.32	NGS	81 JNT	
S16T021111				Undecane, 2-methyl-	7045-71-8	26.44	NGS	110 JNT	
S16T021111				1-Iodo-2-methylundecane	73105-67-6	26.57	NGS	42 JNT	
S16T021111				Silane, trimethyl(2-methyl)ene-	97718-15-9	26.65	NGS	87 JNT	
S16T021111				Decane, 2,6,8-trimethyl-	82108-26-3	27.03	NGS	53 JNT	
S16T021111			BLNK	Unknown-1	-	8.24	NGS	30	

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B - Blank Contamination

Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092  
SDG Number:  
Customer Sample ID: 16-05983-2-EFF-BASE  
Customer Sample ID: 16-05983-2-EFF-BASE

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021112				Unknown-1	-	8.23	NGS	25	JT
S16T021112				Perthane, 2-methyl-	107-83-5	8.88	NGS	32	JNT
S16T021112				Tetrahydrofuran	109-99-9	11.94	NGS	20	JNT
S16T021112				Hexane, 3-methyl-	599-34-4	13.72	NGS	41	JNT
S16T021112				Ethylene Glycol	107-21-1	13.92	NGS	51	JNT
S16T021112				Formamide	75-12-7	14.05	NGS	28	JNT
S16T021112				(Z)-Hex-2-ene, 5-methyl-	13151-17-2	14.17	NGS	72	JNT
S16T021112				2,4-Azeldione, 3,3-dithy	89315-91-9	15.19	NGS	30	JNT
S16T021112				Heptane, 2-methyl-	592-27-9	16.08	NGS	72	JNT
S16T021112				Octane	111-65-9	16.77	NGS	110	JNT
S16T021112				Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	44	JNT
S16T021112				1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	36	JNT
S16T021112				Octane, 3-methyl-	2216-33-3	18.28	NGS	38	JNT
S16T021112				Nonane	111-84-2	18.83	NGS	110	JNT
S16T021112				Heptanal	111-71-7	18.97	NGS	47	JNT
S16T021112				Undecanal	112-44-7	19.42	NGS	20	JNT
S16T021112				Octane, 3,6-dimethyl-	15869-94-0	19.87	NGS	49	JNT
S16T021112				2-Heptanone, 6-methyl-	328-68-7	20.27	NGS	210	JNT
S16T021112				Cyclotetrasiloxane, octamethyl	558-67-2	20.48	NGS	300	JNT
S16T021112				Cyclohexane, 1,1,2,3-tetrameth	8783-92-2	20.84	NGS	31	JNT
S16T021112				Heaodecanal, 2-methyl-	55019-46-0	21.18	NGS	73	JNT
S16T021112				Decane, 2,6,7-trimethyl-	52108-25-2	22.00	NGS	81	JNT
S16T021112				Cyclohexane, 1-methyl-5-(1-met	1461-27-4	22.62	NGS	36	JNT
S16T021112				1-Cyclohexylheptene	114614-63-4	22.67	NGS	27	JNT
S16T021112				Undecane	1120-21-4	23.01	NGS	130	JNT
S16T021112				2,6-Dimethyldecane	13150-81-7	23.14	NGS	48	JNT
S16T021112				1-Ethyl-2,2,6-trimethylcyclohe	71185-27-1	23.31	NGS	31	JNT

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L - LLS Outside Range  
B - Blank Contamination

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092  
SDG Number:  
Customer Sample ID: 16-05983-2-EFF-BASE  
Customer Sample ID: 16-05983-2-EFF-BASE

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021112				1,14-Tetradecanediol	15612-64-7	23.56	NGS	43 JNT	
S16T021112				Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	90 JNT	
S16T021112				Decane, 2,4,6-trimethyl-	62108-27-4	23.85	NGS	110 JNT	
S16T021112				Hexyl octyl ether	17071-54-4	23.94	NGS	100 JNT	
S16T021112				Unknown-2	-	24.26	NGS	340 JT	
S16T021112				cis-9,10-Epoxyoctadecan-1-ol	13590-12-6	24.85	NGS	43 JNT	
S16T021112				Dodecane	112-40-3	25.28	NGS	73 JNT	
S16T021112				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	91 JNT	
S16T021112				Octane, 4-ethyl-	15849-36-0	25.49	NGS	25 JNT	
S16T021112				Unknown-3	-	25.99	NGS	62 JT	
S16T021112				1-Octanol, 2-butyl-	3913-02-8	26.07	NGS	26 JNT	
S16T021112				Methanamine	100-97-0	26.19	NGS	53 JNT	
S16T021112				1,2-Benzisothiazole	272-16-2	26.31	NGS	190 JNT	
S16T021112				Unknown-4	-	26.43	NGS	73 JT	
S16T021112				Heptadecane, 2,6,10,15-tetrame	54833-48-6	26.63	NGS	41 JNT	
S16T021112				Undecane, 2-methyl-	7045-71-8	27.02	NGS	44 JNT	
S16T021112		BLNK		Unknown-1	-	8.24	NGS	30	

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

Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-F1

Customer Sample ID: 16-05983-2-F1

Sample#	R	Ad	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021113				1,3-Butadiene	106-99-0	5.04	NGS	12 JNT	
S16T021113				Acetic anhydride	108-24-7	5.31	NGS	33 JNT	
S16T021113				Acetic acid	64-19-7	9.49	NGS	12 JNT	
S16T021113				Formamide	75-12-7	14.10	NGS	140 JNT	
S16T021113				Propane, 2-methyl-1-nitro-	825-74-1	16.47	NGS	25 JNT	
S16T021113				Cyclohexane, octamethyl	566-67-2	20.48	NGS	1.2E+03 JNT	
S16T021113				2,2,7,7-Tetramethyloctane	1071-31-4	21.51	NGS	76 JNT	
S16T021113				Decane, 2,4,6-trimethyl-	82106-27-4	22.71	NGS	52 JNT	
S16T021113				2,6-Dimethyldodecane	13150-91-7	23.01	NGS	150 JNT	
S16T021113				Unknown-1	-	23.14	NGS	77 JT	
S16T021113				2-Hexyl-1-octanol	19780-79-1	23.55	NGS	48 JNT	
S16T021113				2-Piperidinone, N-(4-bromo- <i>n</i> -b	195194-80-0	23.79	NGS	36 JNT	
S16T021113				Octane, 4-ethyl-	18669-80-0	23.85	NGS	110 JNT	
S16T021113				1-Octanol, 2-butyl-	3913-02-8	23.95	NGS	44 JNT	
S16T021113				Cumoln	18374-83-9	24.05	NGS	61 JNT	
S16T021113				Unknown-2	-	24.26	NGS	1.9E+03 JT	
S16T021113				2,2,6-Trimethyl-bicyclo[4,1,0	78980-11-9	24.84	NGS	54 JNT	
S16T021113				Unknown-3	-	25.05	NGS	35 JT	
S16T021113				Unknown-4	-	25.14	NGS	46 JT	
S16T021113				Unknown-5	-	25.25	NGS	25 JT	
S16T021113				Unknown-6	-	25.41	NGS	30 JT	
S16T021113				2,6,10-Octadecatrienal, 3,7,11-t	4360-32-9	25.80	NGS	30 JNT	
S16T021113				Unknown-7	-	25.98	NGS	300 JT	
S16T021113				2-Dodecen-1-yl- <i>l</i> -lysine amine	19780-11-1	26.04	NGS	65 JNT	
S16T021113				Methanamine	100-97-0	26.19	NGS	220 JNT	
S16T021113				Unknown-8	-	26.30	NGS	68 JT	
S16T021113				1-iodo-2-methylundecane	73105-67-6	26.43	NGS	94 JNT	

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L - LLS Outside Range  
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E - Outside Calibration Range

# Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-F1

Customer Sample ID: 16-05983-2-F1

Sample	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021113				2-Octylcyclopropene-1-heptanol	54467-95-5	26.48	NGS	38	JNT
S16T021113				9,12,15-Octadecatrienoic acid,	55320-01-9	26.56	NGS	69	JNT
S16T021113				Silane, trimethyl(2-methylhe-	87778-15-9	26.64	NGS	140	JNT
S16T021113				1-Bromo-4-bromomethyldecane	81639-11-0	27.01	NGS	34	JNT
S16T021113				Unknown-9	-	27.31	NGS	49	JT
S16T021113				11-Tetradecyn-1-ol	33925-73-4	27.62	NGS	26	JNT
S16T021113			BLNK	Unknown-1	-	8.24	NGS	30	

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Y - Comment  
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L - LLS Outside Range  
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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-G1

Customer Sample ID: 16-05983-2-G1

Sample	R	AS	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021114				1,3-Butadiene	106-99-0	5.04	NGS	17 JNT	
S16T021114				2-Methyl-1-butene	563-46-2	5.25	NGS	51 JNT	
S16T021114				2-Butene	107-01-7	5.34	NGS	32 JNT	
S16T021114				2-Pentene, (E)	648-04-8	5.43	NGS	50 JNT	
S16T021114				Butene, 2-methyl-	78-78-4	5.60	NGS	90 JNT	
S16T021114				1-Pentene	109-67-1	6.91	NGS	61 JNT	
S16T021114				2-Butene, 2-methyl-	513-35-9	7.10	NGS	33 JNT	
S16T021114				Cyclopentane	287-92-3	8.74	NGS	86 JNT	
S16T021114				Tetrahydrofuran	109-99-9	11.94	NGS	28 JNT	
S16T021114				Formamide	75-12-7	14.21	NGS	95 JNT	
S16T021114				Acetonitrile, hydroxy-	107-10-4	16.10	NGS	30 JNT	
S16T021114				Cyclohexasiloxane, octamethyl	558-67-2	20.48	NGS	170 JNT	
S16T021114				2,2,7,7-tetramethyldecane	1071-31-4	21.52	NGS	73 JNT	
S16T021114				Dodecane, 2,6,10-trimethyl-	3891-98-3	22.71	NGS	37 JNT	
S16T021114				Undecane, 4,7-dimethyl-	17301-32-5	23.00	NGS	140 JNT	
S16T021114				Undecane	1120-21-4	23.14	NGS	69 JNT	
S16T021114				Heptanoic acid, 2-ethyl-	3274-29-1	23.68	NGS	45 JNT	
S16T021114				Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	39 JNT	
S16T021114				Dodecane	112-40-3	23.85	NGS	110 JNT	
S16T021114				Decane, 2,4,8-trimethyl-	62105-27-4	23.95	NGS	63 JNT	
S16T021114				2,3-Dimethyldecane	17312-44-6	24.06	NGS	26 JNT	
S16T021114				Unknown-1	-	24.26	NGS	230 JT	
S16T021114				Undecane, 3-methyl-	1002-43-3	24.90	NGS	13 JNT	
S16T021114				Tetradecane, 1-iodo-	19218-94-1	25.27	NGS	42 JNT	
S16T021114				Methanamine	100-97-0	26.19	NGS	32 JNT	
S16T021114			BLNK	Unknown-1	-	8.24	NGS	30	

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Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-H1

Customer Sample ID: 16-05983-2-H1

Sample	R	Ad	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TOU VOA #2									
S16T021115				2-Butene	107-01-7	4.70	NGS	41 JNT	
S16T021115				2-Methyl-1-butene	563-46-2	5.30	NGS	110 JNT	
S16T021115				Butane, 2-methyl-	76-78-4	5.64	NGS	400 JNT	
S16T021115				1,4-Pentadiene	591-93-5	5.81	NGS	29 JNT	
S16T021115				1-Pentene	109-67-1	6.06	NGS	830 JNT	
S16T021115				Pentane	109-68-0	6.29	NGS	3.6E+03 JNT	
S16T021115				2-Pentene, (Z)-	627-20-3	6.58	NGS	160 JNT	
S16T021115				2-Pentene, (E)-	648-04-6	6.83	NGS	96 JNT	
S16T021115				Cyclobutane, 2,2,3-trimethyl	1449-49-6	6.93	NGS	160 JNT	
S16T021115				2-Butene, 2-methyl-	513-35-9	7.02	NGS	43 JNT	
S16T021115				Oxane, 2-(1,1-dimethylethyl	53897-30-6	7.12	NGS	81 JNT	
S16T021115				4-Methoxy-1-pentene	96386-09-5	7.18	NGS	95 JNT	
S16T021115				Heptane, 4-oxido-	27126-22-3	7.56	NGS	36 JNT	
S16T021115				1-Pentene, 4-methyl-	881-37-2	8.42	NGS	290 JNT	
S16T021115				1-Pentene, 3-methyl-	760-20-3	8.46	NGS	69 JNT	
S16T021115				Cyclopentane	287-62-3	8.75	NGS	160 JNT	
S16T021115				Pentane, 2-methyl-	107-83-5	8.89	NGS	1.5E+03 JNT	
S16T021115				Cyclopropane, 1-ethyl-2-methyl	19781-68-1	9.29	NGS	26 JNT	
S16T021115				Cyclobutane, carbonitrile, 3,3-d	53783-86-1	9.42	NGS	66 JNT	
S16T021115				Pentane, 3-methyl-	96-14-0	9.54	NGS	320 JNT	
S16T021115				2-Hexene	592-43-8	10.67	NGS	59 JNT	
S16T021115				2-Hexene, (E)-	4050-45-7	11.18	NGS	28 JNT	
S16T021115				Cyclopropane, propyl-	2415-72-7	11.43	NGS	73 JNT	
S16T021115				Hydroperoxide, hexyl	4312-76-9	11.64	NGS	40 JNT	
S16T021115				Butane, 1-methoxy-	628-28-4	11.73	NGS	72 JNT	
S16T021115				Cyclopentane, methyl-	96-37-7	11.89	NGS	170 JNT	
S16T021115				Tetrahydrofuran	109-99-9	11.97	NGS	640 JNT	

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# Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-H1

Customer Sample ID: 16-05983-2-H1

Sample#	R	Alt	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR:TDU VOA #2									
S16T021115				2-Methyl-5-hexen-3-ol	32815-70-6	12.38	NGS	79 JNT	
S16T021115				(2)-Hex-2-ene, 5-methyl-	13151-17-2	12.92	NGS	110 JNT	
S16T021115				4-Pentanol-2-one	13891-87-7	13.34	NGS	32 JNT	
S16T021115				Hexane, 2-methyl-	591-76-4	13.42	NGS	310 JNT	
S16T021115				Pentane, 2,3-dimethyl-	565-59-3	13.54	NGS	32 JNT	
S16T021115				Hexane, 3-methyl-	569-34-4	13.72	NGS	550 JNT	
S16T021115				Cyclopentane, 1,3-dimethyl-	2453-00-1	14.02	NGS	38 JNT	
S16T021115				Cyclopentane, 1,2-dimethyl-, c	1192-18-3	14.12	NGS	60 JNT	
S16T021115				Hydroxylamine, O-(3-methylbutyl	19411-65-5	14.18	NGS	740 JNT	
S16T021115				2-Pentanol	6032-29-7	14.32	NGS	88 JNT	
S16T021115				Formamide	75-12-7	14.57	NGS	160 JNT	
S16T021115				(2)-3-Heptene	7642-10-6	14.62	NGS	40 JNT	
S16T021115				Tetrahydrofuran, 2,2-dimethyl-	1003-17-4	14.79	NGS	46 JNT	
S16T021115				1-Hexene, 3,5-dimethyl-	7423-69-0	14.88	NGS	31 JNT	
S16T021115				Unknown-1	-	14.91	NGS	33 JT	
S16T021115				Butane, 2-cyclopropyl-	5750-02-7	15.03	NGS	43 JNT	
S16T021115				2,4-Azeldinedione, 3,3-dialkyl	69315-91-9	15.18	NGS	260 JNT	
S16T021115				Oxirane, 2-(1,1-dimethylethyl)	36299-44-2	15.24	NGS	35 JNT	
S16T021115				2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15.31	NGS	110 JNT	
S16T021115				Hexane, 2,4-dimethyl-	589-43-5	15.37	NGS	26 JNT	
S16T021115				Cyclopropane, 1,1-dialkyl-	1003-19-6	15.42	NGS	51 JNT	
S16T021115				1-Heptene, 6-methyl-	6026-76-6	15.90	NGS	150 JNT	
S16T021115				1-Pentanol	71-41-0	15.96	NGS	74 JNT	
S16T021115				Heptane, 2-methyl-	692-27-6	16.08	NGS	230 JNT	
S16T021115				Heptane, 4-methyl-	599-53-7	16.13	NGS	69 JNT	
S16T021115				Heptane, 3,4,5-trimethyl-	20278-69-1	16.25	NGS	64 JNT	
S16T021115				2-Hexene, 5,5-dimethyl-, (2)-	39761-61-0	16.51	NGS	96 JNT	

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NA = Not Analyzed, ND = Not Detected  
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E - Outside Calibration Range

Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-H1

Customer Sample ID: 16-05983-2-H1

Sample#	R	Ad	QC Type	Analyte	CAS No.	Retention Time (min-sec)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021115				Acetic acid, trifluoro-, 3,7-d	28745-07-6	16.60	NGS		34 JNT
S16T021115				Octane	111-65-9	16.77	NGS		160 JNT
S16T021115				Cyclohexane, hexamethyl-	541-05-9	17.05	NGS		77 JNT
S16T021115				Octane, 2-methyl-	3221-61-2	17.41	NGS		58 JNT
S16T021115				Cyclohexane, ethyl-	1678-91-7	17.68	NGS		38 JNT
S16T021115				1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS		78 JNT
S16T021115				Heptane, 4-propyl-	3178-29-8	18.27	NGS		31 JNT
S16T021115				Nonane	111-84-2	18.83	NGS		37 JNT
S16T021115				Cyclohexane, 1-ethyl-2-methyl-	3728-54-9	18.88	NGS		36 JNT
S16T021115				Cyclohexane, octamethyl	556-67-2	20.48	NGS		330 JNT
S16T021115				Undecane	1120-21-4	23.00	NGS		130 JNT
S16T021115				3,3-Dimethylhexane	563-16-6	23.14	NGS		55 JNT
S16T021115				2,6-Dimethyldecane	13150-91-7	23.73	NGS		61 JNT
S16T021115				Dodecane	112-40-3	23.85	NGS		100 JNT
S16T021115				Hexyl octyl ether	17071-54-4	23.94	NGS		63 JNT
S16T021115				1-Octanol, 2-butyl-	3913-02-8	24.06	NGS		32 JNT
S16T021115				Unknown-2	-	24.26	NGS		220 JT
S16T021115				Undecane, 2,6-dimethyl-	17301-23-4	25.27	NGS		64 JNT
S16T021115				1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS		32 JNT
S16T021115				2-Propenoic acid, octyl ester	2499-59-4	25.99	NGS		44 JNT
S16T021115				1,2-Benzisothiazole	272-16-2	26.30	NGS		78 JNT
S16T021115				Undecane, 2-methyl-	7045-71-8	26.43	NGS		19 JNT
S16T021115			BLANK	Unknown-1	-	8.26	NGS		30

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Y - Comment  
Q - Qualitative

J - Estimated  
T - Tentatively Identified Compound

Cartridge Evaluation  
 Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-H2

Customer Sample ID: 16-05983-2-H2

Sample#	R	AS	OC Type	Analysis	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021116				2-Butene	107-01-7	4.73	NGS	57 JNT	
S16T021116				2-Methyl-1-butene	563-46-2	5.33	NGS	160 JNT	
S16T021116				Cyclopropane, 1,2-dimethyl-, c	930-18-7	5.51	NGS	78 JNT	
S16T021116				Butane, 2-methyl-	78-78-4	5.57	NGS	330 JNT	
S16T021116				2-Pentene, (E)-	546-04-8	6.61	NGS	43 JNT	
S16T021116				2-Pentene	109-88-2	6.66	NGS	26 JNT	
S16T021116				1-Pentene	109-87-1	6.96	NGS	260 JNT	
S16T021116				Cyclobutane, methyl-	598-81-8	7.03	NGS	93 JNT	
S16T021116				2-Pentene, (Z)-	827-20-3	7.13	NGS	87 JNT	
S16T021116				Di(1,2,5-oxadiazolo[3,4-b]3,4	166205-18-5	7.88	NGS	31 JNT	
S16T021116				1,4-Pentadiene	591-93-5	8.42	NGS	28 JNT	
S16T021116				Cyclopentane	287-92-3	8.78	NGS	310 JNT	
S16T021116				Tetrahydrofuran	109-99-9	11.96	NGS	120 JNT	
S16T021116				Formamide	75-12-7	14.63	NGS	120 JNT	
S16T021116				Cyclohexasiloxane, octamethyl	556-57-2	20.47	NGS	140 JNT	
S16T021116				Urea	57-13-6	20.86	NGS	31 JNT	
S16T021116				2,6-Dimethyldecane	13150-61-7	23.00	NGS	62 JNT	
S16T021116				Octane, 2,3,6,7-tetramethyl-	52670-34-5	23.14	NGS	27 JNT	
S16T021116				Undecane	1120-21-4	23.73	NGS	39 JNT	
S16T021116				Dodecane	112-40-3	23.85	NGS	64 JNT	
S16T021116				Unknown-1	-	24.26	NGS	200 JT	
S16T021116				Undecane, 2,6-dimethyl-	17301-23-4	25.27	NGS	37 JNT	
S16T021116				Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	33 JNT	
S16T021116				Unknown-2	-	25.59	NGS	51 JT	
S16T021116				1,2-Benzisothiazole	272-16-2	26.30	NGS	79 JNT	
S16T021116				Dodecane, 2,6,11-trimethyl-	31295-56-4	26.43	NGS	22 JNT	
S16T021116			BLANK	Unknown-1	-	8.24	NGS	30	

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

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### Cartridge Evaluation Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-H2

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

Cartridge Evaluation  
Data Summary Report

Sample Group: 20162092

SDG Number:

Customer Sample ID: 16-05983-2-IN-BASE

Customer Sample ID: 16-05983-2-IN-BASE

Sample#	R	AE	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021117				Unknown-1	-	7.15	NGS	27 JT	
S16T021117				Tetrahydrofuran	109-99-9	11.95	NGS	18 JNT	
S16T021117				Formamide	75-12-7	14.04	NGS	36 JNT	
S16T021117				Propane, 2-methyl-1-nitro-	525-74-1	16.50	NGS	32 JNT	
S16T021117				Cyclotrisiloxane, octamethyl	556-87-2	20.48	NGS	310 JNT	
S16T021117				Undecane	1120-21-4	23.00	NGS	91 JNT	
S16T021117				Decane, 2,4,6-trimethyl-	52168-27-4	23.14	NGS	37 JNT	
S16T021117				Heptanoic acid, 2-ethyl-	3274-29-1	23.68	NGS	41 JNT	
S16T021117				Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	37 JNT	
S16T021117				Dodecane	112-40-3	23.85	NGS	82 JNT	
S16T021117				Hydroxylamine, O-decyl-	29812-79-1	23.95	NGS	62 JNT	
S16T021117				Unknown-2	-	24.26	NGS	380 JT	
S16T021117				2,6-Dimethyldodecane	13150-81-7	25.27	NGS	70 JNT	
S16T021117				Acetic acid, trifluoro-, 3,7-d	28745-67-5	25.41	NGS	58 JNT	
S16T021117				Unknown-3	-	26.00	NGS	77 JT	
S16T021117				Methanamine	100-97-0	26.20	NGS	49 JNT	
S16T021117				1,2-Benzisothiazole	272-16-2	26.32	NGS	120 JNT	
S16T021117				Heptadecane, 2,6,10,15-tetramethyl-	54833-48-6	26.44	NGS	57 JNT	
S16T021117				Undecane, 2-methyl-	7045-71-8	27.03	NGS	28 JNT	
S16T021117			BLNK	Unknown-1	-	8.24	NGS	30	

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

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162087

SDG Number:

Customer Sample ID: 16-05982-3-A1

Customer Sample ID: 16-05982-3-A1

Sample #	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021032			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	7.9	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021032			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	2.2	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021032			825-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021032			3777-71-7	2-Hepthofuran	NGS	n/a	n/a	0.47	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021032			534-22-5	2-Methylfuran	NGS	n/a	n/a	1.3	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021032			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021032			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021032			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021032			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	490	n/a	n/a	n/a	n/a	0.10	n/a	E

*James Dwyer*  
 8/15/16

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162087  
SDG Number:  
Customer Sample ID: 16-05982-3-A2  
Customer Sample ID: 16-05982-3-A2

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021033			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021033			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021033			825-98-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021033			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021033			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021033			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021033			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021033			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021033			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected



Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162087  
 SDG Number:  
 Customer Sample ID: 16-05982-3-B1  
 Customer Sample ID: 16-05982-3-B1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021034			1191-89-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021034			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021034			825-85-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021034			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021034			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021034			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.49	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021034			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021034			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021034			109-89-9	Tetrahydrofuran	NGS	n/a	n/a	0.13	n/a	n/a	n/a	n/a	0.10	n/a	J

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162087  
 SDG Number:  
 Customer Sample ID: 16-05982-3-BLANK  
 Customer Sample ID: 16-05982-3-BLANK

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021035			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021035			1708-29-3	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021035			625-96-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021035			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021035			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021035			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021035			4229-91-3	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021035			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021035			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

J - Estimated

E - Outside Calibration Range

Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162087  
SDG Number:  
Customer Sample ID: 16-05982-3-C1  
Customer Sample ID: 16-05982-3-C1

Sample#	R	AP	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021035			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.16		n/a
S161021035			1769-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23		n/a
S161021035			525-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43		n/a
S161021035			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27		n/a
S161021035			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23		n/a
S161021035			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.44	n/a	n/a	n/a	n/a	0.34		n/a J
S161021035			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44		n/a
S161021035			110-00-9	Furan	NGS	n/a	n/a	0.10	n/a	n/a	n/a	n/a	0.090		n/a J
S161021035			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	0.27	n/a	n/a	n/a	n/a	0.10		n/a J

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162087  
 SDG Number:  
 Customer Sample ID: 16-05982-3-D1  
 Customer Sample ID: 16-05982-3-D1

Sample #	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021037			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021037			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021037			825-98-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021037			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021037			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021037			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021037			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021037			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021037			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	1.3	n/a	n/a	n/a	n/a	0.10	n/a J	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range  
 J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162087  
 SDG Number:  
 Customer Sample ID: 16-05982-3-E1  
 Customer Sample ID: 16-05982-3-E1

Sample#	R	Alt	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021038			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021038			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021038			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021038			3771-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021038			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021038			3771-69-3	2-Pentylfuran	NGS	n/a	n/a	0.43	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021038			4229-91-6	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021038			110-00-9	Furan	NGS	n/a	n/a	0.13	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021038			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	6.1	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

J - Estimated

E - Outside Calibration Range

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162087  
 SDG Number:  
 Customer Sample ID: 16-05982-3-EFF-BASE  
 Customer Sample ID: 16-05982-3-EFF-BASE

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S161021039			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S161021039			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S161021039			825-95-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S161021039			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S161021039			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S161021039			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S161021039			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S161021039			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S161021039			109-89-9	Tetrahydrofuran	NGS	n/a	n/a	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range  
 J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162087  
 SDG Number:  
 Customer Sample ID: 16-05982-3-F1  
 Customer Sample ID: 16-05982-3-F1

Sample #	R	AP	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021040			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021040			1708-29-3	2,5-Dihydrofuran	NGS	n/a	n/a	0.34	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021040			625-95-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021040			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021040			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021040			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021040			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021040			110-99-9	Furan	NGS	n/a	n/a	<0.050	n/a	n/a	n/a	n/a	0.050	n/a	
S16T021040			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	8.6	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162087  
 SDG Number:  
 Customer Sample ID: 16-05982-3-G1  
 Customer Sample ID: 16-05982-3-G1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021041			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021041			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021041			625-95-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021041			3777-71-7	2-Hepylfuran	NGS	n/a	n/a	0.34	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021041			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021041			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021041			4228-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021041			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021041			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	150	n/a	n/a	n/a	n/a	0.10	n/a	E

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated



# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162087  
 SDG Number:  
 Customer Sample ID: 16-05982-3-H1  
 Customer Sample ID: 16-05982-3-H1

Sample#	R	AJ	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021042			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021042			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021042			625-95-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021042			3777-71-7	2-Hepoxyfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021042			534-22-5	2-Methylfuran	NGS	n/a	n/a	1.4	n/a	n/a	n/a	n/a	0.23	n/a J	
S16T021042			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021042			4228-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021042			110-99-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021042			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	450	n/a	n/a	n/a	n/a	0.10	n/a E	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162087  
 SDG Number:  
 Customer Sample ID: 16-05982-3-H2  
 Customer Sample ID: 16-05982-3-H2

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cat Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021043			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021043			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021043			525-95-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021043			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021043			534-22-5	2-Methylfuran	NGS	n/a	n/a	0.55	n/a	n/a	n/a	n/a	0.23	n/a J	
S16T021043			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.35	n/a	n/a	n/a	n/a	0.34	n/a J	
S16T021043			4228-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021043			110-00-9	Furan	NGS	n/a	n/a	<0.050	n/a	n/a	n/a	n/a	0.050	n/a	
S16T021043			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	350	n/a	n/a	n/a	n/a	0.10	n/a E	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162087

SDG Number:

Customer Sample ID: 16-05982-3-IN-BASE

Customer Sample ID: 16-05982-3-IN-BASE

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021044			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021044			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021044			825-96-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021044			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021044			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021044			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021044			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021044			110-00-9	Furan	NGS	n/a	n/a	<0.060	n/a	n/a	n/a	n/a	0.060	n/a	
S16T021044			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	0.18	n/a	n/a	n/a	n/a	0.10	n/a	J

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E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-A1  
 Customer Sample ID: 16-05983-3-A1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Crit Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021045			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021045			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	1.8	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021045			625-85-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021045			3777-71-7	2-Hexylfuran	NGS	n/a	n/a	1.2	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021045			534-22-5	2-Methylfuran	NGS	n/a	n/a	1.2	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021045			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.79	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021045			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021045			110-60-9	Furan	NGS	n/a	n/a	0.53	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021045			109-89-9	Tetrahydrofuran	NGS	n/a	n/a	430	n/a	n/a	n/a	n/a	0.10	n/a	E

*Janet Juge*  
 8/15/16

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-A2  
 Customer Sample ID: 16-05983-3-A2

Sample#	R	AI#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021046			1191-99-7	2,3-Dihydrofuran	NCS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021046			1708-29-8	2,5-Dihydrofuran	NCS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021046			625-85-5	2,5-Dimethylfuran	NCS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021046			3777-71-7	2-Hexylfuran	NCS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021046			534-22-5	2-Methylfuran	NCS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021046			3777-69-3	2-Pentylfuran	NCS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021046			4229-91-8	2-Propylfuran	NCS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021046			110-00-9	Furan	NCS	n/a	n/a	<0.060	n/a	n/a	n/a	n/a	0.060	n/a	
S16T021046			109-99-9	Tetrahydrofuran	NCS	n/a	n/a	4.5	n/a	n/a	n/a	n/a	0.10	n/a	

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162088  
SDG Number:  
Customer Sample ID: 16-05983-3-B1  
Customer Sample ID: 16-05983-3-B1

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc Em %	Qual Flags
Furans In Vapor Samples by SIM															
S16T021047			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021047			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021047			825-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021047			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021047			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021047			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.46	n/a	n/a	n/a	n/a	0.34	n/a J	
S16T021047			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021047			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021047			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	2.4	n/a	n/a	n/a	n/a	0.10	n/a J	

E - Outside Calibration Range

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation  
Data Summary of All Results

Sample Group: 20162088  
SDG Number:  
Customer Sample ID: 16-05983-3-BLANK  
Customer Sample ID: 16-05983-3-BLANK

Sample#	R	Alt	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cont Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021048			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021048			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021048			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021048			3777-71-7	2-Hepylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021048			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021048			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021048			4228-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021048			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021048			109-59-9	Tetrahydrofuran	NGS	n/a	n/a	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162086

SDG Number:

Customer Sample ID: 16-05983-3-C1

Customer Sample ID: 16-05983-3-C1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021049			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021049			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021049			825-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021049			3777-71-7	2-Hexylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021049			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021049			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.40	n/a	n/a	n/a	n/a	0.34	n/a J	
S16T021049			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021049			110-00-8	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021049			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	1.3	n/a	n/a	n/a	n/a	0.10	n/a J	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated



# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-D1  
 Customer Sample ID: 16-05983-3-D1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc En %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021050			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021050			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021050			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021050			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021050			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021050			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.50	n/a	n/a	n/a	n/a	0.34	n/a J	
S16T021050			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021050			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021050			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	1.9	n/a	n/a	n/a	n/a	0.10	n/a J	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

# Cartridge Evaluation Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-E1  
 Customer Sample ID: 16-05983-3-E1

Sample#	R	AP	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc En %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021051			1181-69-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021051			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021051			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021051			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021051			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021051			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021051			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021051			110-00-9	Furan	NGS	n/a	n/a	<0.050	n/a	n/a	n/a	n/a	0.050	n/a	
S16T021051			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	4.0	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-EFF-BASE  
 Customer Sample ID: 16-05983-3-EFF-BASE

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Conc Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021052			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021052			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021052			825-85-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021052			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021052			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021052			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.43	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021052			4228-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021052			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021052			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	14	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-F1  
 Customer Sample ID: 16-05983-3-F1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Conc En %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021053			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021053			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021053			525-36-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021053			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021053			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021053			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021053			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021053			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021053			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	10	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-G1  
 Customer Sample ID: 16-05983-3-G1

Sample#	R	AF	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cat En %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021055			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021055			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021055			525-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021055			3777-71-7	2,4-Hexylfuran	NGS	n/a	n/a	0.33	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021055			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021055			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.35	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021055			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021055			110-00-0	Furan	NGS	n/a	n/a	<0.050	n/a	n/a	n/a	n/a	0.050	n/a	
S16T021055			109-59-9	Tetrahydrofuran	NGS	n/a	n/a	30	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-H1  
 Customer Sample ID: 16-05983-3-H1

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021056			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	7.3	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021056			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	1.7	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021056			625-95-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021056			3777-71-7	2-Hepylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021056			534-22-5	2-Methylfuran	NGS	n/a	n/a	1.5	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021056			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021056			4229-91-8	2-Propylfuran	NGS	n/a	n/a	1.8	n/a	n/a	n/a	n/a	0.44	n/a	J
S16T021056			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021056			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	440	n/a	n/a	n/a	n/a	0.50	n/a	E

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-H2  
 Customer Sample ID: 16-05983-3-H2

Sample#	R	AI	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021057			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021057			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021057			825-95-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021057			3777-71-7	2-Hepoxyfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021057			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021057			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021057			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021057			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021057			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	120	n/a	n/a	n/a	n/a	0.10	n/a	E

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation  
 Data Summary of All Results

Sample Group: 20162088  
 SDG Number:  
 Customer Sample ID: 16-05983-3-IN-BASE  
 Customer Sample ID: 16-05983-3-IN-BASE

Sample#	R	AI	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPO %	Spk Rec %	Out Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021058			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021058			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021058			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021058			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	0.45	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021058			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021058			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	2.1	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021058			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021058			110-00-9	Furan	NGS	n/a	n/a	0.38	n/a	n/a	n/a	n/a	0.060	n/a	J
S16T021058			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	20	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated





## ANALYTICAL REPORT

Report Date: July 26, 2016

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20162094

Workorder: 34-1620245

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021173		Collected: 07/15/2016		
Lab ID: 1620245001		Received: 07/20/2016		
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
		Sampling Parameter: Air Volume Not Provided		
Analyzed: 07/25/2016				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	0.21	NA	NA	0.10
Ethylamine	0.43	NA	NA	0.10
Methylamine	3.9	NA	NA	0.10

Sample ID: S16T021174		Collected: 07/15/2016		
Lab ID: 1620245002		Received: 07/20/2016		
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021175		Collected: 07/15/2016		
Lab ID: 1620245003		Received: 07/20/2016		
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]		
		Analyzed: 07/25/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

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## ANALYTICAL REPORT

Workorder: 34-1620245

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021176		Collected: 07/15/2016		
Lab ID: 1620245004		Received: 07/20/2016		
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021177		Collected: 07/15/2016		
Lab ID: 1620245005		Received: 07/20/2016		
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021178		Collected: 07/15/2016		
Lab ID: 1620245006		Received: 07/20/2016		
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021179		Collected: 07/15/2016		
Lab ID: 1620245007		Received: 07/20/2016		
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10



## ANALYTICAL REPORT

Workorder: 34-1620245

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021180		Collected: 07/15/2016	
Lab ID: 1620245008		Received: 07/20/2016	
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]	
		Sampling Parameter: Air Volume Not Provided	
Analyzed: 07/25/2016			
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Dimethylamine	<0.10	NA	NA 0.10
Ethylamine	<0.10	NA	NA 0.10
Methylamine	<0.10	NA	NA 0.10

Sample ID: S16T021181		Collected: 07/15/2016	
Lab ID: 1620245009		Received: 07/20/2016	
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]	
		Sampling Parameter: Air Volume Not Provided	
Analyzed: 07/25/2016			
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Dimethylamine	<0.10	NA	NA 0.10
Ethylamine	<0.10	NA	NA 0.10
Methylamine	<0.10	NA	NA 0.10

Sample ID: S16T021182		Collected: 07/15/2016	
Lab ID: 1620245010		Received: 07/20/2016	
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]	
		Sampling Parameter: Air Volume Not Provided	
Analyzed: 07/25/2016			
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Dimethylamine	<0.10	NA	NA 0.10
Ethylamine	<0.10	NA	NA 0.10
Methylamine	<0.10	NA	NA 0.10

Sample ID: S16T021183		Collected: 07/15/2016	
Lab ID: 1620245011		Received: 07/20/2016	
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]	
		Sampling Parameter: Air Volume Not Provided	
Analyzed: 07/25/2016			
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Dimethylamine	<0.10	NA	NA 0.10
Ethylamine	0.20	NA	NA 0.10
Methylamine	0.87	NA	NA 0.10



## ANALYTICAL REPORT

Workorder: 34-1620245

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021184		Collected: 07/15/2016		
Lab ID: 1620245012		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021185		Collected: 07/15/2016		
Lab ID: 1620245013		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021186		Collected: 07/16/2016		
Lab ID: 1620245014		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	0.19	NA	NA	0.10
Methylamine	0.48	NA	NA	0.10

Sample ID: S16T021187		Collected: 07/16/2016		
Lab ID: 1620245015		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	0.48	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10





## ANALYTICAL REPORT

Workorder: 34-1620245

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021188		Collected: 07/16/2016		
Lab ID: 1620245016		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021189		Collected: 07/16/2016		
Lab ID: 1620245017		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021190		Collected: 07/16/2016		
Lab ID: 1620245018		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021191		Collected: 07/16/2016		
Lab ID: 1620245019		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10



## ANALYTICAL REPORT

Workorder: 34-1620245

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021192		Collected: 07/16/2016		
Lab ID: 1620245020		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021193		Collected: 07/16/2016		
Lab ID: 1620245021		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021194		Collected: 07/16/2016		
Lab ID: 1620245022		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021195		Collected: 07/16/2016		
Lab ID: 1620245023		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10



## ANALYTICAL REPORT

Workorder: **34-1620245**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021196		Collected: 07/16/2016		
Lab ID: 1620245024		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	0.20	NA	NA	0.10
Methylamine	0.30	NA	NA	0.10

Sample ID: S16T021197		Collected: 07/16/2016		
Lab ID: 1620245025		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021198		Collected: 07/16/2016		
Lab ID: 1620245026		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: Amines-VOA Aliphatic VAA-1		Media: SKC 226-96, XAD-7 Tube		
		50/100mg [(NBD) Chloride]		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/25/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

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

Method	Analyst	Peer Review
Amines-VOA Aliphatic VAA-1	/S/ David Teynor 07/26/2016 12:27	/S/ Thomas Bosch 07/26/2016 13:37

### Laboratory Contact Information

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

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



## ANALYTICAL REPORT

Workorder: **34-1620245**  
Client Project ID: CARTRIDGE EVALUATION  
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	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>
	Utah (NELAC)	DATA1	<a href="http://health.utah.gov/labinfo/abimp/">http://health.utah.gov/labinfo/abimp/</a>
	Nevada	UT00009	<a href="http://ndep.nv.gov/bdwlabservice.htm">http://ndep.nv.gov/bdwlabservice.htm</a>
	Oklahoma	UT00009	<a href="http://www.deq.state.ok.us/CSOnew/">http://www.deq.state.ok.us/CSOnew/</a>
	Iowa	IA# 376	<a href="http://www.iowadnr.gov/insideDNR/Regulatory/Water.aspx">http://www.iowadnr.gov/insideDNR/Regulatory/Water.aspx</a>
	Florida (TNI)	E871067	<a href="http://www.dep.state.fl.us/labs/bars/sas/qa/">http://www.dep.state.fl.us/labs/bars/sas/qa/</a>
	Texas (TNI)	T104704456-11-1	<a href="http://www.tceq.texas.gov/field/qa/lab_accred_certif.html">http://www.tceq.texas.gov/field/qa/lab_accred_certif.html</a>
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Lead Testing:			
CPSC	AClass (ISO 17025, CPSC)	ADE-1420	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>
Soil, Dust, Paint, Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Dietary Supplements	AClass (ISO 17025)	ADE-1420	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>

### 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: 1620245

Limits: Historical Performance  
Basis: ALS Laboratory Group

Preparation: NA  
Batch: NA  
Prepared By: NA

Analysis: IH Aliphatic Amines  
Batch: ILC/12352 (HBN: 173446)  
Analyzed By: David Teynor

### Blank

LMB: 509691  
Analyzed: 07/25/2016 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: 509694  
Analyzed: 07/25/2016 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

<p>LCS: 509692 Analyzed: 07/25/2016 00:00 Dilution: 1 Units: ug/sample</p>					<p>LCSD: 509693 Analyzed: 07/25/2016 00:00 Dilution: 1 Units: ug/sample</p>				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Dimethylamine	1.60	2.00	80.0	60.4 134.6	1.63	81.5	1.86	0.0	20.0
Ethylamine	1.08	2.00	54.0	40.0 160.0	1.10	55.0	1.83	0.0	20.0
Methylamine	2.52	2.00	126	40.0 160.0	2.22	111	12.7	0.0	20.0

<p>LCS: 509695 Analyzed: 07/25/2016 00:00 Dilution: 1 Units: ug/sample</p>					<p>LCSD: 509696 Analyzed: 07/25/2016 00:00 Dilution: 1 Units: ug/sample</p>				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Dimethylamine	1.79	2.00	89.5	60.4 134.6	1.77	88.5	1.12	0.0	20.0
Ethylamine	1.45	2.00	72.5	40.0 160.0	1.46	73.0	0.687	0.0	20.0
Methylamine	1.58	2.00	78.0	40.0 160.0	1.54	77.0	1.29	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 07/26/2016 12:27	/S/ Thomas Bosch 07/26/2016 13:37

### 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



1620245

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST									
Collector JAMES W. MOORE SAP No.		Collector/Requestor CARL MOORE IV		Telephone No. 373-6861		C.O.C. No. 20162094		Page 1 of 3	
Project Title CARTERS EVALUATION		SAP Origin CARTERS EVALUATION		Purchase Order/Charge Code 202007/0210		MSN FAX 372-1878			
Shipped To (Lab) ALS		Logistics/Vic Package No. N/A		Ice Chest No. WIS-021		Temp. ON ICE			
Protocol N/A		Method of Shipment		Bill of Lading/Bill No. 776790041619		Parts and Return No. 41034			
Data Turnaround 10 DAYS									
Sample No.	Lab ID	Date	Time	No/Type Container	Sample Analysis	Preservative			
8167021173	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-A1.1	N/A			
8167021174	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-A3.1	N/A			
8167021175	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-B1.1	N/A			
8167021176	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-B1A.1	N/A			
8167021177	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-C1.1	N/A			
8167021178	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-D1.1	N/A			
8167021179	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-E1.1	N/A			
8167021180	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-E1A.1	N/A			
8167021181	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-F1.1	N/A			
8167021182	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-G1.1	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 Moore IV & Greg Moore Carl W. Moore IV, Greg Moore gov Reg son for email CONTRACT 55502 RELEASE \$									
Relinquished By James W. Moore	Print Signature	Sign Date	Time	Received By Juli Padon	Print Signature	Sign Date	Time	Matrix	
Relinquished By Juli Padon	Print Signature	Sign Date	Time	Received By Juli Padon	Print Signature	Sign Date	Time	Matrix	
Relinquished By Juli Padon	Print Signature	Sign Date	Time	Received By Juli Padon	Print Signature	Sign Date	Time	Matrix	
Relinquished By Juli Padon	Print Signature	Sign Date	Time	Received By Juli Padon	Print Signature	Sign Date	Time	Matrix	
Disposal Method (e.g., Return to customer, per lab procedure) (N/A in process)									
Disposed By CONSUMED									
Date/Time 07/27/16 12:00									

A-6003-682 (03/05)



Assembler		C.O.C. No. 20162094				
N/A		Page 3 of 3				
Collector	JONES, TRAZER 1	Contact/Requestor	COIL ROSS, IV			
SHIP No.	N/A	Telephone No.	373-6861			
Project Title	CHARTERED EVALUATION	Purchase Order/Charge Code	20162094			
Shipped To (Lab)	N/A	Lab Order No.	20162094			
Protocol	N/A	Temp.	ON ICE			
		Bill of Lading/IR No.	767 90041619			
		Parts and Return No.	41034			
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
S167021123	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-EFF-BASE	N/A
S167021194	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-EFF	N/A
S167021195	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-G1	N/A
S167021196	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-MB	N/A
S167021197	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-RE	N/A
S167021198	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-2N-BASE	N/A
<b>POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes)</b> MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No						
<b>SPECIAL INSTRUCTIONS</b> Send Results to Carl Rovald IV & Greg Moore 307 842 8200 CONTRACT 255422 RELEASE 9						
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign
Sharon Nelson	M. White		7-19-16 830	Juli Gradstein	Juli Gradstein	7-19-16 830
Relinquished By				Received By		
Juli Gradstein	Juli Gradstein		7-19-16 1400	Received By	Juli Gradstein	7-19-16 1400
Relinquished By				Received By		
Juli Gradstein	Juli Gradstein		7-19-16 1400	Received By	Juli Gradstein	7-19-16 1400
Relinquished By				Received By		
Juli Gradstein	Juli Gradstein		7-19-16 1400	Received By	Juli Gradstein	7-19-16 1400
Disposal Method (e.g., Return to customer, per lab procedure, used in process, etc.) Disposed By: <b>CONSUMED</b>						
Date/Time: 07/19/16 12:00						



## ANALYTICAL REPORT

Report Date: July 25, 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  
20162096

Workorder: 34-1620244

Client Project ID: CARTRIDGE EVALUATION  
Purchase Order: 55502 Rel9  
Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021258		Collected: 07/15/2016		
Lab ID: 1620244001		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube		
		400/200mg		
		Analyzed: 07/21/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021259	Collected: 07/15/2016			
Lab ID: 1620244002	Received: 07/20/2016			
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1606	Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/21/2016	
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021260	Collected: 07/15/2016			
Lab ID: 1620244003	Received: 07/20/2016			
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1606	Media: SKC 226-09, Charcoal Tube 400/200mg	Analyzed: 07/21/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

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

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS. RIGHT PARTNER.



## ANALYTICAL REPORT

Workorder: **34-1620244**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021261		Collected: 07/15/2016		
Lab ID: 1620244004		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube		
		400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021262		Collected: 07/15/2016		
Lab ID: 1620244005		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube		
		400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021263		Collected: 07/15/2016		
Lab ID: 1620244006		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube		
		400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021264		Collected: 07/15/2016		
Lab ID: 1620244007		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube		
		400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021265		Collected: 07/15/2016		
Lab ID: 1620244008		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube		
		400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010





## ANALYTICAL REPORT

Workorder: **34-1620244**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021266		Collected: 07/15/2016		
Lab ID: 1620244009		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021267		Collected: 07/15/2016		
Lab ID: 1620244010		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021268		Collected: 07/15/2016		
Lab ID: 1620244011		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021269		Collected: 07/15/2016		
Lab ID: 1620244012		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021270		Collected: 07/15/2016		
Lab ID: 1620244013		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010



## ANALYTICAL REPORT

Workorder: **34-1620244**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021271		Collected: 07/16/2016		
Lab ID: 1620244014		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021272		Collected: 07/16/2016		
Lab ID: 1620244015		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021273		Collected: 07/16/2016		
Lab ID: 1620244016		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021274		Collected: 07/16/2016		
Lab ID: 1620244017		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021275		Collected: 07/16/2016		
Lab ID: 1620244018		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010





## ANALYTICAL REPORT

Workorder: **34-1620244**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021276		Collected: 07/16/2016		
Lab ID: 1620244019		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021277		Collected: 07/16/2016		
Lab ID: 1620244020		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021278		Collected: 07/16/2016		
Lab ID: 1620244021		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021279		Collected: 07/16/2016		
Lab ID: 1620244022		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021280		Collected: 07/16/2016		
Lab ID: 1620244023		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010



## ANALYTICAL REPORT

Workorder: **34-1620244**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021281		Collected: 07/16/2016		
Lab ID: 1620244024		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube		
		400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021282		Collected: 07/16/2016		
Lab ID: 1620244025		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube		
		400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021283		Collected: 07/16/2016		
Lab ID: 1620244026		Received: 07/20/2016		
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube		
		400/200mg		
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	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 07/25/2016 13:37	/S/ Lyle Edwards 07/25/2016 16:08

### Laboratory Contact Information

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

Phone: (801) 266-7700  
Email: als@alslab.com  
Web: www.alslab.com



## ANALYTICAL REPORT

Workorder: **34-1620244**  
Client Project ID: CARTRIDGE EVALUATION  
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	<a href="http://www.aiclasscorp.com">http://www.aiclasscorp.com</a>
	Utah (NELAC)	DATA1	<a href="http://health.utah.gov/lab/abstmp/">http://health.utah.gov/lab/abstmp/</a>
	Nevada	UT00009	<a href="http://ndep.nv.gov/bdwlabservice.htm">http://ndep.nv.gov/bdwlabservice.htm</a>
	Oklahoma	UT00009	<a href="http://www.deq.state.ok.us/CSOnew/">http://www.deq.state.ok.us/CSOnew/</a>
	Iowa	IA# 376	<a href="http://www.iowadnr.gov/inside/CNR/Regulatory/Water.aspx">http://www.iowadnr.gov/inside/CNR/Regulatory/Water.aspx</a>
	Florida (TNI)	E871067	<a href="http://www.dep.state.fl.us/labs/bars/sas/qa/">http://www.dep.state.fl.us/labs/bars/sas/qa/</a>
	Texas (TNI)	T104704456-11-1	<a href="http://www.tceq.texas.gov/field/qa/lab_accred_certif.html">http://www.tceq.texas.gov/field/qa/lab_accred_certif.html</a>
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Lead Testing:			
CPSC	ACLASS (ISO 17025, CPSC)	ADE-1420	<a href="http://www.aiclasscorp.com">http://www.aiclasscorp.com</a>
Soil, Dust, Paint, Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	<a href="http://www.aiclasscorp.com">http://www.aiclasscorp.com</a>

### 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: 1620244

Limits: Historical Performance  
Basis: ALS Laboratory Group

Preparation: NA  
Batch: NA  
Prepared By: NA

Analysis: IH GC-FID QC  
Batch: IFID7608 (HBN: 173232)  
Analyzed By: Young Hee Yoon

### Blank

MB: 509146 Analyzed: 07/21/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100

MB: 509149 Analyzed: 07/21/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100

### Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509147 Analyzed: 07/21/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 509148 Analyzed: 07/21/2016 00:00 Dilution: 1 Units: mg/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Acetonitrile	0.242	0.250	97.0	86.6   115.3	0.256	104	6.79	0.0   20.0	

LCS: 509150 Analyzed: 07/21/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 509151 Analyzed: 07/21/2016 00:00 Dilution: 1 Units: mg/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Acetonitrile	0.230	0.218	105	86.6   115.3	0.207	94.8	10.5	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 07/25/2016 13:37	/S/ Lyle Edwards 07/25/2016 16:08

### 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



Assembly		C.O.C. No. 20162096				
S/A		Page 2 of 3				
Collector		Telephone No. 313-4841				
SAC No.		MUN 16-02				
S/A		Purchase Order/Charge Code				
Project Title		Lab/Work Package No.				
SAC/PAE EVALUATION		Temp. ON ICE				
Shipped To (Lab)		Bill of Lading/IR No. 7767 90041619				
Protocol		Parts and Return No. 41034				
S/A		Data Turnaround 10 DAYS				
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
5167021268	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-A1	N/A
5167021269	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-A2	N/A
5167021270	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-1X-BASE 1	N/A
5167021271	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-A1	N/A
5167021272	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-A2	N/A
5167021273	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-A1	N/A
5167021274	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-BLANK 1	N/A
5167021275	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-C1	N/A
5167021276	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-D1	N/A
5167021277	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-E1	N/A
<b>POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes)</b> MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No <b>Held Time</b>						
<b>SPECIAL INSTRUCTIONS</b> Send Results To Carl Rowald IV & Greg Moore Carl & Greg: 4841-4841 and Gregory_S_Moore@va.gov gov for email RELEASE 9 Reference Contract # 55502						
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign
Shawn Wilson	7/15/16	0830	7/19/16	Julie Graham	7/19/16	0830
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign
WRPS	Julie Graham	7/19/16	1403	FEDEX		
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign
WRPS	Julie Graham	7/19/16	1403	FEDEX		
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign
WRPS	Julie Graham	7/19/16	1403	FEDEX		
<b>Disposal Method (e.g., Return to customer, per lab procedure (used in process))</b> Return to customer, per lab procedure (used in process)						
FINAL SAMPLE DISPOSITION		Disposed By: <i>Shawn Wilson</i> Date: <i>July 22, 2016</i> Time: <i>10:20 AM</i>				

A-6003-9602 (03/05)

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





ORIGIN ID: 25CA (509) 376-7492  
 1150 S. SHIPWAY  
 US DOE CO WRRS  
 2355 STEVENS DR  
 RICHLAND, WA 99354  
 UNITED STATES US

SHIP DATE: 19JUL16  
 ACTWGT: 14.00 LB  
 CACX: 1022855027NET3790

BILL THIRD PARTY

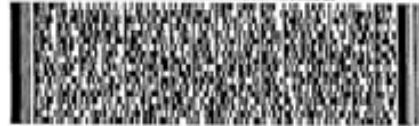
TO RAND POTTER  
 ALS  
 960 WEST LAVOY DR.

SALT LAKE CITY UT 84123

(801) 266-7700  
 NV: PTR47034  
 PO:

REF: 20-JUL-2020R022207 0320

DEPT:



WED - 20 JUL 10:30A

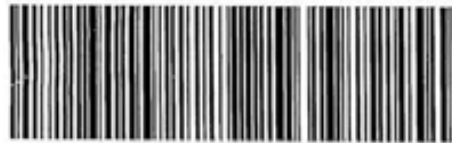
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 9291

7767 9004 1619

**XH BTFA**

84123  
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**FINAL REPORT ON MERCURY VAPOR TUBES  
FOR CARTRIDGE EVALUATION  
COLLECTED JULY 15 - 16, 2016**

**Document No.: 20162086 Rev. 0**

**Michael A. Purcell**  
WAI Hanford Laboratory

**Date Published**  
August 2, 2016



Prepared for:

Prepared by:

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 August 2, 2016  
Michael A. Purcell, WHL Project Coordinator

## NARRATIVE

**FINAL REPORT ON MERCURY VAPOR TUBES  
FOR CARTRIDGE EVALUATION  
COLLECTED JULY 15 - 16, 2016**

This final report presents the results of twenty-six mercury vapor tubes received at the 222-S Laboratory from on July 18, 2016, in good condition and with adequate paperwork. The mercury vapor tubes were logged into sample delivery group 20162086.

**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 16-05982-6-A1, 16-05982-6-H1, 16-05983-6-A1, 16-05983-6-H1, and 16-05983-6-H2. 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).

20162086 Rev. 0

Attachment 1

## DATA SUMMARY REPORT

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C.238

## DATA SUMMARY REPORT FOR SAMPLE GROUP 20162086

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-05982-6-A1	Total	S16T021154	Mercury	ug/sample	n/a	<0.0500	0.360	0.0500
16-05982-6-A1	Resin	S16T021157	Mercury	ug/sample	89.6	<0.0500	0.355	0.0500
16-05982-6-A1	Glass Wool	S16T021158	Mercury	ug/sample	89.6	<0.0500	<0.0500	0.0500
16-05982-6-A2	Total	S16T021159	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-A2	Resin	S16T021160	Mercury	ug/sample	89.6	<0.0500	<0.0500	0.0500
16-05982-6-A2	Glass Wool	S16T021161	Mercury	ug/sample	89.6	<0.0500	<0.0500	0.0500
16-05982-6-B1	Total	S16T021164	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-B1	Resin	S16T021166	Mercury	ug/sample	89.6	<0.0500	<0.0500	0.0500
16-05982-6-B1	Glass Wool	S16T021167	Mercury	ug/sample	89.6	<0.0500	<0.0500	0.0500
16-05982-6-BLANK	Total	S16T021168	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-BLANK	Resin	S16T021169	Mercury	ug/sample	89.6	<0.0500	<0.0500	0.0500
16-05982-6-BLANK	Glass Wool	S16T021202	Mercury	ug/sample	89.6	<0.0500	<0.0500	0.0500
16-05982-6-C1	Total	S16T021204	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-C1	Resin	S16T021206	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-C1	Glass Wool	S16T021207	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-D1	Total	S16T021229	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-D1	Resin	S16T021234	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-D1	Glass Wool	S16T021235	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-E1	Total	S16T021237	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-E1	Resin	S16T021238	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-E1	Glass Wool	S16T021239	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-EFF-BASE	Total	S16T021242	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-EFF-BASE	Resin	S16T021243	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-EFF-BASE	Glass Wool	S16T021244	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-F1	Total	S16T021245	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-F1	Resin	S16T021246	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-F1	Glass Wool	S16T021247	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-G1	Total	S16T021248	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-G1	Resin	S16T021249	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-G1	Glass Wool	S16T021250	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-H1	Total	S16T021251	Mercury	ug/sample	n/a	<0.0500	0.302	0.0500
16-05982-6-H1	Resin	S16T021252	Mercury	ug/sample	91.8	<0.0500	0.296	0.0500
16-05982-6-H1	Glass Wool	S16T021253	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-H2	Total	S16T021254	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-H2	Resin	S16T021256	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05982-6-H2	Glass Wool	S16T021257	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05983-6-A1	Total	S16T021286	Mercury	ug/sample	n/a	<0.0500	0.360	0.0500
16-05983-6-A1	Resin	S16T021287	Mercury	ug/sample	91.8	<0.0500	0.355	0.0500
16-05983-6-A1	Glass Wool	S16T021288	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05983-6-A2	Total	S16T021289	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-A2	Resin	S16T021290	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05983-6-A2	Glass Wool	S16T021291	Mercury	ug/sample	91.8	<0.0500	<0.0500	0.0500
16-05983-6-B1	Total	S16T021292	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-B1	Resin	S16T021293	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-B1	Glass Wool	S16T021294	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-BLANK	Total	S16T021295	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-BLANK	Resin	S16T021296	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-BLANK	Glass Wool	S16T021297	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500

## DATA SUMMARY REPORT FOR SAMPLE GROUP 20162086

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-05983-6-C1	Total	S16T021298	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-C1	Resin	S16T021299	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-C1	Glass Wool	S16T021300	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-D1	Total	S16T021301	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-D1	Resin	S16T021302	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-D1	Glass Wool	S16T021303	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-E1	Total	S16T021304	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-E1	Resin	S16T021305	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-E1	Glass Wool	S16T021306	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-EFF-BASE	Total	S16T021307	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-EFF-BASE	Resin	S16T021311	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-EFF-BASE	Glass Wool	S16T021312	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-F1	Total	S16T021313	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-F1	Resin	S16T021314	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-F1	Glass Wool	S16T021315	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-G1	Total	S16T021317	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-G1	Resin	S16T021319	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-G1	Glass Wool	S16T021321	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-H1	Total	S16T021322	Mercury	ug/sample	n/a	<0.0500	0.359	0.0500
16-05983-6-H1	Resin	S16T021324	Mercury	ug/sample	88.2	<0.0500	0.353	0.0500
16-05983-6-H1	Glass Wool	S16T021325	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-H2	Total	S16T021328	Mercury	ug/sample	n/a	<0.0500	0.0948	0.0500
16-05983-6-H2	Resin	S16T021329	Mercury	ug/sample	88.2	<0.0500	0.0721	0.0500
16-05983-6-H2	Glass Wool	S16T021330	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
16-05983-6-IN-BASE	Total	S16T021360	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05983-6-IN-BASE	Resin	S16T021361	Mercury	ug/sample	91.5	<0.0500	<0.0500	0.0500
16-05983-6-IN-BASE	Glass Wool	S16T021362	Mercury	ug/sample	91.5	<0.0500	<0.0500	0.0500
16-05982-6-IN-BASE	Total	S16T021543	Mercury	ug/sample	n/a	<0.0500	<0.0500	0.0500
16-05982-6-IN-BASE	Resin	S16T021544	Mercury	ug/sample	91.5	<0.0500	<0.0500	0.0500
16-05982-6-IN-BASE	Glass Wool	S16T021545	Mercury	ug/sample	91.5	<0.0500	<0.0500	0.0500

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Attachment 2

## ANALYSIS DATE REPORT

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## ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162086

Laboratory Sample ID	Customer Sample ID	Method	Preparation Date	Analysis Date
S16T021252	16-05982-6-H1	Mercury	07/21/2016 16:00	07/22/2016 13:00
S16T021253	16-05982-6-H1	Mercury	07/21/2016 16:00	07/22/2016 13:02
S16T021256	16-05982-6-H2	Mercury	07/21/2016 16:00	07/22/2016 13:04
S16T021257	16-05982-6-H2	Mercury	07/21/2016 16:00	07/22/2016 13:06
S16T021287	16-05983-6-A1	Mercury	07/21/2016 16:00	07/22/2016 13:11
S16T021288	16-05983-6-A1	Mercury	07/21/2016 16:00	07/22/2016 13:13
S16T021290	16-05983-6-A2	Mercury	07/21/2016 16:00	07/22/2016 13:15
S16T021291	16-05983-6-A2	Mercury	07/21/2016 16:00	07/22/2016 13:17
S16T021157	16-05982-6-A1	Mercury	07/21/2016 16:00	07/22/2016 11:49
S16T021158	16-05982-6-A1	Mercury	07/21/2016 16:00	07/22/2016 11:51
S16T021160	16-05982-6-A2	Mercury	07/21/2016 16:00	07/22/2016 11:53
S16T021161	16-05982-6-A2	Mercury	07/21/2016 16:00	07/22/2016 11:55
S16T021166	16-05982-6-B1	Mercury	07/21/2016 16:00	07/22/2016 12:00
S16T021167	16-05982-6-B1	Mercury	07/21/2016 16:00	07/22/2016 12:02
S16T021169	16-05982-6-BLANK	Mercury	07/21/2016 16:00	07/22/2016 12:03
S16T021202	16-05982-6-BLANK	Mercury	07/21/2016 16:00	07/22/2016 12:05
S16T021206	16-05982-6-C1	Mercury	07/21/2016 16:00	07/22/2016 12:37
S16T021207	16-05982-6-C1	Mercury	07/21/2016 16:00	07/22/2016 12:39
S16T021234	16-05982-6-D1	Mercury	07/21/2016 16:00	07/22/2016 12:40
S16T021235	16-05982-6-D1	Mercury	07/21/2016 16:00	07/22/2016 12:42
S16T021238	16-05982-6-E1	Mercury	07/21/2016 16:00	07/22/2016 12:44
S16T021239	16-05982-6-E1	Mercury	07/21/2016 16:00	07/22/2016 12:46
S16T021243	16-05982-6-EFF-BASE	Mercury	07/21/2016 16:00	07/22/2016 12:51
S16T021244	16-05982-6-EFF-BASE	Mercury	07/21/2016 16:00	07/22/2016 12:52
S16T021246	16-05982-6-F1	Mercury	07/21/2016 16:00	07/22/2016 12:54
S16T021247	16-05982-6-F1	Mercury	07/21/2016 16:00	07/22/2016 12:55
S16T021249	16-05982-6-G1	Mercury	07/21/2016 16:00	07/22/2016 12:57
S16T021250	16-05982-6-G1	Mercury	07/21/2016 16:00	07/22/2016 12:59
S16T021293	16-05983-6-B1	Mercury	07/26/2016 07:30	07/26/2016 11:05
S16T021294	16-05983-6-B1	Mercury	07/26/2016 07:30	07/26/2016 11:07
S16T021296	16-05983-6-BLANK	Mercury	07/26/2016 07:30	07/26/2016 11:09
S16T021297	16-05983-6-BLANK	Mercury	07/26/2016 07:30	07/26/2016 11:11
S16T021299	16-05983-6-C1	Mercury	07/26/2016 07:30	07/26/2016 11:13
S16T021300	16-05983-6-C1	Mercury	07/26/2016 07:30	07/26/2016 11:14
S16T021302	16-05983-6-D1	Mercury	07/26/2016 07:30	07/26/2016 11:20
S16T021303	16-05983-6-D1	Mercury	07/26/2016 07:30	07/26/2016 11:22
S16T021305	16-05983-6-E1	Mercury	07/26/2016 07:30	07/26/2016 11:24
S16T021306	16-05983-6-E1	Mercury	07/26/2016 07:30	07/26/2016 11:25
S16T021311	16-05983-6-EFF-BASE	Mercury	07/26/2016 07:30	07/26/2016 11:27
S16T021312	16-05983-6-EFF-BASE	Mercury	07/26/2016 07:30	07/26/2016 11:29
S16T021314	16-05983-6-F1	Mercury	07/26/2016 07:30	07/26/2016 11:31
S16T021315	16-05983-6-F1	Mercury	07/26/2016 07:30	07/26/2016 11:33
S16T021319	16-05983-6-G1	Mercury	07/26/2016 07:30	07/26/2016 11:34
S16T021321	16-05983-6-G1	Mercury	07/26/2016 07:30	07/26/2016 11:36
S16T021324	16-05983-6-H1	Mercury	07/26/2016 07:30	07/26/2016 11:41
S16T021325	16-05983-6-H1	Mercury	07/26/2016 07:30	07/26/2016 11:43



**ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162086**

Laboratory Sample ID	Customer Sample ID	Method	Preparation Date	Analysis Date
S16T021329	16-05983-6-H2	Mercury	07/26/2016 07:30	07/26/2016 11:45
S16T021330	16-05983-6-H2	Mercury	07/26/2016 07:30	07/26/2016 11:47
S16T021361	16-05983-6-IN-BASE	Mercury	07/26/2016 07:30	07/26/2016 11:54
S16T021362	16-05983-6-IN-BASE	Mercury	07/26/2016 07:30	07/26/2016 11:56
S16T021544	16-05982-6-IN-BASE	Mercury	07/26/2016 07:30	07/26/2016 12:01
S16T021545	16-05982-6-IN-BASE	Mercury	07/26/2016 07:30	07/26/2016 12:02

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Attachment 3

RECEIPT PAPERWORK

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222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST			ATS-LO-090-101 Rev DG-1
Date Samples Received: <u>7-18-16</u> Total Number of Samples: <u>260</u> Group #: <u>20162086-119</u>				
Sample Custodian: <u>Sharon L. Holden</u> IH Technician: <u>Brett Garner/Brett Garner</u>				
Sample Custodian to Complete:				
Action	Yes	No	N/A	Comments
RSR provided?			<input checked="" type="checkbox"/>	
Verify GKI is complete			<input checked="" type="checkbox"/>	<input type="checkbox"/> In Project File
Received from an alpha facility?		<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 checked="" type="checkbox"/>	
Record cooler temperature in centigrade, as appropriate	<u>1°C</u>			<input type="checkbox"/> Check if no cooler and/or no ice
Samples are intact and in good condition	<input checked="" 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"/>			
• Date and time of sampling	<input checked="" type="checkbox"/>			
• Sampling location or origin	<input checked="" type="checkbox"/>			
• Container type, size, and number	<input checked="" type="checkbox"/>			
• Preservatives (if used) noted on the COC/RSA and sample bottles			<input checked="" type="checkbox"/>	
• Analysis request is clear	<input checked="" type="checkbox"/>			
• Signature of persons relinquishing and receiving samples	<input checked="" type="checkbox"/>			
• Date and/or time of sample custody exchange	<input checked="" type="checkbox"/>			
Verify that sample numbers on containers match the COC and/or RSA	<input checked="" type="checkbox"/>			
Samples stored properly (e.g., refrigeration)	<input checked="" 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>SLH</u> Date <u>7-18-16</u>				
If No, comment on communication and resolution: <u>WRPS - Ship - 130</u> <u>7/18/16</u>				
<u>Ru - 78</u>				
<u>WHL - NH<sub>3</sub> - 26</u>				
<u>H<sub>2</sub> - 26</u>				
Number of IH Samples Received: <u>acetron.it, 26</u>				
Aldehyde Screen: <u>26</u>	Amines: <u>26</u>	Ammonia: <u>26</u>	Aromatic HC: _____	Asbestos: _____
Beryllium: _____	Be-Bulk: _____	Be-Filter: _____	Be-Vape: _____	1,3-Butadiene: _____
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-0005-002 (REV 4)

## SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/15/2016	
CACN: 202003	COA: CB20	Survey No.: 16-05982 - Respirator Cartridge Testing BY 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
	16-05982-3-EFF-BASE / TDU (Tenax) [Barcode]	Furans
	16-05982-3-F1 / TDU (Tenax) [Barcode]	Furans
	16-05982-3-G1 / TDU (Tenax) [Barcode]	Furans
	16-05982-3-H1 / TDU (Tenax) [Barcode]	Furans
	16-05982-3-H2 / TDU (Tenax) [Barcode]	Furans
	16-05982-3-IN-BASE / TDU (Tenax) [Barcode]	Furans
• 516T021154 ✓	16-05982-6-A1 / Hydrar (SKC 226-17-1A) [Barcode]	Hg-Elemental
• 516T021159 ✓	16-05982-6-A2 / Hydrar (SKC 226-17-1A) [Barcode]	Hg-Elemental

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	[Signature]	Valerie Hendricks	2704 HV Rm H107	7/16/16	1400
Retrieved from Storage:	[Signature]	BRETT GARNER		7-18-16	0728

	Signature	Printed Name	Date	Time
Relinquished By:	[Signature]	BRETT GARNER	7-18-16	1100
Received By:	[Signature]	Sharon L Holder	7-18-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

## SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions				Date Sampled: 07/15/2016	
CACN: 202003		COA: CB20		Survey No.: 16-05982 - Respirator Cartridge Testing BY 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				Required Analysis
• SI6T021164	16-05982-6-B1 / Hydrar (SKC 226-17-1A) ' ' SI6T021166 1167				Hg-Elemental
• SI6T021168	16-05982-6-BLANK / Hydrar (SKC 226-17-1A) ' ' SI6T021169 1202				Hg-Elemental
• SI6T021204	16-05982-6-C1 / Hydrar (SKC 226-17-1A) ' ' SI6T021206 1207				Hg-Elemental
• SI6T021229	16-05982-6-D1 / Hydrar (SKC 226-17-1A) ' ' SI6T021234 1235				Hg-Elemental
• SI6T021237	16-05982-6-E1 / Hydrar (SKC 226-17-1A) ' ' SI6T021238 1239				Hg-Elemental
• SI6T021248	16-05982-6-EFF-BASE / Hydrar (SKC 226-17-1A) ' ' SI6T021243 1244				Hg-Elemental
• SI6T021245	16-05982-6-F1 / Hydrar (SKC 226-17-1A) ' ' SI6T021246 1247				Hg-Elemental
• SI6T021248	16-05982-6-G1 / Hydrar (SKC 226-17-1A) ' ' SI6T021249 1250				Hg-Elemental
Special Instructions:					
	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Valerie Hendricks	2704HV Rm H107	7/16/16	1100
Retrieved from Storage:		BRETT GARNER		7-18-16	0728
	Signature	Printed Name	Date	Time	
Relinquished By:		BRETT GARNER	7-18-16	1100	
Received By:		Sharon L. Holde	7-18-16	1100	
Relinquished By:					
Received By:					
Relinquished By:					
Received By:					
Additional Comments:					

SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions				Date Sampled: 07/15/2016	
CACN: 202003		COA: CB20		Survey No.: 16-05982 - Respirator Cartridge Testing BY 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	
516T021251	16-05982-6-H1 / Hydrar (SKC 226-17-1A) , 516T021252 1253			Hg-Elemental	
516T021254	16-05982-6-H2 / Hydrar (SKC 226-17-1A) , 516T021256 1257			Hg-Elemental	
516T021543	16-05982-6-IN-BASE / Hydrar (SKC 226-17-1A) , 516T021544 21545			Hg-Elemental	
	16-05982-7-A1 / CISA (SKC 226-29)			NH3	
	16-05982-7-A2 / CISA (SKC 226-29)			NH3	
	16-05982-7-B1 / CISA (SKC 226-29)			NH3	
	16-05982-7-BLANK / CISA (SKC 226-29)			NH3	
	16-05982-7-C1 / CISA (SKC 226-29)			NH3	
Special Instructions:					
	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	<i>[Signature]</i>	Valerie Hendricks	2704HV Rm H107	7/16/16	1600
Retrieved from Storage:	<i>[Signature]</i>	BRETT GARNER		7-18-16	0728
	Signature	Printed Name	Date	Time	
Relinquished By:	<i>[Signature]</i>	BRETT GARNER	7-18-16	1100	
Received By:	<i>[Signature]</i>	Sharon L. Udoka	7-18-16	1100	
Relinquished By:					
Received By:					
Relinquished By:					
Received By:					
Additional Comments:					

## SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions				Date Sampled: 07/16/2016	
CACN: 202003		COA: CB20		Survey No.: 16-05983 - Respirator Cartridge Testing BY 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	
516T021329	16-05983-6-H1 / Hydrar (SKC 226-17-1A) 516T021324 1325			Hg-Elemental	
516T021328	16-05983-6-H2 / Hydrar (SKC 226-17-1A) 516T021329 1330			Hg-Elemental	
516T021360	16-05983-6-IN-BASE / Hydrar (SKC 226-17-1A) 516T021361 1362			Hg-Elemental	
	16-05983-7-A1 / CISA (SKC 226-29)			NH3	
	16-05983-7-A2 / CISA (SKC 226-29)			NH3	
	16-05983-7-B1 / CISA (SKC 226-29)			NH3	
	16-05983-7-BLANK / CISA (SKC 226-29)			NH3	
	16-05983-7-C1 / CISA (SKC 226-29)			NH3	
Special Instructions:					
	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	<i>[Signature]</i>	Aracelis Saenz	2704 HV / M07	07-16-16	0000
Retrieved from Storage:	<i>[Signature]</i>	BRETT GARNER		7-18-16	0824
	Signature	Printed Name	Date	Time	
Relinquished By:	<i>[Signature]</i>	BRETT GARNER	7-18-16	1100	
Received By:	<i>[Signature]</i>	TERESA FORRESTER	7-18-16	1100	
Relinquished By:					
Received By:					
Relinquished By:					
Received By:					
Additional Comments:					

## SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/16/2016	
CACN: 202003	COA: CB20	Survey No.: 16-05983 - Respirator Cartridge Testing BY 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
• S16T021292	16-05983-6-B1 / Hydrar (SKC 226-17-1A) S16T021293 1294	Hg-Elemental
• S16T021295	16-05983-6-BLANK / Hydrar (SKC 226-17-1A) S16T021296 1297	Hg-Elemental
• S16T021298	16-05983-6-C1 / Hydrar (SKC 226-17-1A) S16T021299 1300	Hg-Elemental
• S16T021301	16-05983-6-D1 / Hydrar (SKC 226-17-1A) S16T021302 1303	Hg-Elemental
• S16T021304	16-05983-6-E1 / Hydrar (SKC 226-17-1A) S16T021305 1306	Hg-Elemental
• S16T021307	16-05983-6-EFF-BASE / Hydrar (SKC 226-17-1A) S16T021311 1312	Hg-Elemental
• S16T021313	16-05983-6-F1 / Hydrar (SKC 226-17-1A) S16T021314 1315	Hg-Elemental
• S16T021317	16-05983-6-G1 / Hydrar (SKC 226-17-1A) S16T021319 1321	Hg-Elemental

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	<i>[Signature]</i>	Gerrardo Sanchez	2704HW/4107	07-16-16	0000
Retrieved from Storage:	<i>[Signature]</i>	BRETT GARVER		7-16-16	0824

	Signature	Printed Name	Date	Time
Relinquished By:	<i>[Signature]</i>	BRETT GARVER	7-18-16	1100
Received By:	<i>[Signature]</i>	TERESA FORRESTER	7-18-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:



## SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/16/2016	
CACN: 262003	COA: CB20	Survey No.: 16-05983 - Respirator Cartridge Testing BY 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
	16-05983-3-EFF-BASE / TDU (Tenax) [Barcode]	Furans
	16-05983-3-F1 / TDU (Tenax) [Barcode]	Furans
	16-05983-3-G1 / TDU (Tenax) [Barcode]	Furans
	16-05983-3-H1 / TDU (Tenax) [Barcode]	Furans
	16-05983-3-H2 / TDU (Tenax) [Barcode]	Furans
	16-05983-3-W-BASE / TDU (Tenax) [Barcode]	Furans
SIGTO21286	16-05983-6-A1 / Hydrar (SKC 226-17-1A) [Barcode]	Hg-Elemental
SIGTO21287	16-05983-6-A2 / Hydrar (SKC 226-17-1A) [Barcode]	Hg-Elemental

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	[Signature]	Gerardo Saca	2704HW/H107	07-16-16	0000
Retrieved from Storage:	[Signature]	BRETT GARNER		7-18-16	0824

	Signature	Printed Name	Date	Time
Relinquished By:	[Signature]	BRETT GARNER	7-18-16	1100
Received By:	[Signature]	TERESA FORRESTER	7-18-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

**FINAL REPORT ON AMMONIA VAPOR TUBES  
FOR CARTRIDGE EVALUATION  
COLLECTED JULY 15 – 16, 2016**

**Document No.: 20162085 Rev. 0**

**Michael A. Purcell**  
WAI Hanford Laboratory

**Date Published**  
August 10, 2016



Prepared for:


Prepared by:

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August 10, 2016  
Michael A. Purcell, WHL Project Coordinator

## NARRATIVE

**FINAL REPORT ON AMMONIA VAPOR TUBES  
FOR CARTRIDGE EVALUATION  
COLLECTED JULY 15 - 16, 2016**

This final report presents the results of twenty-six ammonia vapor tubes received at the 222-S Laboratory on July 18, 2016, in good condition and with adequate paperwork. The samples were logged into sample delivery group 20162085.

**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. Twenty-two of the twenty-six ammonia results for sample group 20162085 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).

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Attachment 1

## DATA SUMMARY REPORT

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## DATA SUMMARY REPORT FOR SAMPLE GROUP 20162085

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-05982-7-A1	Total	SI6T021002	Ammonia	ug/sample	n/a	<10.0	6.55E+03	1000
16-05982-7-A1	Front Resin	SI6T021003	Ammonia	ug/sample	99.6	<10.0	6.55E+03	1000
16-05982-7-A1	Back Resin	SI6T021004	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-A2	Total	SI6T021005	Ammonia	ug/sample	n/a	<10.0	925	500
16-05982-7-A2	Front Resin	SI6T021006	Ammonia	ug/sample	99.6	<10.0	924	500
16-05982-7-A2	Back Resin	SI6T021007	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-B1	Total	SI6T021008	Ammonia	ug/sample	n/a	<10.0	5.35E+03	1000
16-05982-7-B1	Front Resin	SI6T021009	Ammonia	ug/sample	99.6	<10.0	5.33E+03	1000
16-05982-7-B1	Back Resin	SI6T021010	Ammonia	ug/sample	99.6	<10.0	26.7	10.0
16-05982-7-BLANK	Total	SI6T021011	Ammonia	ug/sample	n/a	<10.0	<10.0	10.0
16-05982-7-BLANK	Front Resin	SI6T021012	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-BLANK	Back Resin	SI6T021013	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-C1	Total	SI6T021014	Ammonia	ug/sample	n/a	<10.0	6.29E+03	1000
16-05982-7-C1	Front Resin	SI6T021015	Ammonia	ug/sample	99.6	<10.0	6.28E+03	1000
16-05982-7-C1	Back Resin	SI6T021016	Ammonia	ug/sample	99.6	<10.0	18.6	10.0
16-05982-7-D1	Total	SI6T021017	Ammonia	ug/sample	n/a	<10.0	2.16E+03	500
16-05982-7-D1	Front Resin	SI6T021018	Ammonia	ug/sample	99.6	<10.0	2.16E+03	500
16-05982-7-D1	Back Resin	SI6T021019	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-E1	Total	SI6T021020	Ammonia	ug/sample	n/a	<10.0	5.75E+03	1000
16-05982-7-E1	Front Resin	SI6T021021	Ammonia	ug/sample	99.6	<10.0	5.74E+03	1000
16-05982-7-E1	Back Resin	SI6T021022	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-EFF-BASE	Total	SI6T021023	Ammonia	ug/sample	n/a	<10.0	<10.0	10.0
16-05982-7-EFF-BASE	Front Resin	SI6T021024	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-EFF-BASE	Back Resin	SI6T021025	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-F1	Total	SI6T021026	Ammonia	ug/sample	n/a	<10.0	2.14E+03	500
16-05982-7-F1	Front Resin	SI6T021027	Ammonia	ug/sample	99.6	<10.0	2.14E+03	500
16-05982-7-F1	Back Resin	SI6T021028	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-G1	Total	SI6T021029	Ammonia	ug/sample	n/a	<10.0	5.94E+03	1000
16-05982-7-G1	Front Resin	SI6T021030	Ammonia	ug/sample	99.6	<10.0	5.94E+03	1000
16-05982-7-G1	Back Resin	SI6T021031	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-H1	Total	SI6T021054	Ammonia	ug/sample	n/a	<10.0	6.95E+03	1000
16-05982-7-H1	Front Resin	SI6T021059	Ammonia	ug/sample	100	<10.0	6.92E+03	1000
16-05982-7-H1	Back Resin	SI6T021060	Ammonia	ug/sample	100	<10.0	32.9	10.0
16-05982-7-H2	Total	SI6T021068	Ammonia	ug/sample	n/a	<10.0	6.30E+03	1000
16-05982-7-H2	Front Resin	SI6T021074	Ammonia	ug/sample	100	<10.0	6.28E+03	1000
16-05982-7-H2	Back Resin	SI6T021075	Ammonia	ug/sample	100	<10.0	17.0	10.0
16-05982-7-IN-BASE	Total	SI6T021089	Ammonia	ug/sample	n/a	<10.0	<10.0	10.0
16-05982-7-IN-BASE	Front Resin	SI6T021103	Ammonia	ug/sample	100	<10.0	<10.0	10.0
16-05982-7-IN-BASE	Back Resin	SI6T021104	Ammonia	ug/sample	100	<10.0	<10.0	10.0
16-05983-7-A1	Total	SI6T021118	Ammonia	ug/sample	n/a	<10.0	6.32E+03	1000
16-05983-7-A1	Front Resin	SI6T021119	Ammonia	ug/sample	100	<10.0	6.31E+03	1000
16-05983-7-A1	Back Resin	SI6T021120	Ammonia	ug/sample	100	<10.0	<10.0	10.0
16-05983-7-A2	Total	SI6T021141	Ammonia	ug/sample	n/a	<10.0	884	500
16-05983-7-A2	Front Resin	SI6T021148	Ammonia	ug/sample	100	<10.0	883	500
16-05983-7-A2	Back Resin	SI6T021149	Ammonia	ug/sample	100	<10.0	<10.0	10.0
16-05983-7-B1	Total	SI6T021150	Ammonia	ug/sample	n/a	<10.0	4.68E+03	500
16-05983-7-B1	Front Resin	SI6T021151	Ammonia	ug/sample	100	<10.0	4.68E+03	500
16-05983-7-B1	Back Resin	SI6T021152	Ammonia	ug/sample	100	<10.0	<10.0	10.0

## DATA SUMMARY REPORT FOR SAMPLE GROUP 20162085

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-05983-7-BLANK	Total	SI6T021153	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-05983-7-BLANK	Front Resin	SI6T021155	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-BLANK	Back Resin	SI6T021156	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-C1	Total	SI6T021162	Ammonia	µg/sample	n/a	<10.0	6.18E+03	1000
16-05983-7-C1	Front Resin	SI6T021163	Ammonia	µg/sample	100	<10.0	6.16E+03	1000
16-05983-7-C1	Back Resin	SI6T021165	Ammonia	µg/sample	100	<10.0	20.2	10.0
16-05983-7-D1	Total	SI6T021170	Ammonia	µg/sample	n/a	<10.0	4.39E+03	500
16-05983-7-D1	Front Resin	SI6T021171	Ammonia	µg/sample	100	<10.0	4.39E+03	500
16-05983-7-D1	Back Resin	SI6T021172	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-E1	Total	SI6T021199	Ammonia	µg/sample	n/a	<10.0	7.35E+03	1.50E+03
16-05983-7-E1	Front Resin	SI6T021200	Ammonia	µg/sample	93.0	<10.0	7.34E+03	1.50E+03
16-05983-7-E1	Back Resin	SI6T021201	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-EFF-BASE	Total	SI6T021236	Ammonia	µg/sample	n/a	<10.0	13.8	10.0
16-05983-7-EFF-BASE	Front Resin	SI6T021240	Ammonia	µg/sample	93.0	<10.0	13.2	10.0
16-05983-7-EFF-BASE	Back Resin	SI6T021241	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-F1	Total	SI6T021255	Ammonia	µg/sample	n/a	<10.0	6.84E+03	1.50E+03
16-05983-7-F1	Front Resin	SI6T021284	Ammonia	µg/sample	93.0	<10.0	6.84E+03	1.50E+03
16-05983-7-F1	Back Resin	SI6T021285	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-G1	Total	SI6T021308	Ammonia	µg/sample	n/a	<10.0	6.46E+03	1.50E+03
16-05983-7-G1	Front Resin	SI6T021309	Ammonia	µg/sample	93.0	<10.0	6.46E+03	1.50E+03
16-05983-7-G1	Back Resin	SI6T021310	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-H1	Total	SI6T021316	Ammonia	µg/sample	n/a	<10.0	7.52E+03	1.50E+03
16-05983-7-H1	Front Resin	SI6T021318	Ammonia	µg/sample	93.0	<10.0	7.36E+03	1.50E+03
16-05983-7-H1	Back Resin	SI6T021320	Ammonia	µg/sample	93.0	<10.0	160	50.0
16-05983-7-H2	Total	SI6T021323	Ammonia	µg/sample	n/a	<10.0	7.36E+03	1.50E+03
16-05983-7-H2	Front Resin	SI6T021326	Ammonia	µg/sample	93.0	<10.0	7.35E+03	1.50E+03
16-05983-7-H2	Back Resin	SI6T021327	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-IN-BASE	Total	SI6T021331	Ammonia	µg/sample	n/a	<10.0	18.6	10.0
16-05983-7-IN-BASE	Front Resin	SI6T021358	Ammonia	µg/sample	93.0	<10.0	18.1	10.0
16-05983-7-IN-BASE	Back Resin	SI6T021359	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0

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Attachment 2

ANALYSIS DATE REPORT

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## ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162085

Laboratory Sample ID	Customer Sample ID	Method	Preparation Date	Analysis Date
S16T021003	16-05982-7-A1	Ammoria	07/27/2016 08:35	07/28/2016 23:21
S16T021004	16-05982-7-A1	Ammoria	07/27/2016 08:35	07/27/2016 17:39
S16T021006	16-05982-7-A2	Ammoria	07/27/2016 08:35	07/28/2016 15:38
S16T021007	16-05982-7-A2	Ammoria	07/27/2016 08:35	07/27/2016 18:25
S16T021009	16-05982-7-B1	Ammoria	07/27/2016 08:35	07/28/2016 23:45
S16T021010	16-05982-7-B1	Ammoria	07/27/2016 08:35	07/27/2016 19:12
S16T021012	16-05982-7-BLANK	Ammoria	07/27/2016 08:35	07/27/2016 20:44
S16T021013	16-05982-7-BLANK	Ammoria	07/27/2016 08:35	07/27/2016 21:07
S16T021015	16-05982-7-C1	Ammoria	07/27/2016 08:35	07/29/2016 00:08
S16T021016	16-05982-7-C1	Ammoria	07/27/2016 08:35	07/27/2016 21:54
S16T021018	16-05982-7-D1	Ammoria	07/27/2016 08:35	07/28/2016 16:48
S16T021019	16-05982-7-D1	Ammoria	07/27/2016 08:35	07/27/2016 22:40
S16T021021	16-05982-7-E1	Ammoria	07/27/2016 08:35	07/29/2016 00:31
S16T021022	16-05982-7-E1	Ammoria	07/27/2016 08:35	07/27/2016 23:26
S16T021024	16-05982-7-EFF-BASE	Ammoria	07/27/2016 08:35	07/27/2016 23:49
S16T021025	16-05982-7-EFF-BASE	Ammoria	07/27/2016 08:35	07/28/2016 00:13
S16T021027	16-05982-7-F1	Ammoria	07/27/2016 08:35	07/28/2016 17:34
S16T021028	16-05982-7-F1	Ammoria	07/27/2016 08:35	07/28/2016 02:08
S16T021030	16-05982-7-G1	Ammoria	07/27/2016 08:35	07/29/2016 00:54
S16T021031	16-05982-7-G1	Ammoria	07/27/2016 08:35	07/28/2016 02:55
S16T021059	16-05982-7-H1	Ammoria	07/27/2016 08:35	07/29/2016 01:17
S16T021060	16-05982-7-H1	Ammoria	07/27/2016 08:35	07/28/2016 06:23
S16T021074	16-05982-7-H2	Ammoria	07/27/2016 08:35	07/29/2016 01:40
S16T021075	16-05982-7-H2	Ammoria	07/27/2016 08:35	07/28/2016 07:09
S16T021103	16-05982-7-IN-BASE	Ammoria	07/27/2016 08:35	07/28/2016 07:32
S16T021104	16-05982-7-IN-BASE	Ammoria	07/27/2016 08:35	07/28/2016 07:56
S16T021119	16-05983-7-A1	Ammoria	07/27/2016 08:35	07/29/2016 02:03
S16T021120	16-05983-7-A1	Ammoria	07/27/2016 08:35	07/28/2016 09:51
S16T021148	16-05983-7-A2	Ammoria	07/27/2016 08:35	07/28/2016 20:39
S16T021149	16-05983-7-A2	Ammoria	07/27/2016 08:35	07/28/2016 10:38
S16T021151	16-05983-7-B1	Ammoria	07/27/2016 08:35	07/28/2016 21:03
S16T021152	16-05983-7-B1	Ammoria	07/27/2016 08:35	07/28/2016 11:24
S16T021155	16-05983-7-BLANK	Ammoria	07/27/2016 08:35	07/28/2016 11:47
S16T021156	16-05983-7-BLANK	Ammoria	07/27/2016 08:35	07/28/2016 12:10
S16T021163	16-05983-7-C1	Ammoria	07/27/2016 08:35	07/29/2016 02:50
S16T021165	16-05983-7-C1	Ammoria	07/27/2016 08:35	07/28/2016 12:56
S16T021171	16-05983-7-D1	Ammoria	07/27/2016 08:35	07/28/2016 21:49
S16T021172	16-05983-7-D1	Ammoria	07/27/2016 08:35	07/28/2016 14:52
S16T021200	16-05983-7-E1	Ammoria	08/03/2016 08:00	08/04/2016 09:22
S16T021201	16-05983-7-E1	Ammoria	08/03/2016 08:00	08/03/2016 18:10
S16T021240	16-05983-7-EFF-BASE	Ammoria	08/03/2016 08:00	08/03/2016 18:27
S16T021241	16-05983-7-EFF-BASE	Ammoria	08/03/2016 08:00	08/03/2016 18:44
S16T021284	16-05983-7-F1	Ammoria	08/03/2016 08:00	08/04/2016 10:13
S16T021285	16-05983-7-F1	Ammoria	08/03/2016 08:00	08/03/2016 19:18
S16T021309	16-05983-7-G1	Ammoria	08/03/2016 08:00	08/04/2016 10:30
S16T021310	16-05983-7-G1	Ammoria	08/03/2016 08:00	08/03/2016 20:42

**ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162085**

Laboratory Sample ID	Customer Sample ID	Method	Preparation Date	Analysis Date
S16T021318	16-05983-7-H1	Ammoria	08/03/2016 08:00	08/04/2016 10:47
S16T021320	16-05983-7-H1	Ammoria	08/03/2016 08:00	08/04/2016 11:04
S16T021326	16-05983-7-H2	Ammoria	08/03/2016 08:00	08/04/2016 11:20
S16T021327	16-05983-7-H2	Ammoria	08/03/2016 08:00	08/03/2016 21:50
S16T021358	16-05983-7-IN-BASE	Ammoria	08/03/2016 08:00	08/03/2016 22:07
S16T021359	16-05983-7-IN-BASE	Ammoria	08/03/2016 08:00	08/03/2016 22:24

20162085 Rev. 0

Attachment 3

RECEIPT PAPERWORK

10 of 15

C.261

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST			ATS-LO-090-101 Rev DG-1
Date Samples Received: <u>7-18-16</u> Total Number of Samples: <u>260</u> Group #: <u>20162085-NH3</u>				
Sample Custodian: <u>Sharon L. Holden</u> IH Technician: <u>Brett Garner/Brett Garner</u>				
Sample Custodian to Complete:				
Action	Yes	No	N/A	Comments
RSR provided?			<input checked="" type="checkbox"/>	
Verify GKI is complete			<input checked="" type="checkbox"/>	<input type="checkbox"/> In Project File
Received from an alpha facility?		<input checked="" type="checkbox"/>		<input type="checkbox"/> Contact PC for approval to release
Check that outer custody seal is intact, if present			<input checked="" type="checkbox"/>	
Record cooler temperature in centigrade, as appropriate	<u>12</u>			<input type="checkbox"/> Check if no cooler and/or no ice
Samples are intact and in good condition	<input checked="" 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"/>			
• Date and time of sampling	<input checked="" type="checkbox"/>			
• Sampling location or origin	<input checked="" type="checkbox"/>			
• Container type, size, and number	<input checked="" type="checkbox"/>			
• Preservatives (if used) noted on the COC/RSA and sample bottles			<input checked="" type="checkbox"/>	
• Analysis request is clear	<input checked="" type="checkbox"/>			
• Signature of persons relinquishing and receiving samples	<input checked="" type="checkbox"/>			
• Date and/or time of sample custody exchange	<input checked="" type="checkbox"/>			
Verify that sample numbers on containers match the COC and/or RSA	<input checked="" type="checkbox"/>			
Samples stored properly (e.g., refrigeration)	<input checked="" 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>SLH</u> Date <u>7-18-16</u>				
If No, comment on communication and resolution: <u>WTF</u> <u>7/18/16</u>				
<u>WRPS Ship - 130</u>				
<u>RUC - 78</u>				
<u>WHL - NH<sub>3</sub> - 26</u>				
<u>H<sub>2</sub> - 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: _____
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)

## SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		Date Sampled: 07/15/2016	
CACN: 202003	COA: CB20	Survey No.: 16-05982 - Respirator Cartridge Testing BY 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	
	16-05982-6-H1 / Hydrar (SKC 226-17-1A)	Hg-Elemental	
	16-05982-6-H2 / Hydrar (SKC 226-17-1A)	Hg-Elemental	
	16-05982-6-N-BASE / Hydrar (SKC 226-17-1A)	Hg-Elemental	
516T021002	16-05982-7-A1 / CISA (SKC 226-29)	NH3	
516T021003	16-05982-7-A2 / CISA (SKC 226-29)	NH3	
516T021008	16-05982-7-B1 / CISA (SKC 226-29)	NH3	
516T021011	16-05982-7-BLANK / CISA (SKC 226-29)	NH3	
516T021014	16-05982-7-C1 / CISA (SKC 226-29)	NH3	
Special Instructions:			
	Signature	Printed Name	Location
Delivered to Storage:	<i>[Signature]</i>	Valerie Hendricks	2704 HV Rm 4107
Retrieved from Storage:	<i>[Signature]</i>	BRETT GARDNER	
	Signature	Printed Name	Date
Relinquished By:	<i>[Signature]</i>	BRETT GARDNER	7/18/16
Received By:	<i>[Signature]</i>	LESLIE MAZ	7/18/16
Relinquished By:			
Received By:			
Relinquished By:			
Received By:			
Additional Comments:			

## SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			Date Sampled: 07/15/2016		
CACN: 202003		COA: CB20	Survey No.: 16-05982 - Respirator Cartridge Testing BY 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			
516T021017	16-05982-7-D1 / CISA (SKC 226-29) 516T021018 1019	NH3			
516T021020	16-05982-7-E1 / CISA (SKC 226-29) 516T021021 1022	NH3			
516T021023	16-05982-7-EFF-BASE / CISA (SKC 226-29) 516T021024 1025	NH3			
516T021026	16-05982-7-F1 / CISA (SKC 226-29) 516T021027 1028	NH3			
516T021029	16-05982-7-G1 / CISA (SKC 226-29) 516Tp21030 1031	NH3			
516T021054	16-05982-7-H1 / CISA (SKC 226-29) 516T021059 1060	NH3			
516T021068	16-05982-7-H2 / CISA (SKC 226-29) 516T021074 1075	NH3			
516T021089	16-05982-7-IN-BASE / CISA (SKC 226-29) 516T021103 1104	NH3			
Special Instructions:					
	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Valerie Honricks	2704HV Rm H107	7/16/16	1600
Retrieved from Storage:		BRETT GARNER		7-18-16	0801
	Signature	Printed Name	Date	Time	
Relinquished By:		BRETT GARNER	7/18/16	11:00	
Received By:		LESLIE DIAZ	7/18/16	11:00	
Relinquished By:					
Received By:					
Relinquished By:					
Received By:					
Additional Comments:					



SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions				Date Sampled: 07/16/2016	
CACN: 202003		COA: CB20		Survey No.: 16-05983 - Respirator Cartridge Testing BY 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	
516To2 1170	16-05983-7-D1 / CISA (SKC 226-29) 516To2 1171 1172			NH3	
516To2 1199	16-05983-7-E1 / CISA (SKC 226-29) 516To2 1200 1201			NH3	
516To2 1236	16-05983-7-EFF-BASE / CISA (SKC 226-29) 516To2 1240 1241			NH3	
516To2 1255	16-05983-7-F1 / CISA (SKC 226-29) 516To2 1284 1285			NH3	
516To2 1308	16-05983-7-G1 / CISA (SKC 226-29) 516To2 1309 1310			NH3	
516To2 1316	16-05983-7-H1 / CISA (SKC 226-29) 516To2 1318 1320			NH3	
516To2 1323	16-05983-7-H2 / CISA (SKC 226-29) 516To2 1326 1327			NH3	
516To2 1331	16-05983-7-IN-BASE / CISA (SKC 226-29) 516To2 1358 1359			NH3	
Special Instructions:					
	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	<i>Paul Sany</i>	Gerardo Sany	2704HV / H107	07-16-16	0000
Retrieved from Storage:	<i>Brett Garner</i>	BRETT GARNER		7-18-16	0830
	Signature	Printed Name	Date	Time	
Relinquished By:	<i>Brett Garner</i>	BRETT GARNER	7-18-16	1100	
Received By:	<i>Teresa Forrester</i>	TERESA FORRESTER	7-18-16	1100	
Relinquished By:					
Received By:					
Relinquished By:					
Received By:					
Additional Comments:					

SWIHD - Chain of Custody

## INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions				Date Sampled: 07/16/2016	
CACN: 202003		COA: GB20		Survey No.: 16-05983 - Respirator Cartridge Testing BY 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			
	16-05983-6-H1 / Hydrar (SKC 226-17-1A) [Barcode]	Hg-Elemental			
	16-05983-6-H2 / Hydrar (SKC 226-17-1A) [Barcode]	Hg-Elemental			
	16-05983-6-IN-BASE / Hydrar (SKC 226-17-1A) [Barcode]	Hg-Elemental			
5167621118	16-05983-7-A1 / CISA (SKC 226-29) [Barcode]	NH3			
5167621141	16-05983-7-A2 / CISA (SKC 226-29) [Barcode]	NH3			
5167621150	16-05983-7-B1 / CISA (SKC 226-29) [Barcode]	NH3			
5167621153	16-05983-7-BLANK / CISA (SKC 226-29) [Barcode]	NH3			
5167621162	16-05983-7-C1 / CISA (SKC 226-29) [Barcode]	NH3			
Special Instructions:					
	Signature	Printed Name	Location	Date	Time
Delivered to Storage:	[Signature]	Gerrardo Saenz	2704HV/H107	07-16-16	0000
Retrieved from Storage:	[Signature]	BRETT GARNER		7-18-16	0830
	Signature	Printed Name	Date	Time	
Relinquished By:	[Signature]	BRETT GARNER	7-18-16	1100	
Received By:	[Signature]	TERESA FORRESTER	7-18-16	1100	
Relinquished By:					
Received By:					
Relinquished By:					
Received By:					
Additional Comments:					





## ANALYTICAL REPORT

Report Date: July 27, 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

20162095

Workorder: 34-1620241

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021205		Collected: 07/15/2016		
Lab ID: 1620241001		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 228-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/21/2016		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	0.69	NA	NA	0.050
Acetaldehyde	11	NA	NA	0.050
Acetone	73	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	5.6	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	7.1	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	1.3	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	1.1	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021208	Collected: 07/15/2016		
Lab ID: 1620241002	Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)	
Method: EPA TO-11A	Analyzed: 07/21/2016		
Sampling Parameter: Air Volume Not Provided			
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)
Formaldehyde	<0.050	NA	NA
Acetaldehyde	3.5	NA	NA

Results Continued on Next Page

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## ANALYTICAL REPORT

Workorder: 34-1620241

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021208		Collected: 07/15/2016		
Lab ID: 1620241002		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/21/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Acetone	<0.050	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

Sample ID: S16T021209		Collected: 07/15/2016		
Lab ID: 1620241003		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/21/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	4.4	NA	NA	0.050
Acetone	0.20	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: 34-1620241

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021210		Collected: 07/15/2016		
Lab ID: 1620241004		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/21/2018		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	<0.050	NA	NA	0.050
Acetone	<0.050	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

Sample ID: S16T021211		Collected: 07/15/2016		
Lab ID: 1620241005		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/21/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	6.3	NA	NA	0.050
Acetone	3.0	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

Results Continued on Next Page



## ANALYTICAL REPORT

Workorder: **34-1620241**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021211		Collected: 07/15/2016		
Lab ID: 1620241005		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/21/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021212		Collected: 07/15/2016		
Lab ID: 1620241006		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/21/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	7.3	NA	NA	0.050
Acetone	12	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

Sample ID: S16T021213		Collected: 07/15/2016		
Lab ID: 1620241007		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/21/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	7.2	NA	NA	0.050
Acetone	19	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehydve	0.11	NA	NA	0.050

Results Continued on Next Page





## ANALYTICAL REPORT

Workorder: 34-1620241

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021213		Collected: 07/15/2016		
Lab ID: 1620241007		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/21/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
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: S16T021214		Collected: 07/15/2016		
Lab ID: 1620241008		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/21/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	0.056	NA	NA	0.050
Acetaldehyde	0.051	NA	NA	0.050
Acetone	<0.050	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: 34-1620241

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

## Analytical Results

Sample ID: S16T021215		Collected: 07/15/2016		
Lab ID: 1620241009		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/21/2018		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	2.1	NA	NA	0.050
Acetone	14	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	0.070	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: S16T021216		Collected: 07/15/2016		
Lab ID: 1620241010		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/21/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	7.7	NA	NA	0.050
Acetone	61	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	0.82	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

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## ANALYTICAL REPORT

Workorder: **34-1620241**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021216		Collected: 07/15/2016		
Lab ID: 1620241010		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/21/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021217		Collected: 07/15/2016		
Lab ID: 1620241011		Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/22/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	0.22	NA	NA	0.050
Acetaldehyde	11	NA	NA	0.050
Acetone	60	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	5.6	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	8.7	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	1.2	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	0.33	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021218		Collected: 07/15/2016		
Lab ID: 1620241012		Received: 07/20/2016		
Method: EPA TO-11A		Sampling Location: CARTRIDGE EVALUATION		Analyzed: 07/22/2016
		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	7.1	NA	NA	0.050
Acetone	82	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	1.0	NA	NA	0.050

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## ANALYTICAL REPORT

Workorder: **34-1620241**  
Client Project ID: CARTRIDGE EVALUATION  
Purchase Order: 55502 Rel9  
Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021218		Collected: 07/15/2016		
Lab ID: 1620241012		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
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: S16T021219		Collected: 07/15/2016		
Lab ID: 1620241013		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	0.12	NA	NA	0.050
Acetaldehyde	0.074	NA	NA	0.050
Acetone	<0.050	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	0.12	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050





## ANALYTICAL REPORT

Workorder: **34-1620241**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021220		Collected: 07/16/2016		
Lab ID: 1620241014		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	0.54	NA	NA	0.050
Acetaldehyde	11	NA	NA	0.050
Acetone	75	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	5.4	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	8.2	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	1.2	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	1.2	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021221		Collected: 07/16/2016		
Lab ID: 1620241015		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	2.6	NA	NA	0.050
Acetone	<0.050	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

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## ANALYTICAL REPORT

Workorder: **34-1620241**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021221		Collected: 07/16/2016		
Lab ID: 1620241015		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/22/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021222		Collected: 07/16/2016		
Lab ID: 1620241016		Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/22/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	0.069	NA	NA	0.050
Acetaldehyde	3.0	NA	NA	0.050
Acetone	0.39	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

Sample ID: S16T021223		Collected: 07/16/2016		
Lab ID: 1620241017		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/22/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	<0.050	NA	NA	0.050
Acetone	0.17	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050

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## ANALYTICAL REPORT

Workorder: **34-1620241**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021223		Collected: 07/16/2016		
Lab ID: 1620241017		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
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: S16T021224		Collected: 07/16/2016		
Lab ID: 1620241018		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	0.052	NA	NA	0.050
Acetaldehyde	4.9	NA	NA	0.050
Acetone	1.1	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: **34-1620241**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021225		Collected: 07/16/2016		
Lab ID: 1620241019		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	0.061	NA	NA	0.050
Acetaldehyde	6.0	NA	NA	0.050
Acetone	6.1	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

Sample ID: S16T021226		Collected: 07/16/2016		
Lab ID: 1620241020		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	0.052	NA	NA	0.050
Acetaldehyde	7.2	NA	NA	0.050
Acetone	16	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

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## ANALYTICAL REPORT

Workorder: **34-1620241**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021226		Collected: 07/16/2016		
Lab ID: 1620241020		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/22/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021227		Collected: 07/16/2016		
Lab ID: 1620241021		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/22/2016		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	0.061	NA	NA	0.050
Acetaldehyde	0.085	NA	NA	0.050
Acetone	0.089	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

Sample ID: S16T021228		Collected: 07/16/2016		
Lab ID: 1620241022		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/22/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	7.8	NA	NA	0.050
Acetone	25	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	0.095	NA	NA	0.050

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## ANALYTICAL REPORT

Workorder: **34-1620241**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021228		Collected: 07/16/2016		
Lab ID: 1620241022		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
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: S16T021230		Collected: 07/16/2016		
Lab ID: 1620241023		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	7.2	NA	NA	0.050
Acetone	42	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	0.32	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: 34-1620241

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

## Analytical Results

Sample ID: S16T021231		Collected: 07/16/2016		
Lab ID: 1620241024		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/22/2018		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	0.32	NA	NA	0.050
Acetaldehyde	11	NA	NA	0.050
Acetone	57	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	5.4	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	8.3	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	1.2	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	0.44	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: S16T021232		Collected: 07/16/2016		
Lab ID: 1620241025		Received: 07/20/2016		
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		
Sampling Parameter: Air Volume Not Provided		Analyzed: 07/22/2016		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	7.4	NA	NA	0.050
Acetone	61	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	0.59	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

Results Continued on Next Page



## ANALYTICAL REPORT

Workorder: **34-1620241**  
Client Project ID: CARTRIDGE EVALUATION  
Purchase Order: 55502 Rel9  
Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021232		Collected: 07/16/2016	
Lab ID: 1620241025		Received: 07/20/2016	
Sampling Location: CARTRIDGE EVALUATION			
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)	
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided	
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA

Sample ID: S16T021233		Collected: 07/16/2016	
Lab ID: 1620241026		Received: 07/20/2016	
Sampling Location: CARTRIDGE EVALUATION			
Method: EPA TO-11A		Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)	
Analyzed: 07/22/2016		Sampling Parameter: Air Volume Not Provided	
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)
Formaldehyde	0.11	NA	NA
Acetaldehyde	0.12	NA	NA
Acetone	0.089	NA	NA
Acrolein	<0.050	NA	NA
Propionaldehyde	<0.050	NA	NA
Crotonaldehyde	<0.050	NA	NA
Butyraldehyde	<0.050	NA	NA
Benzaldehyde	<0.050	NA	NA
Isovaleraldehyde	<0.050	NA	NA
Valeraldehyde	<0.050	NA	NA
m-Tolualdehyde	<0.050	NA	NA
p-Tolualdehyde	<0.050	NA	NA
o-Tolualdehyde	<0.050	NA	NA
Hexanal	0.11	NA	NA
2,5-Dimethylbenzaldehyde	<0.050	NA	NA

### Comments

#### Quality Control: EPA TO-11A - (HBN: 173313)

Samples 1620241001 and 010 required 10X dilution for reporting of Acetone within calibrated range for front and back sections.

LMB used to media correct LCS/LCSD and field samples for Acetone only.

#### Quality Control: EPA TO-11A - (HBN: 173364)

Samples 1620241011, 012, 014, 023, 024 and 025 required 10X dilution for reporting of Acetone within calibrated range for front and back sections.

Samples 1620241022 required 10X dilution to front section only for reporting of Acetone within calibrated range.

LMB used to media correct LCS/LCSD and field samples for Acetone only.





## ANALYTICAL REPORT

Workorder: **34-1620241**  
Client Project ID: CARTRIDGE EVALUATION  
Purchase Order: 55502 Rel9  
Project Manager: Rand Potter

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

Method	Analyst	Peer Review
EPA TO-11A	/S/ David Teynor 07/26/2016 13:20	/S/ Christopher Winter 07/27/2016 10:24

### Laboratory Contact Information

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

Phone: (801) 266-7700  
Email: [alsltlab@ALSGlobal.com](mailto:alsltlab@ALSGlobal.com)  
Web: [www.alslc.com](http://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) Utah (NELAC) Nevada Oklahoma Iowa Florida (TNI) Texas (TNI)	ADE-1420 DATA1 UT00009 UT00009 IA# 376 E871067 T104704456-11-1	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a> <a href="http://health.utah.gov/lab/labimp/">http://health.utah.gov/lab/labimp/</a> <a href="http://ndep.nv.gov/bdwlabservice.htm">http://ndep.nv.gov/bdwlabservice.htm</a> <a href="http://www.deq.state.ok.us/CSDnew/">http://www.deq.state.ok.us/CSDnew/</a> <a href="http://www.iowadnr.gov/insideDNR/RegulatoryWater.aspx">http://www.iowadnr.gov/insideDNR/RegulatoryWater.aspx</a> <a href="http://www.dep.state.fl.us/labs/bars/sas/qa/">http://www.dep.state.fl.us/labs/bars/sas/qa/</a> <a href="http://www.tceq.texas.gov/feld/qa/lab_accred_certif.html">http://www.tceq.texas.gov/feld/qa/lab_accred_certif.html</a>
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Lead Testing: CPSC Soil, Dust, Paint, Air	AClass (ISO 17025, CPSC) AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	ADE-1420 101574	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a> <a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Dietary Supplements	AClass (ISO 17025)	ADE-1420	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>



## ANALYTICAL REPORT

Workorder: **34-1620241**  
Client Project ID: CARTRIDGE EVALUATION  
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: 1620241

Limits: Historical Performance  
Basis: ALS Laboratory Group

Preparation: NA  
Batch: NA  
Prepared By: NA

Analysis: EPA TO-11A  
Batch: ILC/12332 (HBN: 173313)  
Analyzed By: David Teynor

### Blank

LMB: 509340			
Analyzed: 07/21/2016 00:00			
Units: ug/sample			
Analyte	Result	MDL	RL
Formaldehyde	ND	NA	0.0500
Acetaldehyde	ND	NA	0.0500
Acetone	0.216	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: 509341					LCS: 509342				
Analyzed: 07/21/2016 00:00					Analyzed: 07/21/2016 00:00				
Dilution: 1					Dilution: 1				
Units: ug/sample					Units: ug/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
Formaldehyde	3.00	3.00	100	87.8 116.8	2.98	99.3	0.669	0.0	20.0
Acetaldehyde	3.00	3.00	100	94.7 110.5	3.01	100	0.333	0.0	20.0
Acetone	2.80	3.00	93.5	69.2 119.9	2.80	93.5	0.00	0.0	20.0
Acrolein	2.94	3.00	98.0	83.5 120.2	2.94	98.0	0.00	0.0	20.0
Propionaldehyde	3.14	3.00	105	92.2 117.2	3.17	106	0.951	0.0	20.0
Crotonaldehyde	2.97	3.00	99.0	93.1 114.8	2.99	99.7	0.671	0.0	20.0
Butyraldehyde	3.14	3.00	105	86.6 120.8	3.04	101	3.24	0.0	20.0
Benzaldehyde	3.06	3.00	102	96.0 112.3	3.05	102	0.327	0.0	20.0
Isovaleraldehyde	3.19	3.00	106	95.4 121.6	3.11	104	2.54	0.0	20.0
Valeraldehyde	3.04	3.00	101	85.3 120.4	2.99	99.7	1.66	0.0	20.0
m-Tolualdehyde	2.75	3.00	91.7	80.9 118.6	2.80	93.3	1.80	0.0	20.0
p-Tolualdehyde	3.21	3.00	107	83.5 122.2	3.17	106	1.25	0.0	20.0
o-Tolualdehyde	2.93	3.00	97.7	91.6 111.4	2.91	97.0	0.685	0.0	20.0
Hexanal	2.94	3.00	98.0	85.4 127.6	3.16	105	7.21	0.0	20.0
2,5-Dimethylbenzaldehyde	3.17	3.00	106	99.6 118.7	3.30	110	4.02	0.0	20.0



## Quality Control Sample Batch Report

### Analysis Information

Workorder: 1620241

Limits: Historical Performance  
Basis: ALS Laboratory Group

Preparation: NA  
Batch: NA  
Prepared By: NA

Analysis: EPA TO-11A  
Batch: ILC/12332 (HBN: 173313)  
Analyzed By: David Teynor

### Comments

Samples 162024 1001 and 010 required 10X dilution for reporting of Acetone within calibrated range for front and back sections.  
LMB used to media correct LCS/LCSD and field samples for Acetone only.

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

Analyst	Peer Review
/S/ David Teynor 07/25/2016 15:37	/S/ Christopher Winter 07/26/2016 12:17

### 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: **1620241**

Limits: Historical Performance  
Basis: ALS Laboratory Group

Preparation: NA  
Batch: NA  
Prepared By: NA

Analysis: EPA TO-11A  
Batch: ILC/12338 (HBN: 173364)  
Analyzed By: David Teynor

### Blank

LMB: 509471			
Analyzed: 07/22/2016 00:00			
Units: ug/sample			
Analyte	Result	MDL	RL
Formaldehyde	ND	NA	0.0500
Acetaldehyde	ND	NA	0.0500
Acetone	0.237	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: 509472					LCS: 509473			
Analyzed: 07/22/2016 00:00					Analyzed: 07/22/2016 00:00			
Dilution: 1					Dilution: 1			
Units: ug/sample					Units: ug/sample			
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Formaldehyde	2.98	3.00	99.3	87.8 116.8	3.02	101	1.33	0.0 20.0
Acetaldehyde	3.01	3.00	100	94.7 110.5	3.04	101	0.992	0.0 20.0
Acetone	2.78	3.00	92.8	69.2 119.9	2.79	93.1	0.359	0.0 20.0
Acrolein	2.95	3.00	98.3	83.5 120.2	2.94	98.0	0.340	0.0 20.0
Propionaldehyde	3.13	3.00	104	92.2 117.2	3.13	104	0.00	0.0 20.0
Crotonaldehyde	2.99	3.00	99.7	93.1 114.8	2.98	99.3	0.335	0.0 20.0
Butyraldehyde	3.06	3.00	102	86.6 120.8	3.01	100	1.65	0.0 20.0
Benzaldehyde	3.02	3.00	101	96.0 112.3	3.11	104	2.94	0.0 20.0
Isovaleraldehyde	3.15	3.00	105	95.4 121.6	3.13	104	0.637	0.0 20.0
Valeraldehyde	3.03	3.00	101	85.3 120.4	2.99	99.7	1.33	0.0 20.0
m-Tolualdehyde	2.95	3.00	98.3	80.9 118.6	3.12	104	5.60	0.0 20.0
p-Tolualdehyde	3.02	3.00	101	83.5 122.2	2.82	94.0	6.85	0.0 20.0
o-Tolualdehyde	2.95	3.00	98.3	91.6 111.4	2.95	98.3	0.00	0.0 20.0
Hexanal	3.08	3.00	103	85.4 127.6	3.15	105	2.25	0.0 20.0
2,5-Dimethylbenzaldehyde	3.26	3.00	109	99.6 118.7	3.20	107	1.86	0.0 20.0



## Quality Control Sample Batch Report

### Analysis Information

Workorder: 1620241

Limits: Historical Performance  
Basis: ALS Laboratory Group

Preparation: NA  
Batch: NA  
Prepared By: NA

Analysis: EPA TO-11A  
Batch: ILC/12338 (HBN: 173364)  
Analyzed By: David Teynor

### Comments

Samples 162024 1011, 012, 014, 023, 024 and 025 required 10X dilution for reporting of Acetone within calibrated range for front and back sections.

Samples 162024 1022 required 10X dilution to front section only for reporting of Acetone within calibrated range.

LMB used to media correct LCS/LCSD and field samples for Acetone only.

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

Analyst	Peer Review
/S/ David Teynor 07/26/2016 13:20	/S/ Christopher Winter 07/27/2016 10:24

### 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



1620241

140241

Assembler N/A		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				C.O.C. No. 20162095	
Collector JOEES		Contact/Requestor CARL HOWARD IV				Telephone No. 373-4861	
SAF No. N/A		Sample Origin CARTRIDGE EVALUATION				FAX 372-1878	
Project Title CARTRIDGE EVALUATION		Logbook Work Package No. N/A				Purchase Order/Charge Code 2000000000	
Shipped To (Lab) ALS		Method of Shipment N/A				Ion Charge No. WTS-021	
Protocol N/A		Data Turnaround 10 DAYS				Temp. ON ICE	
		Parts and Return No. 7767 9004 1619				Bill of Lading/Air Bill No.	
		Sample Analysis				Preservative	
Sample No.	Lab ID	Date	Time	No./Type Container			
	S167021205	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-A1		25C or low
	S167021208	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-A2		25C or low
	S167021209	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-B1		25C or low
	S167021210	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-BLANK		25C or low
	S167021211	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-C1		25C or low
	S167021212	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-C1		25C or low
	S167021213	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-B1		25C or low
	S167021214	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-EFF-BASE		25C or low
	S167021215	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-F1		25C or low
	S167021216	VA	7/15/16	SILICA GEL	Aldehyde 16-05582-8-G1		25C or low
POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No Hold Time							
EPA 70-11A							
SPECIAL INSTRUCTIONS Send Results to Carl Howard IV & Greg Moore Carl Howard IV: 373-4861 Gregory S. Moore: 373-4861 for email Release 9 Reference Contract # 55502 NORTH 2016 ROD							
Relinquished By Sharon L. Miller	Print Sharon L. Miller	Signature Sharon L. Miller	Date/Time 7/16/16 0830	Received By Julie Gaudin	Signature Julie Gaudin	Date/Time 7/16/16 0830	Matrix* S = Soil SE = Sediment SO = Solid SL = Sludge W = Water V = Vegetation VA = Vapor X = Other DS = Drum Solids
Relinquished By WRPS	Print Julie Gaudin	Signature Julie Gaudin	Date/Time 7/19/16 1400	Received By FEDX	Signature FEDX	Date/Time 7/19/16 1400	
Relinquished By FEDX	Print FEDX	Signature FEDX	Date/Time 7/19/16 1400	Received By Tara L. Gaudin	Signature Tara L. Gaudin	Date/Time 7/19/16 1400	
Disposal Method (e.g., Return to customer, per lab procedure listed in 602025)				Disposed By CONSUMED			
Final Sample Disposition				Date/Time 07/20/16 16:00			
All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.							
A-6003-982 (03/05)							

Assembler		C.O.C. No. 20162095	
W/A		Page 2 of 3	
Collector		Telephone No. 773-6861 MSN 16-03 FAX 372-1878	
SOP No.		Sample Origin	
Project Title		Logbook/Work Package No.	
Condition Evaluation		Ice Chest No.	
Shipped To (Lab)		Method of Shipment	
Protocol		Date Turnaround	
N/A		10 DAYS	
Sample No.		Lab ID	Date
S167021217		VA	7/15/16
S167021218		VA	7/15/16
S167021219		VA	7/15/16
S167021220		VA	7/16/16
S167021221		VA	7/16/16
S167021222		VA	7/16/16
S167021223		VA	7/16/16
S167021224		VA	7/16/16
S167021225		VA	7/16/16
S167021226		VA	7/16/16
Sample Analysis		Preservative	
Aldehyde 16-05982-8-B1		25C or Low	
Aldehyde 16-05982-8-B2		25C or Low	
Aldehyde 16-05982-8-B3		25C or Low	
Aldehyde 16-05983-8-A1		25C or Low	
Aldehyde 16-05983-8-A2		25C or Low	
Aldehyde 16-05983-8-B1		25C or Low	
Aldehyde 16-05983-8-B2		25C or Low	
Aldehyde 16-05983-8-B3		25C or Low	
Aldehyde 16-05983-8-C1		25C or Low	
Aldehyde 16-05983-8-C2		25C or Low	
Aldehyde 16-05983-8-D1		25C or Low	
Aldehyde 16-05983-8-E1		25C or Low	
SPECIAL INSTRUCTIONS		Hold Time	
Send Results to Carl Rowland IV & Greg Moose			
Send to: carl.rowland@va.gov and greg.moose@va.gov see SOW for email			
Release 9			
Reference Contract # 55502			
N1055 2016 MOD			
Relinquished By	Print	Signature	Date/Time
Sharon Walker	7/19/16 0830	Julie Gashon	7/19/16 0830
Relinquished By	Print	Signature	Date/Time
WRPS	7/19/16 1400	Julie Gashon	7/19/16 1400
Relinquished By	Print	Signature	Date/Time
WRPS	7/19/16 1400	Julie Gashon	7/19/16 1400
Relinquished By	Print	Signature	Date/Time
WRPS	7/19/16 1400	Julie Gashon	7/19/16 1400
Disposal Method (e.g., Return to customer, per lab procedure listed in process)		Disposition	
DOT		CONSUMPED	
Date/Time		Date/Time	
07/22/16 12:00		07/22/16 12:00	







## ANALYTICAL REPORT

Report Date: August 01, 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

20162100

Workorder: 34-1620493

Client Project ID: Washington River Protection  
So

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021368		Collected: 07/15/2016		
Lab ID: 1620493001		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.050	NA	NA	0.010

Sample ID: S16T021369		Collected: 07/15/2016		
Lab ID: 1620493002		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021370		Collected: 07/15/2016		
Lab ID: 1620493003		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.0059	NA	NA	0.0010

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## ANALYTICAL REPORT

Workorder: 34-1620493

Client Project ID: Washington River Protection  
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Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021371		Collected: 07/15/2016		
Lab ID: 1620493004		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021372		Collected: 07/15/2016		
Lab ID: 1620493005		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.018	NA	NA	0.010

Sample ID: S16T021373		Collected: 07/15/2016		
Lab ID: 1620493006		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.042	NA	NA	0.010

Sample ID: S16T021374		Collected: 07/15/2016		
Lab ID: 1620493007		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		
		Sampling Parameter: Air Volume Not Provided		
		Analyzed: 07/30/2016		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.089	NA	NA	0.010

Sample ID: S16T021375		Collected: 07/15/2016		
Lab ID: 1620493008		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.050	NA	NA	0.010



## ANALYTICAL REPORT

Workorder: 34-1620493

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Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021376		Collected: 07/15/2016		
Lab ID: 1620493009		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.13	NA	NA	0.010

Sample ID: S16T021377		Collected: 07/15/2016		
Lab ID: 1620493010		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.050	NA	NA	0.010

Sample ID: S16T021378		Collected: 07/15/2016		
Lab ID: 1620493011		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.066	NA	NA	0.010

Sample ID: S16T021379		Collected: 07/15/2016		
Lab ID: 1620493012		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021380		Collected: 07/15/2016		
Lab ID: 1620493013		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010



## ANALYTICAL REPORT

Workorder: 34-1620493

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Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021381		Collected: 07/15/2016		
Lab ID: 1620493014		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021382		Collected: 07/15/2016		
Lab ID: 1620493015		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021383		Collected: 07/15/2016		
Lab ID: 1620493016		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021384		Collected: 07/15/2016		
Lab ID: 1620493017		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021385		Collected: 07/15/2016		
Lab ID: 1620493018		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010





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### Analytical Results

Sample ID: S16T021386		Collected: 07/15/2016		
Lab ID: 1620493019		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021387		Collected: 07/15/2016		
Lab ID: 1620493020		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.0034	NA	NA	0.0010

Sample ID: S16T021388		Collected: 07/15/2016		
Lab ID: 1620493021		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.0064	NA	NA	0.0010

Sample ID: S16T021389		Collected: 07/15/2016		
Lab ID: 1620493022		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.010	NA	NA	0.0010

Sample ID: S16T021390		Collected: 07/15/2016		
Lab ID: 1620493023		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010



## ANALYTICAL REPORT

Workorder: 34-1620493

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### Analytical Results

Sample ID: S16T021391		Collected: 07/15/2016		
Lab ID: 1620493024		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021392		Collected: 07/15/2016		
Lab ID: 1620493025		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021393		Collected: 07/15/2016		
Lab ID: 1620493026		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021394		Collected: 07/16/2016		
Lab ID: 1620493027		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.071	NA	NA	0.0010

Sample ID: S16T021395		Collected: 07/16/2016		
Lab ID: 1620493028		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010



## ANALYTICAL REPORT

Workorder: 34-1620493

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### Analytical Results

Sample ID: S16T021396		Collected: 07/16/2016		
Lab ID: 1620493029		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021397		Collected: 07/16/2016		
Lab ID: 1620493030		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021398		Collected: 07/16/2016		
Lab ID: 1620493031		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.017	NA	NA	0.0010

Sample ID: S16T021399		Collected: 07/16/2016		
Lab ID: 1620493032		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.037	NA	NA	0.010

Sample ID: S16T021400		Collected: 07/16/2016		
Lab ID: 1620493033		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010





## ANALYTICAL REPORT

Workorder: 34-1620493

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### Analytical Results

Sample ID: S16T021401		Collected: 07/16/2016		
Lab ID: 1620493034		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.086	NA	NA	0.010

Sample ID: S16T021402		Collected: 07/16/2016		
Lab ID: 1620493035		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.021	NA	NA	0.010

Sample ID: S16T021403		Collected: 07/16/2016		
Lab ID: 1620493036		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.061	NA	NA	0.010

Sample ID: S16T021404		Collected: 07/16/2016		
Lab ID: 1620493037		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		
		Sampling Parameter: Air Volume Not Provided		
		Analyzed: 07/30/2016		
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.032	NA	NA	0.010

Sample ID: S16T021405		Collected: 07/16/2016		
Lab ID: 1620493038		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010



## ANALYTICAL REPORT

Workorder: 34-1620493

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Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021406		Collected: 07/16/2016		
Lab ID: 1620493039		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021407		Collected: 07/16/2016		
Lab ID: 1620493040		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021408		Collected: 07/16/2016		
Lab ID: 1620493041		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021409		Collected: 07/16/2016		
Lab ID: 1620493042		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021410		Collected: 07/16/2016		
Lab ID: 1620493043		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010



## ANALYTICAL REPORT

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### Analytical Results

Sample ID: S16T021411		Collected: 07/16/2016		
Lab ID: 1620493044		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.059	NA	NA	0.010

Sample ID: S16T021412		Collected: 07/16/2016		
Lab ID: 1620493045		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.0023	NA	NA	0.0010

Sample ID: S16T021413		Collected: 07/16/2016		
Lab ID: 1620493046		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.097	NA	NA	0.010

Sample ID: S16T021414		Collected: 07/16/2016		
Lab ID: 1620493047		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.0016	NA	NA	0.0010

Sample ID: S16T021415		Collected: 07/16/2016		
Lab ID: 1620493048		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.072	NA	NA	0.010



## ANALYTICAL REPORT

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Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021416		Collected: 07/16/2016		
Lab ID: 1620493049		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021417		Collected: 07/16/2016		
Lab ID: 1620493050		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021418		Collected: 07/16/2016		
Lab ID: 1620493051		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021419		Collected: 07/16/2016		
Lab ID: 1620493052		Received: 07/22/2016		
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube		Analyzed: 07/30/2016
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (mg/sample)	Result (mg/m <sup>3</sup> )	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 08/01/2016 15:08	/S/ Thomas J. Masoian 08/01/2016 16:37

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## ANALYTICAL REPORT

Workorder: **34-1620493**  
 Client Project ID: Washington River Protection  
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 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	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>
	Utah (NELAC)	DATA 1	<a href="http://health.utah.gov/lab/abimpl/">http://health.utah.gov/lab/abimpl/</a>
	Nevada	UT00009	<a href="http://ndep.nv.gov/bds/dvrlabservice.htm">http://ndep.nv.gov/bds/dvrlabservice.htm</a>
	Oklahoma	UT00009	<a href="http://www.deq.state.ok.us/CS/Oneof">http://www.deq.state.ok.us/CS/Oneof</a>
	Iowa	IAW 376	<a href="http://www.iowadnr.gov/insideDNR/Regulatory/Water.aspx">http://www.iowadnr.gov/insideDNR/Regulatory/Water.aspx</a>
	Florida (TNI)	E871067	<a href="http://www.dep.state.fl.us/labs/labs/las/qal/">http://www.dep.state.fl.us/labs/labs/las/qal/</a>
	Texas (TNI)	T 104704456-11.1	<a href="http://www.tceq.texas.gov/field/qalab_accred_certif.html">http://www.tceq.texas.gov/field/qalab_accred_certif.html</a>
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Lead Testing			
CPSC	AClass (ISO 17025, CPSC)	ADE-1420	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>
Soil, Dust, Paint, Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Dietary Supplements	AClass (ISO 17025)	ADE-1420	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>

### 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: **1620493**

Limits: Historical/Performance  
Basis: ALS Laboratory Group

Preparation: NA  
Batch: NA  
Prepared By: NA

Analysis: NIOSH 1024  
Batch: IFID/7623 (HBN: 173681)  
Analyzed By: Fred Rejali

### Blank

MB: 510262 Analyzed: 07/30/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

MB: 510265 Analyzed: 07/30/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

MB: 510268 Analyzed: 07/30/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

### Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510263 Analyzed: 07/30/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 510264 Analyzed: 07/30/2016 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	99.1	78.0 117.6	0.0304	98.7	0.361	0.0	20.0

LCS: 510266 Analyzed: 07/30/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 510267 Analyzed: 07/30/2016 00:00 Dilution: 1 Units: mg/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0244	0.0274	89.2	78.0 117.6	0.0270	98.7	10.1	0.0	20.0

LCS: 510269 Analyzed: 07/30/2016 00:00 Dilution: 1 Units: mg/sample					LCSD: 510270 Analyzed: 07/30/2016 00:00 Dilution: 1 Units: mg/sample				
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0286	0.0274	105	78.0 117.6	0.0294	107	2.76	0.0	20.0



## Quality Control Sample Batch Report

### Analysis Information

Workorder: **1620493**

Limits: Historical/Performance  
Basis: ALS Laboratory Group

Preparation: NA  
Batch: NA  
Prepared By: NA

Analysis: NIOSH 1024  
Batch: IFID/7623 (HBN: 173681)  
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 08/01/2016 15:08	/S/ Thomas J. Masolan 08/01/2016 16:37

### 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







CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST									
Assembler N/A		C.O.C. No. 20162100 Page 3 of 6							
Collector JOSSE		Contract/Requester CARL RONALD IV		Telephone No. 373-6861		MSRN TE-03		FAX 373-1878	
SAP No. N/A		Sample Origin CARTRIDGE EVALUATION		Purchase Order/Charge Code 150017003					
Project Title CARTRIDGE EVALUATION		Logbook/Work Package No. N/A		Ice Chest No. N/A		Temp. 22			
Shipped To (Lab) JOSSE		Method of Shipment N/A		Date of Labelling 7/26/16		Date of Labelling 7/26/16		Date of Labelling 7/26/16	
Protocol N/A		Data Turnaround 10 Days		Parts and Return No. 41035					
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative			
8167021388	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-A-B1 ✓	CHILL -4C			
8167021389	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-A-B2 ✓	CHILL -4C			
8167021390	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-EFF-A-BASE ✓	CHILL -4C			
8167021391	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-EFF-B-BASE ✓	CHILL -4C			
8167021392	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-1N-A-BASE ✓	CHILL -4C			
8167021393	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-1N-B-BASE ✓	CHILL -4C			
8167021394	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-A-A1 ✓	CHILL -4C			
8167021395	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-A-A2 ✓	CHILL -4C			
8167021396	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-A-B1 ✓	CHILL -4C			
8167021397	VA	7/15/16		CEMCOAL TUBE	1,3-Butadiene 16-05982-9-A-BASE ✓	CHILL -4C			
<b>POSSIBLE SAMPLE HAZARD/REMARKS (List all known hazards)</b> MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No <b>Hold Time</b>									
<b>SPECIAL INSTRUCTIONS</b> Send Results to: Carl W. Ronald IV, Carl W. Ronald IV, Inc., and Greg Moore, Gregory J. Moore LLC, see J08 for email Reference Contract # 55502 REISSUE 3 REISSUE 1024 CHILL BELOW -4 C									
Relinquished By Sharon Webb	Print 7/20/16	Sign Sharon Webb	Date/Time 7/20/16 0830	Received By Julie Goodrich	Print 7/20/16	Sign Julie Goodrich	Date/Time 7/20/16 0830	Matrix* DL = Drum Liquids T = Tissue WM = Waste L = Liquid V = Vapor VA = Vegetation X = Other	
Relinquished By Julie Goodrich	Print 7/20/16	Sign Julie Goodrich	Date/Time 7/20/16 1400	Received By FEDEX	Print 7/20/16	Sign FEDEX	Date/Time 7/20/16 1400		
Relinquished By FEDEX	Print 7/20/16	Sign FEDEX	Date/Time 7/20/16 1400	Received By Dewey Hill	Print 7/20/16	Sign Dewey Hill	Date/Time 7/20/16 1400		
Relinquished By Dewey Hill	Print 7/20/16	Sign Dewey Hill	Date/Time 7/20/16 1400	Received By Fred Rejal	Print 7/20/16	Sign Fred Rejal	Date/Time 7/20/16 2300		
<b>FINAL SAMPLE DISPOSITION</b> Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By: Fred Rejal									

A-0023-912 (03/09)

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

Assessor N/A		C.O.C. No. 20162100				
Chain of Custody/Sample Analysis Request		Page 4 of 6				
Collector JONES	Contact/Receiver GAIL HOWARD IV	Telephone No. 773-6841	MSN 372-1878			
SAF No.	Sample Origin CANTALISE EVALUATION	Purchase Order/Charge Code				
Project Title CANTALISE EVALUATION	Lab/Order Work Package No. N/A	Ice Chart No. WIS-055	Temp. ON ICE			
Shipped To (Lab)	Method of Shipment	Bill of Lading/Air Bill No.	776 799 846583			
Protocol N/A	Date Turnaround 24 HRS	Pack and Return No.	41035			
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative
5167021398	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-03 ✓	CHILL -4C
5167021399	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-02 ✓	CHILL -4C
5167021400	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-01 ✓	CHILL -4C
5167021401	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-07 ✓	CHILL -4C
5167021402	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-02 ✓	CHILL -4C
5167021403	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-01 ✓	CHILL -4C
5167021404	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-02 ✓	CHILL -4C
5167021405	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-01 ✓	CHILL -4C
5167021406	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-02 ✓	CHILL -4C
5167021407	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-3-A-01 ✓	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. Howard IV, Carl W. Howard IV, and Greg Moore, Gregory_S_Howard@fryer.com See SOH for email. Reference Contract # 55502 RELEASE 3 N108N 1024 CHILL BELOW -4 C						
Relinquished By Sharon Walker Mr. Walsh 7/20/16	Print Date/Time 08/30/16 14:00	Sign Date/Time 7/20/16 0830	Received By Julie Graham	Print Date/Time 7/20/16 0830	Sign Date/Time 7/20/16 0830	Material DL = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air DS = Drum Solids DL = Drum Liquids T = Tissue VM = Vapour L = Liquid V = Vegetation VA = Vapor X = Other
Relinquished By Julie Graham	Print Date/Time 7/20/16 1400	Sign Date/Time 7/20/16 1400	Received By DANIEL HILL DUNNATHO	Print Date/Time 07/30/16	Sign Date/Time 07/30/16	
Relinquished By Fodex	Print Date/Time 7/20/16 1400	Sign Date/Time 7/20/16 1400	Received By DANIEL HILL DUNNATHO	Print Date/Time 07/30/16	Sign Date/Time 07/30/16	
Relinquished By Fodex	Print Date/Time 7/20/16 1400	Sign Date/Time 7/20/16 1400	Received By DANIEL HILL DUNNATHO	Print Date/Time 07/30/16	Sign Date/Time 07/30/16	
Disposal Method (e.g., Return to customer, per lab procedure, used in process)						
Disposed By Fred R. J. 07/30/16 2300						
All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.						

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST									
Assembler N/A		C.O.C. No. 20162100 Page 5 of 6							
Collector JONES		Contact/Requester CARL HOWARD IV		Telephone No. 373-6841		MSDN 76-05		FAX 372-1878	
SAP No. N/A		Sample Origin CANTON		Purchase Order/Charge Code 20003/0203					
Project Title CANTON EVALUATION		Lab/Work Package No. N/A		Use Charge No. N/A		Temp ON ICE			
Shipped To (Lab) ALS		Method of Shipment		Bill of Lading/Bill No. 776799846583					
Protocol N/A		Data Turnaround 10 DAYS		Parts and Return No. 41035					
Sample No.	Lab ID	Date	Time	No / Type Container	Sample Analysis	Preservative			
5167021408	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-B-SLASH ✓	CEILL -4C			
5167021409	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-B-C1 ✓	CEILL -4C			
5167021410	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-E-02 ✓	CEILL -4C			
5167021411	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-B-E1 ✓	CEILL -4C			
5167021412	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-B-E2 ✓	CEILL -4C			
5167021413	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-B-E3 ✓	CEILL -4C			
5167021414	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-B-E4 ✓	CEILL -4C			
5167021415	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-B-E1 ✓	CEILL -4C			
5167021416	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-B-E2 ✓	CEILL -4C			
5167021417	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05583-9-EFF-B-BASE ✓	CEILL -4C			
POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No SPECIAL INSTRUCTIONS Hold Time									
Send Results to Carl W. Howard IV, Canton, MA 01903. For more information, contact Gregory A. Moore at 373-6841. Reference Contract # 55502. BOSTON 1224 CHILL BELOW -4 C.									
Relinquished By Sharon Wilber, Mr. Hall	Print 7/20/16 8:30	Sign Juli Gachon	Received By Juli Gachon	Print 7/20/16 8:30	Sign Juli Gachon	Date/Time 7/20/16 8:30	Materials S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, O = Oil, A = Air, DS = Drum Solids		
Relinquished By Juli Gachon	Print 7/20/16 1400	Sign FEDEX	Received By Dorothy Hill	Print 7/20/16 1400	Sign Dorothy Hill	Date/Time 7/20/16 1400	Materials DL = Drum Liquids, T = Tissue, VM = Wipe, L = Liquid, V = Vegetation, VA = Vapor, X = Other		
Relinquished By FEDEX	Print 7/20/16 1400	Sign FEDEX	Received By Dorothy Hill	Print 7/20/16 1400	Sign Dorothy Hill	Date/Time 7/20/16 1400			
Disposal Method (e.g., Return to customer, per lab procedure used in process)							Disposed By Fred Rejch. 07/30/16 2300		





## ANALYTICAL REPORT

Report Date: July 28, 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

20162093

Workorder: 34-1620246

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021121		Collected: 07/15/2016		
Lab ID: 1620246001		Received: 07/20/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube		
		100/50mg		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	0.91	NA	NA	0.50
2,4-Dimethylpyridine	1.3	NA	NA	0.50

Sample ID: S16T021122	Collected: 07/15/2016			
Lab ID: 1620246002	Received: 07/20/2016			
Method: NIOSH 1613 Mod.	Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 07/26/2016	
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021123	Collected: 07/15/2016			
Lab ID: 1620246003	Received: 07/20/2016			
Method: NIOSH 1613 Mod.	Media: SKC 226-01, Charcoal Tube 100/50mg		Analyzed: 07/26/2016	
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

ADDRESS: 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE: +1 801 266 7700 | FAX: +1 801 268 9992  
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## ANALYTICAL REPORT

Workorder: **34-1620246**  
Client Project ID: CARTRIDGE EVALUATION  
Purchase Order: 55502 Rel9  
Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021124		Collected: 07/15/2016		
Lab ID: 1620246004		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
		Analyzed: 07/26/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021125		Collected: 07/15/2016		
Lab ID: 1620246005		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
Analyzed: 07/26/2016				
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021126		Collected: 07/15/2016		
Lab ID: 1620246006		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
Analyzed: 07/26/2016				
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021127		Collected: 07/15/2016		
Lab ID: 1620246007		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
Analyzed: 07/26/2016				
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50





## ANALYTICAL REPORT

Workorder: **34-1620246**  
Client Project ID: CARTRIDGE EVALUATION  
Purchase Order: 55502 Rel9  
Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021128		Collected: 07/15/2016		
Lab ID: 1620246008		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
		Analyzed: 07/26/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021129		Collected: 07/15/2016		
Lab ID: 1620246009		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
Analyzed: 07/26/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021130		Collected: 07/15/2016		
Lab ID: 1620246010		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
Analyzed: 07/26/2016		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021131		Collected: 07/15/2016		
Lab ID: 1620246011		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
		Analyzed: 07/26/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	1.0	NA	NA	0.50
2,4-Dimethylpyridine	1.3	NA	NA	0.50





## ANALYTICAL REPORT

Workorder: 34-1620246

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021132		Collected: 07/15/2016	
Lab ID: 1620246012		Received: 07/20/2016	
Sampling Location: CARTRIDGE EVALUATION			
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg	
Analyzed: 07/27/2016		Sampling Parameter: Air Volume Not Provided	
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Pyridine	<0.50	NA	NA 0.50
2,4-Dimethylpyridine	<0.50	NA	NA 0.50

Sample ID: S16T021133		Collected: 07/15/2016	
Lab ID: 1620246013		Received: 07/20/2016	
Sampling Location: CARTRIDGE EVALUATION			
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg	
Analyzed: 07/27/2016		Sampling Parameter: Air Volume Not Provided	
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Pyridine	<0.50	NA	NA 0.50
2,4-Dimethylpyridine	<0.50	NA	NA 0.50

Sample ID: S16T021134		Collected: 07/16/2016	
Lab ID: 1620246014		Received: 07/20/2016	
Sampling Location: CARTRIDGE EVALUATION			
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg	
Analyzed: 07/27/2016		Sampling Parameter: Air Volume Not Provided	
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Pyridine	0.73	NA	NA 0.50
2,4-Dimethylpyridine	1.1	NA	NA 0.50

Sample ID: S16T021135		Collected: 07/16/2016	
Lab ID: 1620246015		Received: 07/20/2016	
Sampling Location: CARTRIDGE EVALUATION			
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg	
Analyzed: 07/27/2016		Sampling Parameter: Air Volume Not Provided	
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Pyridine	<0.50	NA	NA 0.50
2,4-Dimethylpyridine	<0.50	NA	NA 0.50



## ANALYTICAL REPORT

Workorder: **34-1620246**  
Client Project ID: CARTRIDGE EVALUATION  
Purchase Order: 55502 Rel9  
Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021136		Collected: 07/16/2016		
Lab ID: 1620246016		Received: 07/20/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
		Analyzed: 07/27/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021137		Collected: 07/16/2016		
Lab ID: 1620246017		Received: 07/20/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
		Analyzed: 07/27/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021138		Collected: 07/16/2016		
Lab ID: 1620246018		Received: 07/20/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
		Analyzed: 07/27/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021139		Collected: 07/16/2016		
Lab ID: 1620246019		Received: 07/20/2016		
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
		Analyzed: 07/27/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50



## ANALYTICAL REPORT

Workorder: 34-1620246

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021140		Collected: 07/16/2016		
Lab ID: 1620246020		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
Analyzed: 07/27/2016				
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021142		Collected: 07/16/2016		
Lab ID: 1620246021		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
Analyzed: 07/27/2016				
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021143		Collected: 07/16/2016		
Lab ID: 1620246022		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
		Analyzed: 07/27/2016		
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021144		Collected: 07/16/2016		
Lab ID: 1620246023		Received: 07/20/2016		
Sampling Location: CARTRIDGE EVALUATION				
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg		
Analyzed: 07/27/2016				
Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50



## ANALYTICAL REPORT

Workorder: **34-1620246**

Client Project ID: CARTRIDGE EVALUATION

Purchase Order: 55502 Rel9

Project Manager: Rand Potter

### Analytical Results

Sample ID: S16T021145		Collected: 07/16/2016	
Lab ID: 1620246024		Received: 07/20/2016	
Sampling Location: CARTRIDGE EVALUATION			
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg	
Analyzed: 07/27/2016		Sampling Parameter: Air Volume Not Provided	
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Pyridine	0.69	NA	NA 0.50
2,4-Dimethylpyridine	1.1	NA	NA 0.50

Sample ID: S16T021146		Collected: 07/16/2016	
Lab ID: 1620246025		Received: 07/20/2016	
Sampling Location: CARTRIDGE EVALUATION			
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg	
Analyzed: 07/27/2016		Sampling Parameter: Air Volume Not Provided	
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	Result (ppm) RL (ug/sample)
Pyridine	<0.50	NA	NA 0.50
2,4-Dimethylpyridine	<0.50	NA	NA 0.50

Sample ID: S16T021147		Collected: 07/16/2016	
Lab ID: 1620246026		Received: 07/20/2016	
Sampling Location: CARTRIDGE EVALUATION			
Method: NIOSH 1613 Mod.		Media: SKC 226-01, Charcoal Tube 100/50mg	
Analyzed: 07/27/2016		Sampling Parameter: Air Volume Not Provided	
Analyte	Result (ug/sample)	Result (mg/m <sup>3</sup> )	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: 173466)

The referenced method has not been validated for 2,4-dimethyl pyridine. Additionally, studies regarding media collection efficiency, sample storage stability, analyte retention capability, and/or analyte desorption efficiency have not been performed.

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

Method	Analyst	Peer Review
NIOSH 1613 Mod.	/S/ Emilie Pratt 07/27/2016 11:26	/S/ Thomas J. Masoian 07/28/2016 14:31

### Laboratory Contact Information

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

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



## ANALYTICAL REPORT

Workorder: **34-1620246**  
Client Project ID: CARTRIDGE EVALUATION  
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	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>
	Utah (NELAC)	DATA1	<a href="http://health.utah.gov/labinfo.htm">http://health.utah.gov/labinfo.htm</a>
	Nevada	UT00009	<a href="http://ndep.nv.gov/bdwlabservice.htm">http://ndep.nv.gov/bdwlabservice.htm</a>
	Oklahoma	UT00009	<a href="http://www.deq.state.ok.us/CSOnew/">http://www.deq.state.ok.us/CSOnew/</a>
	Iowa	IA# 376	<a href="http://www.iowadnr.gov/inside/CNR/Regulatory/Water.aspx">http://www.iowadnr.gov/inside/CNR/Regulatory/Water.aspx</a>
	Florida (TNI)	E871067	<a href="http://www.dep.state.fl.us/labs/bars/sas/qa/">http://www.dep.state.fl.us/labs/bars/sas/qa/</a>
	Texas (TNI)	T104704456-11-1	<a href="http://www.tceq.texas.gov/field/qa/lab_accred_certif.html">http://www.tceq.texas.gov/field/qa/lab_accred_certif.html</a>
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Lead Testing:			
CPSC	AClass (ISO 17025, CPSC)	ADE-1420	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>
Soil, Dust, Paint, Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>
Dietary Supplements	AClass (ISO 17025)	ADE-1420	<a href="http://www.aclasscorp.com">http://www.aclasscorp.com</a>

### 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: 1620246

Limits: Historical Performance  
Basis: ALS Laboratory Group

Preparation: NA  
Batch: NA  
Prepared By: NA

Analysis: NIOSH 1613 Mod.  
Batch: ISVO/3072 (HBN: 173486)  
Analyzed By: Emilie Pratt

### Blank

LMB: 509729 Analyzed: 07/26/2016 19:36 Units: ug/sample			
Analyte	Result	MDL	RL
Pyridine	ND	NA	0.200
2,4-Dimethylpyridine	ND	NA	0.200

LMB: 509732 Analyzed: 07/27/2016 05:01 Units: ug/sample			
Analyte	Result	MDL	RL
Pyridine	ND	NA	0.200
2,4-Dimethylpyridine	ND	NA	0.200

### Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509730 Analyzed: 07/26/2016 19:56 Dilution: 1 Units: ug/sample					LCSD: 509731 Analyzed: 07/26/2016 20:15 Dilution: 1 Units: ug/sample			
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Pyridine	1.26	2.00	62.9	61.8 141.1	1.41	70.8	11.9	0.0 22.1
2,4-Dimethylpyridine	1.11	1.98	56.3	51.7 130.6	1.18	59.3	5.33	0.0 22.2

LCS: 509733 Analyzed: 07/27/2016 05:21 Dilution: 1 Units: ug/sample					LCSD: 509734 Analyzed: 07/27/2016 05:40 Dilution: 1 Units: ug/sample			
Analyte	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Pyridine	1.86	2.00	93.1	61.8 141.1	1.34	67.2*	32.3	0.0 22.1
2,4-Dimethylpyridine	1.31	1.98	66.3	51.7 130.6	1.09	55.0	18.6	0.0 22.2

### Comments

The referenced method has not been validated for 2,4-dimethyl pyridine. Additionally, studies regarding media collection efficiency, sample storage stability, analyte retention capability, and/or analyte desorption efficiency have not been performed.

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

Analyst	Peer Review
/S/ Emilie Pratt 07/27/2016 11:26	/S/ Thomas J. Masojan 07/28/2016 14:31

### 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



1620246

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			
Assembled N/A	C.O.C. No. 20162093 Page 1 of 3		
Collector LONES	Contract/Requestor CAME, KIMBLE, IV	Telephone No. 373-5861	MSIN 373-5861
SP# No.	Sample Origin CANTON, EVALUATION	Purchase Order/Charge Code 3503037520	FAX 372-1876
Project Title CHARTERED EVALUATION	Logbook Work Package No.	Lot Chest No.	Temp. 81.1°C
Shipped To (Lab)	Method of Shipment	Bill of Lading/AFB No.	7710790041619
Protocol N/A	Data Turnaround 20 days	Items and Return No.	41034
Sample No.	Lab ID	Date	Time
			No. Type Container
	5167021121	7/15/16	Pyridine 16-05982-10-A1
	5167021122	7/15/16	Pyridine 16-05982-10-A2
	5167021123	7/15/16	Pyridine 16-05982-10-A3
	5167021124	7/15/16	Pyridine 16-05982-10-BLANK
	5167021125	7/15/16	Pyridine 16-05982-10-C1
	5167021126	7/15/16	Pyridine 16-05982-10-C2
	5167021127	7/15/16	Pyridine 16-05982-10-E1
	5167021128	7/15/16	Pyridine 16-05982-10-EFF-BASE
	5167021129	7/15/16	Pyridine 16-05982-10-F1
	5167021130	7/15/16	Pyridine 16-05982-10-E1
POSSIBLE SAMPLE HAZARD/REMARKS (List all known wastes) MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No			
SPECIAL INSTRUCTIONS Send Results to Carl Ewald IV & George Moore Carl Ewald IV and George Moore see SCW for email RELEASE # Reference Contract # 35502			
Relinquished By Sharon W. L. M. M.	Print 7/19/16	Sign 7/19/16	Received By Julie Gradine
Relinquished By Julie Gradine	Date/Time 7/19/16 0830	Date/Time 7/19/16 0930	Date/Time 7/19/16 0930
Relinquished By pedro	Date/Time 7/19/16 1400	Date/Time 7/19/16 1400	Date/Time 7/19/16 1400
Relinquished By	Date/Time	Date/Time	Date/Time
Matrix* S = Soil SE = Sediment T = Tissue SO = Solid SL = Sludge L = Liquid VY = Vapor VA = Vapor X = Other DS = Drum Solids			
Final Sample Disposition	Disposed By Disposal Method (e.g., Return to customer, per lab procedure, used in process) Date/Time Date/Time		

Assembler		C.O.C. No. 20162093				
N/A		Page 2 of 3				
<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>						
Collector	Contract/Receptor	Telephone No.	MSRN			
Waste	CARL MOORE IV	373-6861	372-2876			
SAP No.	Sample Origin	Signature/Order/Charge Code				
N/A	CANTONMENT EVALUATION	30303/020				
Project Title	Logistics Week Package No.	Lot Chart No.	Temp.			
OUTSIDE EVALUATION	N/A	713-021	ON ISC			
Shipped To (Lab)	Method of Shipment	Bill of Lading/AFB No.	776790041619			
ACS		Part and Return No.	41034			
Protocol	Data Turnaround					
N/A	20 days					
Sample No.	Lab ID	Date	Time	No. Type Container	Sample Analysis	Preservative
	5167021131	VA	7/15/16		Pyridines 16-05982-10-R1 #	N/A
	5167021132	VA	7/15/16		Pyridines 16-05982-10-R2 #	N/A
	5167021133	VA	7/15/16		Pyridines 16-05982-16-1N-8A88 #	N/A
	5167021134	VA	7/16/16		Pyridines 16-05983-16-A1 #	N/A
	5167021135	VA	7/16/16		Pyridines 16-05983-16-A2 #	N/A
	5167021136	VA	7/16/16		Pyridines 16-05983-16-B1 #	N/A
	5167021137	VA	7/16/16		Pyridines 16-05983-10-BLANK #	N/A
	5167021138	VA	7/16/16		Pyridines 16-05983-10-C1 #	N/A
	5167021239	VA	7/16/16		Pyridines 16-05983-10-D1 #	N/A
	5167021240	VA	7/16/16		Pyridines 16-05983-10-E1 #	N/A
<b>POSSIBLE SAMPLE HAZARD/REMARKS (List all known wastes)</b> MSDS <input type="radio"/> Yes <input checked="" type="radio"/> No SPECIAL INSTRUCTIONS Send Results to Carl Moore IV & Greg Moore Carl Moore IV, 1507 and Ogechee 3, Mooreville, GA 30648 Reference Contract # 55562						
Relinquished By	Print	Sign	Received By	Print	Sign	Master
Shawn Walker Mullins	7/16	0830	Julie Gadsden	7/16	0830	DL = Drum Liquids SE = Sediment SO = Solid SL = Sludge W = Water V = Vapor X = Other DS = Drum Solids
Relinquished By	Print	Sign	Received By	Print	Sign	Master
Julie Gadsden	7/16	1400	FEDEX			DL = Drum Liquids SE = Sediment SO = Solid SL = Sludge W = Water V = Vapor X = Other DS = Drum Solids
Relinquished By	Print	Sign	Received By	Print	Sign	Master
						DL = Drum Liquids SE = Sediment SO = Solid SL = Sludge W = Water V = Vapor X = Other DS = Drum Solids
Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By: Julie Gadsden for Enviro Path 7/26/16 126 A-6003-062 (03/05)						







RJ Lee Group, Inc. | Columbia Basin Analytical Laboratories  
2710 North 20th Avenue, Pasco WA 99301  
Tel: (509) 545-4989 | Fax: (509) 544-6080

Carl Howald IV

08/18/16

Washington River Protection Solutions, LLC  
P.O. Box 850 MSIN H6-16  
Richland, WA 99352

Contract No.: 55503 R5

Project: Cartridge Evaluation

#### Subject: Nitrosamines Analysis Report, Group Number 20162097

Enclosed is the final report for group 20162097 number analyzed for Nitrosamines using NIOSH 2522-Modified. This group number 20162097 has been assigned a Columbia Basin Analytical Laboratories login order number of W607059. 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 07/19/16 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.

*Conformational analysis was performed qualitatively due to excessive interference in all samples.*

#### Positive Results

There were detectable nitrosamines concentrations above the reporting limit in the samples.

16-05982-11-A1	W607059-01	N-Nitrosodiethylamine	0.024	µg/tube	
16-05982-11-A1	W607059-01	N-Nitrosodimethylamine	0.264	µg/tube	
16-05982-11-A1	W607059-01	N-Nitrosodi-n-propylamine	0.155	µg/tube	
16-05982-11-A1	W607059-01	N-Nitrosomethylethylamine	0.309	µg/tube	
16-05982-11-A1	W607059-01	N-Nitrosomorpholine	0.113	µg/tube	
16-05982-11-A1	W607059-01	N-Nitrosopiperidine	0.212	µg/tube	
16-05982-11-A1	W607059-01	N-Nitrosopyrrolidine	0.179	µg/tube	
16-05982-11-H1	W607059-11	N-Nitrosodimethylamine	0.060	µg/tube	
16-05982-11-H1	W607059-11	N-Nitrosodi-n-propylamine	0.024	µg/tube	
16-05982-11-H1	W607059-11	N-Nitrosomethylethylamine	0.025	µg/tube	C
16-05983-11-A1	W607059-14	N-Nitrosodiethylamine	0.033	µg/tube	
16-05983-11-A1	W607059-14	N-Nitrosodimethylamine	0.126	µg/tube	
16-05983-11-A1	W607059-14	N-Nitrosodi-n-butylamine	0.166	µg/tube	
16-05983-11-A1	W607059-14	N-Nitrosodi-n-propylamine	0.115	µg/tube	
16-05983-11-A1	W607059-14	N-Nitrosomethylethylamine	0.249	µg/tube	
16-05983-11-A1	W607059-14	N-Nitrosomorpholine	0.057	µg/tube	
16-05983-11-A1	W607059-14	N-Nitrosopiperidine	0.110	µg/tube	

Columbia Basin Analytical Laboratories | 2710 North 20th Avenue, Pasco WA 99301 | 509.545.4989

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16-05983-11-A1	W607059-14	N-Nitrosopyrrolidine	0.116	µg/tube	C
16-05983-11-H1	W607059-24	N-Nitrosodimethylamine	0.192	µg/tube	
16-05983-11-H1	W607059-24	N-Nitrosodi-n-butylamine	0.023	µg/tube	
16-05983-11-H1	W607059-24	N-Nitrosodi-n-propylamine	0.038	µg/tube	
16-05983-11-H1	W607059-24	N-Nitrosomethylethylamine	0.043	µg/tube	
16-05983-11-H1	W607059-24	N-Nitrosomorpholine	0.040	µg/tube	
16-05983-11-H1	W607059-24	N-Nitrosopiperidine	0.034	µg/tube	
16-05983-11-H1	W607059-24	N-Nitrosopyrrolidine	0.048	µg/tube	
16-05983-11-IN-BASE	W607059-26	N-Nitrosodimethylamine	0.040	µg/tube	
16-05983-11-IN-BASE	W607059-26	N-Nitrosodi-n-butylamine	0.052	µg/tube	
16-05983-11-IN-BASE	W607059-26	N-Nitrosopiperidine	0.024	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.



08/16/16

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.

Columbia Basin Analytical Laboratories | 2710 North 20th Avenue, Pasco WA 99301 | 509.545.4989

WWW.RJLEEGROUP.COM



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.: W607059  
Samples Received: 07/19/16  
Report Date: 08/18/16  
COC No.: 20162097  
Extraction Date: 7/27/2016

Client Sample ID	Sample Identification RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-05982-11-A1   S16T021332	W607059-01	07/15/16	07/27/16	N-Nitrosodimethylamine	0.264	0.023	
		07/15/16	07/29/16	N-Nitrosodimethylamine	<0.020	0.020	
		07/15/16	07/29/16	N-Nitrosomethylethylamine	<0.020	0.020	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	0.309	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	0.024	0.022	
		07/15/16	07/29/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	0.155	0.021	
		07/15/16	07/29/16	N-Nitrosodi-n-propylamine	<0.019	0.019	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/29/16	N-Nitrosodi-n-butylamine	<0.020	0.020	
		07/15/16	07/29/16	N-Nitrosopiperidine	<0.019	0.019	
		07/15/16	07/27/16	N-Nitrosopiperidine	0.212	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	0.179	0.022	
		07/15/16	07/29/16	N-Nitrosopyrrolidine	<0.019	0.019	
16-05982-11-A2   S16T021333	W607059-02	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<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

F = Analyte detected below quantitation limits, concentration is estimated

P = Library spectrum match, < 90% w 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 time for preparation or analysis exceeded

L = Sample condition at receipt out of compliance with method defined conditions

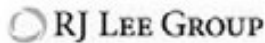
Q = Result out of method specific acceptance QC criteria

S = Spike Recovery outside accepted recovery limits

Z = Not ELAP accredited analyte

ND = Not Detected

C = Confirmation analysis unavailable



Sample Identification Client Sample ID RJLG ID		Sampling Date	Analysis Date	Analyte	Concentration µg/rbse	KL	Qualifiers
16-05982-11-B1   S16T021334	W607059-03	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-BLANK   S16T021335	W607059-04	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-C1   S16T021336	W607059-05	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-D1   S16T021337	W607059-06	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	

## Report Qualifiers:

A = Target Analyte media insufficiently 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, &lt;90% w/ RT match

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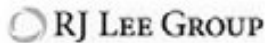
Q = Result out of method specific acceptance QC criteria

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						
16-05982-11-E1   5167021338	W607059-07	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-EFF BASE   5167021339	W607059-08	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-F1   5167021340	W607059-09	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-C1   5167021341	W607059-10	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	

## Report Qualifiers:

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D = Analyte analyzed in a dilution

E = Report concentration was above the instrument calibration range

J = Analyte detected below quantitation limits, concentration is estimated

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Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/rbse	KL	Qualifiers
Client Sample ID	RJLG ID						
16-05982-11-H1   S16T021342	W607059-11	07/15/16	07/27/16	N-Nitrosodimethylamine	0.060	0.023	C
		07/15/16	07/27/16	N-Nitrosomethylethylamine	0.025	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	0.024	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	0.022	0.022	
16-05982-11-H2   S16T021343	W607059-12	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-IN-BASE   S16T021344	W607059-13	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-A1   S16T021345	W607059-14	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.020	0.020	
		07/16/16	07/27/16	N-Nitrosodimethylamine	0.126	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.020	0.020	
		07/16/16	07/27/16	N-Nitrosomethylethylamine	0.249	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/16/16	07/27/16	N-Nitrosodiethylamine	0.033	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.019	0.019	
		07/16/16	07/27/16	N-Nitrosodi-n-propylamine	0.115	0.021	

## Report Qualifiers:

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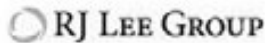
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Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/rube	KL	Qualifiers
Client Sample ID	RJLG ID						
16-0983-11-A1   S16T021345	W60709-14	07/16/16	07/27/16	N-Nitrosodi-n-butylamine	0.166	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.020	0.020	
		07/16/16	07/26/16	N-Nitrosopiperidine	<0.019	0.019	
		07/16/16	07/27/16	N-Nitrosopiperidine	0.110	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.019	0.019	
		07/16/16	07/27/16	N-Nitrosopyrrolidine	0.116	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.019	0.019	
		07/16/16	07/27/16	N-Nitrosomorpholine	0.087	0.022	
16-0983-11-A2   S16T021346	W60709-15	07/16/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/16/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-0983-11-B1   S16T021347	W60709-16	07/16/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/16/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-0983-11-BLANK   S16T021348	W60709-17	07/16/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/16/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
Report Qualifiers:			B = Analyte detected in the associated blank				
A = Target Analyte media breakthrough suspect, see analytical report			d = Data that exceeds the RSD criteria set by the SOP				
D = Analyte analyzed in a dilution			H = Holding time for preparation or analysis exceeded				
E = Report concentration was above the instrument calibration range			I = Sample condition at receipt out of compliance with method defined conditions				
J = Analyte detected below quantitation limits, concentration is estimated			Q = Result out of method specific acceptance QC criteria				
P = Library spectrum match, <90% or RT match			S = Spike Recovery outside accepted recovery limits				
K = RPD (relative percent difference) outside accepted recovery limits			Z = Not ELAP accredited analyte				
U = Analyte analyzed for but not detected			ND = Not Detected				
N/A = Not Applicable			C = Confirmation analysis unavailable				





Sample Identification Client Sample ID RJLG ID		Sampling Date	Analysis Date	Analyte	Concentration µg/rbse	KL	Qualifiers
16-05983-11-C1   516T021349	W607059-18	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-D1   516T021350	W607059-19	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-E1   516T021351	W607059-20	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-EFF-BASE   516T021352	W607059-21	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	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

I = Analyte detected below quantitation limits, concentration is estimated

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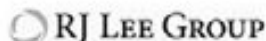
Q = Result out of method specific acceptance QC criteria

S = Spike Recovery outside accepted recovery limits

Z = Not ELAP accredited analyte

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Sample Identification Client Sample ID RJLG ID		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	KL	Qualifiers
16-05983-11-F1   S16T021353	W607059-22	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-G1   S16T021354	W607059-23	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-H1   S16T021355	W607059-24	07/16/16	07/29/16	N-Nitrosodimethylamine	0.192	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	0.043	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	0.038	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	0.023	0.021	C
		07/16/16	07/29/16	N-Nitrosopiperidine	0.034	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	0.048	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	0.040	0.022	
16-05983-11-H2   S16T021356	W607059-25	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	

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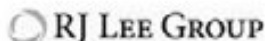
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Client Sample ID	Sample Identification RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/rube	KL	Qualifiers
16-05983-11-IN-BASE	5167821357	07/16/16	07/29/16	N-Nitrosodimethylamine	0.040	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	0.052	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	0.024	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	

## Report Qualifiers:

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D = Analyte analyzed in a dilution

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J = Analyte detected below quantitation limits, concentration is estimated

P = Library spectrum match, not 100% or RT match

R = RPD (relative percent difference) outside accepted recovery limits

U = Analyte analyzed for but not detected

N/A = Not Applicable

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d = Data that exceeds the RSD criteria set by the SOP

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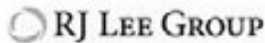
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### Quality Control

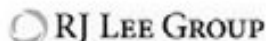
NIOSH 2522

RJ Lee Group No.: W607059  
Samples Received: 07/19/16  
Report Date: 08/18/16  
COC No.: 20162097  
Extraction Date: 7/27/2016

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	LCS-1	07/27/16	0.200	0.183	0.91	0.202	101	2.24	
N-Nitrosodiethylamine	55-18-5	LCS-1	07/28/16	0.200	0.174	0.90	0.193	96.2	4.21	
N-Nitrosodiethylamine	55-18-5	LCS-1	07/28/16	0.200	0.204	1.02	0.200	99.6	3.12	
N-Nitrosodimethylamine	62-75-9	LCS-1	07/27/16	0.200	0.175	0.88	0.199	99.7	0.721	
N-Nitrosodimethylamine	62-75-9	LCS-1	07/28/16	0.200	0.164	0.85	0.192	96.1	3.38	
N-Nitrosodimethylamine	62-75-9	LCS-1	07/28/16	0.200	0.201	1.00	0.201	100	1.16	
N-Nitrosodi-n-butylamine	924-16-3	LCS-1	07/27/16	0.200	0.183	0.91	0.201	100	1.20	
N-Nitrosodi-n-butylamine	924-16-3	LCS-1	07/28/16	0.200	0.182	0.93	0.195	97.4	2.82	
N-Nitrosodi-n-butylamine	924-16-3	LCS-1	07/28/16	0.200	0.198	1.01	0.197	98.2	1.55	
N-Nitrosodi-n-propylamine	621-64-7	LCS-1	07/27/16	0.200	0.182	0.93	0.195	97.5	2.32	
N-Nitrosodi-n-propylamine	621-64-7	LCS-1	07/28/16	0.200	0.179	0.93	0.193	96.6	3.20	
N-Nitrosodi-n-propylamine	621-64-7	LCS-1	07/28/16	0.200	0.208	1.04	0.199	99.5	2.94	
N-Nitrosomethylethylamine	10595-95-6	LCS-1	07/27/16	0.200	0.176	0.89	0.198	98.8	1.13	
N-Nitrosomethylethylamine	10595-95-6	LCS-1	07/28/16	0.200	0.167	0.87	0.192	95.5	4.17	
N-Nitrosomethylethylamine	10595-95-6	LCS-1	07/28/16	0.200	0.202	1.01	0.199	99.5	2.26	
N-Nitrosomorpholine	59-89-2	LCS-1	07/27/16	0.200	0.186	0.92	0.201	100	1.32	
N-Nitrosomorpholine	59-89-2	LCS-1	07/28/16	0.200	0.180	0.93	0.194	96.8	2.87	
N-Nitrosomorpholine	59-89-2	LCS-1	07/28/16	0.200	0.215	1.06	0.202	101	1.48	
N-Nitrosopiperidine	100-75-4	LCS-1	07/27/16	0.200	0.182	0.92	0.198	99.0	0.906	
N-Nitrosopiperidine	100-75-4	LCS-1	07/28/16	0.200	0.179	0.92	0.195	97.2	2.46	
N-Nitrosopiperidine	100-75-4	LCS-1	07/28/16	0.200	0.205	1.03	0.199	99.4	0.774	
N-Nitrosopyrrolidine	930-55-2	LCS-1	07/27/16	0.200	0.181	0.91	0.198	99.2	2.35	
N-Nitrosopyrrolidine	930-55-2	LCS-1	07/28/16	0.200	0.179	0.90	0.198	98.8	1.19	
N-Nitrosopyrrolidine	930-55-2	LCS-1	07/28/16	0.200	0.209	1.04	0.201	100	0.357	
N-Nitrosodiethylamine	55-18-5	LCS-2	07/27/16	0.200	0.177	0.91	0.195	97.5	2.24	
N-Nitrosodiethylamine	55-18-5	LCS-2	07/28/16	0.200	0.179	0.90	0.198	99.2	4.21	
N-Nitrosodiethylamine	55-18-5	LCS-2	07/28/16	0.200	0.211	1.02	0.207	103	3.12	
N-Nitrosodimethylamine	62-75-9	LCS-2	07/27/16	0.200	0.175	0.88	0.199	99.5	0.721	
N-Nitrosodimethylamine	62-75-9	LCS-2	07/28/16	0.200	0.174	0.85	0.204	101	3.38	
N-Nitrosodimethylamine	62-75-9	LCS-2	07/28/16	0.200	0.202	1.00	0.202	101	1.16	
N-Nitrosodi-n-butylamine	924-16-3	LCS-2	07/27/16	0.200	0.180	0.91	0.198	98.7	1.20	
N-Nitrosodi-n-butylamine	924-16-3	LCS-2	07/28/16	0.200	0.186	0.93	0.199	99.6	2.82	
N-Nitrosodi-n-butylamine	924-16-3	LCS-2	07/28/16	0.200	0.203	1.01	0.202	101	1.55	
N-Nitrosodi-n-propylamine	621-64-7	LCS-2	07/27/16	0.200	0.187	0.93	0.201	100	2.32	
N-Nitrosodi-n-propylamine	621-64-7	LCS-2	07/28/16	0.200	0.186	0.93	0.201	100	3.20	





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	LCS-2	07/28/16	0.200	0.216	1.04	0.207	103	2.94	
N-Nitrosomethylethylamine	10595-95-6	LCS-2	07/27/16	0.200	0.180	0.89	0.203	101	1.13	
N-Nitrosomethylethylamine	10595-95-6	LCS-2	07/28/16	0.200	0.176	0.87	0.202	101	4.17	
N-Nitrosomethylethylamine	10595-95-6	LCS-2	07/28/16	0.200	0.208	1.01	0.205	102	2.26	
N-Nitrosomorpholine	59-89-2	LCS-2	07/27/16	0.200	0.182	0.92	0.197	98.6	1.32	
N-Nitrosomorpholine	59-89-2	LCS-2	07/28/16	0.200	0.187	0.93	0.202	101	2.87	
N-Nitrosomorpholine	59-89-2	LCS-2	07/28/16	0.200	0.214	1.06	0.201	101	1.48	
N-Nitrosopiperidine	100-75-4	LCS-2	07/27/16	0.200	0.185	0.92	0.201	101	0.906	
N-Nitrosopiperidine	100-75-4	LCS-2	07/28/16	0.200	0.186	0.92	0.202	101	2.46	
N-Nitrosopiperidine	100-75-4	LCS-2	07/28/16	0.200	0.208	1.03	0.202	101	0.774	
N-Nitrosopyrrolidine	930-55-2	LCS-2	07/27/16	0.200	0.179	0.91	0.196	98.1	2.35	
N-Nitrosopyrrolidine	930-55-2	LCS-2	07/28/16	0.200	0.181	0.90	0.200	99.9	1.19	
N-Nitrosopyrrolidine	930-55-2	LCS-2	07/28/16	0.200	0.209	1.04	0.201	100	0.357	
N-Nitrosodiethylamine	55-18-5	LCS-3	07/27/16	0.200	0.185	0.91	0.204	102	2.24	
N-Nitrosodiethylamine	55-18-5	LCS-3	07/28/16	0.200	0.189	0.90	0.210	105	4.21	
N-Nitrosodiethylamine	55-18-5	LCS-3	07/28/16	0.200	0.198	1.02	0.194	97.1	3.12	
N-Nitrosodimethylamine	62-75-9	LCS-3	07/27/16	0.200	0.177	0.88	0.202	101	0.721	
N-Nitrosodimethylamine	62-75-9	LCS-3	07/28/16	0.200	0.175	0.88	0.205	102	3.38	
N-Nitrosodimethylamine	62-75-9	LCS-3	07/28/16	0.200	0.197	1.00	0.197	98.7	1.16	
N-Nitrosodi-n-butylamine	924-16-3	LCS-3	07/27/16	0.200	0.184	0.91	0.202	101	1.20	
N-Nitrosodi-n-butylamine	924-16-3	LCS-3	07/28/16	0.200	0.193	0.93	0.206	103	2.82	
N-Nitrosodi-n-butylamine	924-16-3	LCS-3	07/28/16	0.200	0.203	1.01	0.202	101	1.55	
N-Nitrosodi-n-propylamine	621-64-7	LCS-3	07/27/16	0.200	0.190	0.93	0.204	102	2.32	
N-Nitrosodi-n-propylamine	621-64-7	LCS-3	07/28/16	0.200	0.191	0.93	0.206	103	3.20	
N-Nitrosodi-n-propylamine	621-64-7	LCS-3	07/28/16	0.200	0.203	1.04	0.194	97.3	2.94	
N-Nitrosomethylethylamine	10595-95-6	LCS-3	07/27/16	0.200	0.178	0.89	0.200	100	1.13	
N-Nitrosomethylethylamine	10595-95-6	LCS-3	07/28/16	0.200	0.181	0.87	0.208	104	4.17	
N-Nitrosomethylethylamine	10595-95-6	LCS-3	07/28/16	0.200	0.199	1.01	0.196	98.0	2.26	
N-Nitrosomorpholine	59-89-2	LCS-3	07/27/16	0.200	0.187	0.92	0.202	101	1.32	
N-Nitrosomorpholine	59-89-2	LCS-3	07/28/16	0.200	0.190	0.93	0.205	102	2.87	
N-Nitrosomorpholine	59-89-2	LCS-3	07/28/16	0.200	0.209	1.06	0.196	98.3	1.48	
N-Nitrosopiperidine	100-75-4	LCS-3	07/27/16	0.200	0.185	0.92	0.201	100	0.906	
N-Nitrosopiperidine	100-75-4	LCS-3	07/28/16	0.200	0.187	0.92	0.203	102	2.46	
N-Nitrosopiperidine	100-75-4	LCS-3	07/28/16	0.200	0.206	1.03	0.200	99.7	0.774	
N-Nitrosopyrrolidine	930-55-2	LCS-3	07/27/16	0.200	0.188	0.91	0.206	103	2.35	
N-Nitrosopyrrolidine	930-55-2	LCS-3	07/28/16	0.200	0.183	0.90	0.203	101	1.19	
N-Nitrosopyrrolidine	930-55-2	LCS-3	07/28/16	0.200	0.208	1.04	0.200	99.6	0.357	
N-Nitrosodiethylamine	55-18-5	MB	07/27/16		0.00	0.91	0.00			
N-Nitrosodiethylamine	55-18-5	MB	07/28/16		0.00	0.90	0.00			
N-Nitrosodiethylamine	55-18-5	MB	07/28/16		0.00	1.02	0.00			
N-Nitrosodimethylamine	62-75-9	MB	07/27/16		0.00	0.88	0.00			
N-Nitrosodimethylamine	62-75-9	MB	07/28/16		0.00	0.85	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	07/28/16		0.00	1.00	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	07/27/16		0.00	0.91	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	07/28/16		0.00	0.93	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	07/28/16		0.00	1.01	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	07/27/16		0.00	0.93	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	07/28/16		0.00	0.93	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	07/28/16		0.00	1.04	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	07/27/16		0.00	0.89	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	07/28/16		0.00	0.87	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	07/28/16		0.00	1.01	0.00			
N-Nitrosomorpholine	59-89-2	MB	07/27/16		0.00	0.92	0.00			
N-Nitrosomorpholine	59-89-2	MB	07/28/16		0.00	0.93	0.00			
N-Nitrosomorpholine	59-89-2	MB	07/28/16		0.00	1.06	0.00			
N-Nitrosopiperidine	100-75-4	MB	07/27/16		0.00	0.92	0.00			
N-Nitrosopiperidine	100-75-4	MB	07/28/16		0.00	0.92	0.00			
N-Nitrosopiperidine	100-75-4	MB	07/28/16		0.00	1.03	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	07/27/16		0.00	0.91	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	07/28/16		0.00	0.90	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	07/28/16		0.00	1.04	0.00			
N-Nitrosodiethylamine	55-18-5	MRL	07/27/16	0.020	0.022	0.91	0.024	119		
N-Nitrosodiethylamine	55-18-5	MRL	07/28/16	0.020	0.023	0.90	0.025	125		
N-Nitrosodiethylamine	55-18-5	MRL	07/28/16	0.020	0.027	1.02	0.026	129		
N-Nitrosodimethylamine	62-75-9	MRL	07/27/16	0.020	0.023	0.88	0.026	128		
N-Nitrosodimethylamine	62-75-9	MRL	07/28/16	0.020	0.021	0.85	0.025	123		
N-Nitrosodimethylamine	62-75-9	MRL	07/28/16	0.020	0.028	1.00	0.028	139		
N-Nitrosodi-n-butylamine	924-16-3	MRL	07/27/16	0.020	0.022	0.91	0.024	120		
N-Nitrosodi-n-butylamine	924-16-3	MRL	07/28/16	0.020	0.021	0.93	0.022	109		
N-Nitrosodi-n-butylamine	924-16-3	MRL	07/28/16	0.020	0.025	1.01	0.025	123		
N-Nitrosodi-n-propylamine	621-64-7	MRL	07/27/16	0.020	0.021	0.93	0.023	113		
N-Nitrosodi-n-propylamine	621-64-7	MRL	07/28/16	0.020	0.021	0.93	0.023	114		
N-Nitrosodi-n-propylamine	621-64-7	MRL	07/28/16	0.020	0.024	1.04	0.023	113		
N-Nitrosomethylethylamine	10595-95-6	MRL	07/27/16	0.020	0.024	0.89	0.027	133		
N-Nitrosomethylethylamine	10595-95-6	MRL	07/28/16	0.020	0.024	0.87	0.027	136		
N-Nitrosomethylethylamine	10595-95-6	MRL	07/28/16	0.020	0.024	1.01	0.024	119		
N-Nitrosomorpholine	59-89-2	MRL	07/27/16	0.020	0.022	0.92	0.024	122		
N-Nitrosomorpholine	59-89-2	MRL	07/28/16	0.020	0.021	0.93	0.023	115		
N-Nitrosomorpholine	59-89-2	MRL	07/28/16	0.020	0.026	1.06	0.024	118		
N-Nitrosopiperidine	100-75-4	MRL	07/27/16	0.020	0.023	0.92	0.025	127		
N-Nitrosopiperidine	100-75-4	MRL	07/28/16	0.020	0.022	0.92	0.024	118		
N-Nitrosopiperidine	100-75-4	MRL	07/28/16	0.020	0.026	1.03	0.025	125		
N-Nitrosopyrrolidine	930-55-2	MRL	07/27/16	0.020	0.023	0.91	0.025	127		
N-Nitrosopyrrolidine	930-55-2	MRL	07/28/16	0.020	0.021	0.90	0.023	116		



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	07/28/16	0.020	0.026	1.04	0.025	123		

## 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

I = Analyte detected below quantitation limits, concentration is estimated

P = Library spectrum match,  $\geq 95\%$  or RF 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

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 CIBLAP Lab Code 4061 ABNA-LAP, LLC Lab ID 170626 EPA ID WA001965 and WA DOE Lab ID C638. 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.

A-6003-062 (03/05)



W607059

Assembled				C.O.C. No. 20162097			
S/A				Page 2 of 3			
Collector				Contact/Requestor			
Zone				Cite, Locality			
S/F No.				Sample Origin			
S/A				Character Evaluation			
Project 199				Leopold Work Package No.			
CARTIDGE EVALUATION				N/A			
Shipped To (Lab)				Method of Shipment			
CART				Data Turnaround			
S/A				10 Days			
Protocol				Sample Analysis			
Sample No.	Lab ID	Date	Time	No./Type Container	Preservative		
5167021342	VA	7/13/16		Nitrosamine 16-05982-11-A1	S/A		
				Thermosep-N	S/A		
5167021343	VA	7/13/16		Nitrosamine 16-05982-11-A2	S/A		
				Thermosep-N	S/A		
5167021344	VA	7/13/16		Nitrosamine 16-05982-11-TN-BASE	S/A		
				Thermosep-N	S/A		
5167021345	VA	7/16/16		Nitrosamine 16-05983-11-A1	S/A		
				Thermosep-N	S/A		
5167021346	VA	7/16/16		Nitrosamine 16-05983-11-A2	S/A		
				Thermosep-N	S/A		
5167021347	VA	7/16/16		Nitrosamine 16-05983-11-B1	S/A		
				Thermosep-N	S/A		
5167021348	VA	7/16/16		Nitrosamine 16-05983-11-BLANK	S/A		
				Thermosep-N	S/A		
5167021349	VA	7/16/16		Nitrosamine 16-05983-11-C1	S/A		
				Thermosep-N	S/A		
5167021350	VA	7/16/16		Nitrosamine 16-05983-11-C1	S/A		
				Thermosep-N	S/A		
5167021351	VA	7/16/16		Nitrosamine 16-05983-11-E1	S/A		
				Thermosep-N	S/A		
POSSIBLE SAMPLE HAZARDS/REMARKS (List all known hazards)				MSDS <input type="radio"/> YES <input checked="" type="radio"/> NO			
SPECIAL INSTRUCTIONS				Hold Time			
Send Results to Carl Rowland IV 8 Greg Moore Carl M Rowland@tnc.org gregmoore@tnc.gov see SCW for email.							
CONTRACT 55503							
REMARKS							
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
Sharon W. W. Sharnelle			7-19-16 08:30	CLARE R. ILI			7-19-16 08:30
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time
CLARE R. ILI	7-19-16 11:18	CLARE R. ILI	7-19-16 11:18				
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time
Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Consumed			Disposed By	8/6/16 14:45		
FINAL SAMPLE DISPOSITION				8/6/16	14:45		

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

A-6003-002 (03/05)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST										C.O.C. No. 20162097	
										Page 3 of 3	
Assembler N/A											
Collector JONES			Contact/Requestor CARL HOWARD IV							Telephone No. 313-6861	
SAFE No.			Sample Origin CARTRIDGE EVALUATION							Purchase Order/Charge Code 11200143302	
Project Title CARTRIDGE EVALUATION			Logbook Work Package No. N/A							Ice Chest No.	
Shipped To (State)			Method of Shipment Mail							BAG or Labeling BAG No.	
Protocol N/A			Data Turnaround 10 days							Pails and Return No.	
Sample No.	Lab ID	Date	Time	No./Type Container	Sample Analysis	Preservative					
	3167021352	7/16/16		THE RM000B-S	WETROSLIM100 16-05983-11-B7-BASE	B/A					
	3167021353	7/16/16		THE RM000B-S	WETROSLIM100 16-05983-11-B1	B/A					
	3167021354	7/16/16		THE RM000B-S	WETROSLIM100 16-05983-11-B1	B/A					
	3167021355	7/16/16		THE RM000B-S	WETROSLIM100 16-05983-11-B1	B/A					
	3167021356	7/16/16		THE RM000B-S	WETROSLIM100 16-05983-11-B2	B/A					
	3167021357	7/16/16		THE RM000B-S	WETROSLIM100 16-05983-11-B2-BASE	B/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 Howard IV & Greg Moore Carl @ howardiv.gov and gregory_s.moore@rl.gov see SOM for email CONTRACT 55503	
REQUESTED BY <u>Paul Sign</u> Date/Time <u>7/19/16 0830</u> RECEIVED BY <u>Jeffrey Moore</u> Date/Time <u>7/19/16 0830</u>										HOLD TIME	
REQUESTED BY <u>Rebecca Jones</u> Date/Time <u>11/18</u> RECEIVED BY <u>Jeffrey Moore</u> Date/Time <u>11/18</u>										MARK* S = Soil DL = Drum Liquids SE = Sediment T = Tissue SO = Solid WM = Waste SL = Sludge L = Liquid W = Water V = Vegetation O = Oil VA = Vapor A = Air X = Other DS = Drum Solids	
REQUESTED BY <u>Rebecca Jones</u> Date/Time <u>11/18</u> RECEIVED BY <u>Jeffrey Moore</u> Date/Time <u>11/18</u>										DATE/TIME <u>08/10/16 1445</u>	
SNAIL SAMPLE DEPOSITION <u>CONSUMED</u>										A-6033-542 103/05	

## 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 (ppm) 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  $\text{mg}/\text{sample}$ , the value of  $C$  needs to be multiplied by 1000; if the analytical result unit is in  $\text{ng}/\text{sample}$  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 expressed as  $\text{g}/\text{mol}$ . When the ratio between concentration and the corresponding Occupational Exposure Limit (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 ( $T_{\text{standard}}$ ) and 760 Torr ( $P_{\text{standard}}$ ), respectively. For temperatures, the reported upstream temperatures for each time period were used ( $T_{\text{upstream}}$ , 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 ( $P_{\text{upstream}}$ , 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 expressed as 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 <sub>tube</sub> , 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 calculation of the correction factors follows. For a given time period, assume that the reported upstream pressure (P<sub>upstream</sub>) was 734 Torr and the corresponding temperature (T<sub>upstream</sub>) was 85.9°F (or 302.9 K). 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 would be 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—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 the furan category instead of volatile organic compound (VOC) (or volatile organic analyte) were used. For acetonitrile, results from the VOC category were used. For butanal, the results from the VOC category instead of the aldehydes category were used. For pyridine and 2,4-dimethylpyridine, the results from the VOC 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 measurements. This same rule applies to 1,3-Butadiene. The results in the plots and tables reflect the sum of 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	5982-A1	416	25	1663%		2.35%
1	Ammonia	16	5982-H1	433	25	1733%		2.35%
1	Ammonia	2	5982-A2	61	25	243%		2.35%
1	Ammonia	4	5982-B1	345	25	1379%		2.35%
1	Ammonia	6	5982-C1	405	25	1619%		2.35%
1	Ammonia	8	5982-D1	141	25	563%		2.35%
1	Ammonia	10	5982-E1	366	25	1466%		2.35%
1	Ammonia	12	5982-F1	130	25	521%		2.35%
1	Ammonia	14	5982-G1	375	25	1501%		2.35%
1	Ammonia	16	5982-H2	400	25	1599%		2.35%
1	Ammonia	2	5983-A1	403	25	1611%		2.35%
1	Ammonia	16	5983-H1	479	25	1915%		2.35%
1	Ammonia	2	5983-A2	53	25	212%		2.35%
1	Ammonia	4	5983-B1	296	25	1185%		2.35%
1	Ammonia	6	5983-C1	402	25	1608%		2.35%
1	Ammonia	8	5983-D1	284	25	1137%		2.35%
1	Ammonia	10	5983-E1	478	25	1912%		2.35%
1	Ammonia	12	5983-F1	442	25	1767%		2.35%
1	Ammonia	14	5983-G1	410	25	1640%		2.35%
1	Ammonia	16	5983-H2	465	25	1859%		2.35%
3	Mercury	2	5982-A1	0.00159	0.003	52.0%		7.43%
3	Mercury	16	5982-H1	0.00128	0.003	42.0%		7.43%
3	Mercury	2	5982-A2	0.00022	0.003	7.15%	YES	7.43%
3	Mercury	4	5982-B1	0.00022	0.003	7.24%	YES	7.43%
3	Mercury	6	5982-C1	0.00022	0.003	7.10%	YES	7.43%
3	Mercury	8	5982-D1	0.00023	0.003	7.43%	YES	7.43%
3	Mercury	10	5982-E1	0.00022	0.003	7.22%	YES	7.43%
3	Mercury	12	5982-F1	0.00021	0.003	6.94%	YES	7.43%
3	Mercury	14	5982-G1	0.00022	0.003	7.08%	YES	7.43%
3	Mercury	16	5982-H2	0.00022	0.003	7.22%	YES	7.43%
3	Mercury	2	5983-A1	0.00153	0.003	50.2%		7.43%
3	Mercury	16	5983-H1	0.00156	0.003	51.2%		7.43%
3	Mercury	2	5983-A2	0.00021	0.003	6.96%	YES	7.43%
3	Mercury	4	5983-B1	0.00022	0.003	7.16%	YES	7.43%
3	Mercury	6	5983-C1	0.00022	0.003	7.26%	YES	7.43%
3	Mercury	8	5983-D1	0.00022	0.003	7.19%	YES	7.43%
3	Mercury	10	5983-E1	0.00022	0.003	7.26%	YES	7.43%
3	Mercury	12	5983-F1	0.00022	0.003	7.21%	YES	7.43%
3	Mercury	14	5983-G1	0.00022	0.003	7.12%	YES	7.43%
3	Mercury	16	5983-H2	0.00041	0.003	13.5%		7.43%
4	1,3-Butadiene	2	5982-A1	1.0	1.0	102%		2.02%
4	1,3-Butadiene	16	5982-H1	1.1	1.0	112%		2.02%
4	1,3-Butadiene	2	5982-A2	0.020	1.0	2.02%	YES	2.02%
4	1,3-Butadiene	4	5982-B1	0.12	1.0	12.2%		2.02%
4	1,3-Butadiene	6	5982-C1	0.37	1.0	37.2%		2.02%
4	1,3-Butadiene	8	5982-D1	0.90	1.0	89.7%		2.02%
4	1,3-Butadiene	10	5982-E1	1.8	1.0	184%		2.02%
4	1,3-Butadiene	12	5982-F1	1.0	1.0	100%		2.02%
4	1,3-Butadiene	14	5982-G1	2.7	1.0	268%		2.02%
4	1,3-Butadiene	16	5982-H2	1.5	1.0	153%		2.02%
4	1,3-Butadiene	2	5983-A1	1.4	1.0	138%		2.02%
4	1,3-Butadiene	16	5983-H1	1.2	1.0	125%		2.02%
4	1,3-Butadiene	2	5983-A2	0.019	1.0	1.87%	YES	2.02%
4	1,3-Butadiene	4	5983-B1	0.020	1.0	2.00%	YES	2.02%
4	1,3-Butadiene	6	5983-C1	0.35	1.0	34.6%		2.02%
4	1,3-Butadiene	8	5983-D1	0.75	1.0	74.7%		2.02%
4	1,3-Butadiene	10	5983-E1	1.2	1.0	123%		2.02%
4	1,3-Butadiene	12	5983-F1	1.8	1.0	181%		2.02%
4	1,3-Butadiene	14	5983-G1	2.4	1.0	241%		2.02%
4	1,3-Butadiene	16	5983-H2	2.1	1.0	214%		2.02%



COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
5	Benzene	2	5982-A1	0.00276	0.50	0.551%		0.024%
5	Benzene	16	5982-H1	0.00404	0.50	0.808%		0.024%
5	Benzene	2	5982-A2	0.00011	0.50	0.022%	YES	0.024%
5	Benzene	4	5982-B1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	6	5982-C1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	8	5982-D1	0.00011	0.50	0.022%	YES	0.024%
5	Benzene	10	5982-E1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	14	5982-G1	0.00019	0.50	0.037%		0.024%
5	Benzene	16	5982-H2	0.00025	0.50	0.050%		0.024%
5	Benzene	2	5983-A1	0.00431	0.50	0.863%		0.024%
5	Benzene	16	5983-H1	0.00320	0.50	0.640%		0.024%
5	Benzene	2	5983-A2	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	4	5983-B1	0.00011	0.50	0.022%	YES	0.024%
5	Benzene	6	5983-C1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	8	5983-D1	0.00011	0.50	0.023%	YES	0.024%
5	Benzene	10	5983-E1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	12	5983-F1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	14	5983-G1	0.00010	0.50	0.021%	YES	0.024%
5	Benzene	16	5983-H2	0.00012	0.50	0.024%	YES	0.024%
6	Biphenyl	2	5982-A1	0.00009	0.20	0.047%	YES	0.048%
6	Biphenyl	16	5982-H1	0.00008	0.20	0.040%	YES	0.048%
6	Biphenyl	2	5982-A2	0.00008	0.20	0.042%	YES	0.048%
6	Biphenyl	4	5982-B1	0.00009	0.20	0.043%	YES	0.048%
6	Biphenyl	6	5982-C1	0.00009	0.20	0.046%	YES	0.048%
6	Biphenyl	8	5982-D1	0.00010	0.20	0.048%	YES	0.048%
6	Biphenyl	10	5982-E1	0.00009	0.20	0.044%	YES	0.048%
6	Biphenyl	12	5982-F1	0.00008	0.20	0.042%	YES	0.048%
6	Biphenyl	16	5982-H2	0.00009	0.20	0.045%	YES	0.048%
6	Biphenyl	2	5983-A1	0.00018	0.20	0.088%	YES	0.092%
6	Biphenyl	16	5983-H1	0.00018	0.20	0.088%	YES	0.092%
6	Biphenyl	2	5983-A2	0.00016	0.20	0.082%	YES	0.092%
6	Biphenyl	4	5983-B1	0.00017	0.20	0.085%	YES	0.092%
6	Biphenyl	6	5983-C1	0.00017	0.20	0.086%	YES	0.092%
6	Biphenyl	8	5983-D1	0.00018	0.20	0.092%	YES	0.092%
6	Biphenyl	10	5983-E1	0.00018	0.20	0.092%	YES	0.092%
6	Biphenyl	12	5983-F1	0.00018	0.20	0.090%	YES	0.092%
6	Biphenyl	14	5983-G1	0.00018	0.20	0.090%	YES	0.092%
6	Biphenyl	16	5983-H2	0.00018	0.20	0.088%	YES	0.092%
7	1-Butanol	2	5982-A1	0.78	20	3.89%		0.005%
7	1-Butanol	16	5982-H1	0.34	20	1.68%		0.005%
7	1-Butanol	2	5982-A2	0.00154	20	0.008%		0.005%
7	1-Butanol	4	5982-B1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	6	5982-C1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	8	5982-D1	0.00153	20	0.008%		0.005%
7	1-Butanol	10	5982-E1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	14	5982-G1	0.00038	20	0.002%	YES	0.005%
7	1-Butanol	16	5982-H2	0.00151	20	0.008%		0.005%
7	1-Butanol	2	5983-A1	0.86	20	4.29%		0.005%
7	1-Butanol	16	5983-H1	1.0	20	5.02%		0.005%
7	1-Butanol	2	5983-A2	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	4	5983-B1	0.00085	20	0.004%	YES	0.005%
7	1-Butanol	6	5983-C1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	8	5983-D1	0.00088	20	0.004%	YES	0.005%
7	1-Butanol	10	5983-E1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	12	5983-F1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	14	5983-G1	0.00080	20	0.004%	YES	0.005%
7	1-Butanol	16	5983-H2	0.00097	20	0.005%	YES	0.005%



COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
9	2-Hexanone	2	5982-A1	0.018	5.0	0.367%		0.003%
9	2-Hexanone	16	5982-H1	0.016	5.0	0.322%		0.003%
9	2-Hexanone	2	5982-A2	0.00009	5.0	0.002%	YES	0.003%
9	2-Hexanone	4	5982-B1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	6	5982-C1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	8	5982-D1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	10	5982-E1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	14	5982-G1	0.00016	5.0	0.003%	YES	0.003%
9	2-Hexanone	16	5982-H2	0.00016	5.0	0.003%	YES	0.003%
9	2-Hexanone	2	5983-A1	0.018	5.0	0.355%		0.003%
9	2-Hexanone	16	5983-H1	0.016	5.0	0.324%		0.003%
9	2-Hexanone	2	5983-A2	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	4	5983-B1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	6	5983-C1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	8	5983-D1	0.00009	5.0	0.002%	YES	0.003%
9	2-Hexanone	10	5983-E1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	12	5983-F1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	14	5983-G1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	16	5983-H2	0.00010	5.0	0.002%	YES	0.003%
11	4-Methyl-2-hexanone	2	5982-A1	0.00133	0.50	0.266%		0.030%
11	4-Methyl-2-hexanone	16	5982-H1	0.00135	0.50	0.270%		0.030%
11	4-Methyl-2-hexanone	2	5982-A2	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	4	5982-B1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	6	5982-C1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	8	5982-D1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	10	5982-E1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	14	5982-G1	0.00015	0.50	0.030%	YES	0.030%
11	4-Methyl-2-hexanone	16	5982-H2	0.00015	0.50	0.030%	YES	0.030%
11	4-Methyl-2-hexanone	2	5983-A1	0.00111	0.50	0.223%		0.030%
11	4-Methyl-2-hexanone	16	5983-H1	0.00101	0.50	0.201%		0.030%
11	4-Methyl-2-hexanone	2	5983-A2	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	4	5983-B1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	6	5983-C1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	8	5983-D1	0.00008	0.50	0.017%	YES	0.030%
11	4-Methyl-2-hexanone	10	5983-E1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	12	5983-F1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	14	5983-G1	0.00008	0.50	0.015%	YES	0.030%
11	4-Methyl-2-hexanone	16	5983-H2	0.00009	0.50	0.018%	YES	0.030%
13	3-Buten-2-one	2	5982-A1	0.00015	0.20	0.077%	YES	0.090%
13	3-Buten-2-one	16	5982-H1	0.047	0.20	23.5%		0.090%
13	3-Buten-2-one	2	5982-A2	0.00017	0.20	0.087%		0.090%
13	3-Buten-2-one	4	5982-B1	0.00017	0.20	0.084%	YES	0.090%
13	3-Buten-2-one	6	5982-C1	0.00019	0.20	0.094%		0.090%
13	3-Buten-2-one	8	5982-D1	0.00035	0.20	0.177%		0.090%
13	3-Buten-2-one	10	5982-E1	0.00080	0.20	0.399%		0.090%
13	3-Buten-2-one	14	5982-G1	0.00018	0.20	0.090%	YES	0.090%
13	3-Buten-2-one	16	5982-H2	0.00330	0.20	1.65%		0.090%
13	3-Buten-2-one	2	5983-A1	0.00015	0.20	0.077%	YES	0.090%
13	3-Buten-2-one	16	5983-H1	0.041	0.20	20.3%		0.090%
13	3-Buten-2-one	2	5983-A2	0.00017	0.20	0.084%	YES	0.090%
13	3-Buten-2-one	4	5983-B1	0.00017	0.20	0.086%	YES	0.090%
13	3-Buten-2-one	6	5983-C1	0.00017	0.20	0.083%	YES	0.090%
13	3-Buten-2-one	8	5983-D1	0.00024	0.20	0.120%		0.090%
13	3-Buten-2-one	10	5983-E1	0.00021	0.20	0.104%		0.090%
13	3-Buten-2-one	12	5983-F1	0.00061	0.20	0.306%		0.090%
13	3-Buten-2-one	14	5983-G1	0.00373	0.20	1.86%		0.090%
13	3-Buten-2-one	16	5983-H2	0.00088	0.20	0.442%		0.090%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
14	Formaldehyde	2	5982-A1	0.026	0.30	8.56%		0.631%
14	Formaldehyde	16	5982-H1	0.00799	0.30	2.66%		0.631%
14	Formaldehyde	2	5982-A2	0.00189	0.30	0.631%	YES	0.631%
14	Formaldehyde	4	5982-B1	0.00183	0.30	0.611%	YES	0.631%
14	Formaldehyde	6	5982-C1	0.00180	0.30	0.602%	YES	0.631%
14	Formaldehyde	8	5982-D1	0.00184	0.30	0.612%	YES	0.631%
14	Formaldehyde	10	5982-E1	0.00184	0.30	0.613%	YES	0.631%
14	Formaldehyde	12	5982-F1	0.00179	0.30	0.597%	YES	0.631%
14	Formaldehyde	14	5982-G1	0.00180	0.30	0.602%	YES	0.631%
14	Formaldehyde	16	5982-H2	0.00181	0.30	0.602%	YES	0.631%
14	Formaldehyde	2	5983-A1	0.018	0.30	6.00%		0.631%
14	Formaldehyde	16	5983-H1	0.012	0.30	3.94%		0.631%
14	Formaldehyde	2	5983-A2	0.00175	0.30	0.583%	YES	0.631%
14	Formaldehyde	4	5983-B1	0.00256	0.30	0.853%		0.631%
14	Formaldehyde	6	5983-C1	0.00198	0.30	0.660%		0.631%
14	Formaldehyde	8	5983-D1	0.00231	0.30	0.770%		0.631%
14	Formaldehyde	10	5983-E1	0.00196	0.30	0.654%		0.631%
14	Formaldehyde	12	5983-F1	0.00184	0.30	0.613%	YES	0.631%
14	Formaldehyde	14	5983-G1	0.00184	0.30	0.615%	YES	0.631%
14	Formaldehyde	16	5983-H2	0.00186	0.30	0.619%	YES	0.631%
15	Acetaldehyde	2	5982-A1	0.28	25	1.12%		0.005%
15	Acetaldehyde	16	5982-H1	0.27	25	1.09%		0.005%
15	Acetaldehyde	2	5982-A2	0.090	25	0.361%		0.005%
15	Acetaldehyde	4	5982-B1	0.11	25	0.440%		0.005%
15	Acetaldehyde	6	5982-C1	0.16	25	0.620%		0.005%
15	Acetaldehyde	8	5982-D1	0.18	25	0.732%		0.005%
15	Acetaldehyde	10	5982-E1	0.18	25	0.723%		0.005%
15	Acetaldehyde	12	5982-F1	0.051	25	0.205%		0.005%
15	Acetaldehyde	14	5982-G1	0.19	25	0.758%		0.005%
15	Acetaldehyde	16	5982-H2	0.17	25	0.699%		0.005%
15	Acetaldehyde	2	5983-A1	0.25	25	1.000%		0.005%
15	Acetaldehyde	16	5983-H1	0.28	25	1.11%		0.005%
15	Acetaldehyde	2	5983-A2	0.062	25	0.248%		0.005%
15	Acetaldehyde	4	5983-B1	0.076	25	0.303%		0.005%
15	Acetaldehyde	6	5983-C1	0.13	25	0.509%		0.005%
15	Acetaldehyde	8	5983-D1	0.15	25	0.619%		0.005%
15	Acetaldehyde	10	5983-E1	0.19	25	0.740%		0.005%
15	Acetaldehyde	12	5983-F1	0.20	25	0.783%		0.005%
15	Acetaldehyde	14	5983-G1	0.18	25	0.724%		0.005%
15	Acetaldehyde	16	5983-H2	0.19	25	0.749%		0.005%
16	Butanal	2	5982-A1	0.020	25	0.081%		0.001%
16	Butanal	16	5982-H1	0.034	25	0.134%		0.001%
16	Butanal	2	5982-A2	0.00021	25	0.001%	YES	0.001%
16	Butanal	4	5982-B1	0.00020	25	0.001%	YES	0.001%
16	Butanal	6	5982-C1	0.00020	25	0.001%	YES	0.001%
16	Butanal	8	5982-D1	0.00021	25	0.001%	YES	0.001%
16	Butanal	10	5982-E1	0.00020	25	0.001%	YES	0.001%
16	Butanal	14	5982-G1	0.00027	25	0.001%	YES	0.001%
16	Butanal	16	5982-H2	0.00027	25	0.001%	YES	0.001%
16	Butanal	2	5983-A1	0.021	25	0.085%		0.001%
16	Butanal	16	5983-H1	0.019	25	0.075%		0.001%
16	Butanal	2	5983-A2	0.00020	25	0.001%	YES	0.001%
16	Butanal	4	5983-B1	0.00026	25	0.001%		0.001%
16	Butanal	6	5983-C1	0.00020	25	0.001%	YES	0.001%
16	Butanal	8	5983-D1	0.00021	25	0.001%	YES	0.001%
16	Butanal	10	5983-E1	0.00020	25	0.001%	YES	0.001%
16	Butanal	12	5983-F1	0.00020	25	0.001%	YES	0.001%
16	Butanal	14	5983-G1	0.00020	25	0.001%	YES	0.001%
16	Butanal	16	5983-H2	0.00023	25	0.001%	YES	0.001%



COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
19	Furan	2	5982-A1	0.00001	0.001	0.873%	YES	0.933%
19	Furan	16	5982-H1	0.00001	0.001	0.861%	YES	0.933%
19	Furan	2	5982-A2	0.00001	0.001	0.929%	YES	0.933%
19	Furan	4	5982-B1	0.00001	0.001	0.925%	YES	0.933%
19	Furan	6	5982-C1	0.00001	0.001	1.02%		0.933%
19	Furan	8	5982-D1	0.00001	0.001	0.933%	YES	0.933%
19	Furan	10	5982-E1	0.00001	0.001	1.26%		0.933%
19	Furan	12	5982-F1	0.00001	0.001	0.844%	YES	0.933%
19	Furan	14	5982-G1	0.00001	0.001	0.872%	YES	0.933%
19	Furan	16	5982-H2	0.00001	0.001	0.869%	YES	0.933%
19	Furan	2	5983-A1	0.00005	0.001	4.86%		0.933%
19	Furan	16	5983-H1	0.00001	0.001	0.889%	YES	0.933%
19	Furan	2	5983-A2	0.00001	0.001	0.886%	YES	0.933%
19	Furan	4	5983-B1	0.00001	0.001	0.880%	YES	0.933%
19	Furan	6	5983-C1	0.00001	0.001	0.906%	YES	0.933%
19	Furan	8	5983-D1	0.00001	0.001	0.882%	YES	0.933%
19	Furan	10	5983-E1	0.00001	0.001	0.895%	YES	0.933%
19	Furan	12	5983-F1	0.00001	0.001	0.895%	YES	0.933%
19	Furan	14	5983-G1	0.00001	0.001	0.880%	YES	0.933%
19	Furan	16	5983-H2	0.00001	0.001	0.900%	YES	0.933%
20	2,3-Dihydrofuran	2	5982-A1	0.00074	0.001	74.5%		1.81%
20	2,3-Dihydrofuran	16	5982-H1	0.00002	0.001	1.67%	YES	1.81%
20	2,3-Dihydrofuran	2	5982-A2	0.00002	0.001	1.81%	YES	1.81%
20	2,3-Dihydrofuran	4	5982-B1	0.00002	0.001	1.80%	YES	1.81%
20	2,3-Dihydrofuran	6	5982-C1	0.00002	0.001	1.78%	YES	1.81%
20	2,3-Dihydrofuran	8	5982-D1	0.00002	0.001	1.81%	YES	1.81%
20	2,3-Dihydrofuran	10	5982-E1	0.00002	0.001	1.70%	YES	1.81%
20	2,3-Dihydrofuran	12	5982-F1	0.00002	0.001	1.64%	YES	1.81%
20	2,3-Dihydrofuran	14	5982-G1	0.00002	0.001	1.69%	YES	1.81%
20	2,3-Dihydrofuran	16	5982-H2	0.00002	0.001	1.69%	YES	1.81%
20	2,3-Dihydrofuran	2	5983-A1	0.00002	0.001	1.60%	YES	1.81%
20	2,3-Dihydrofuran	16	5983-H1	0.00070	0.001	70.0%		1.81%
20	2,3-Dihydrofuran	2	5983-A2	0.00002	0.001	1.72%	YES	1.81%
20	2,3-Dihydrofuran	4	5983-B1	0.00002	0.001	1.71%	YES	1.81%
20	2,3-Dihydrofuran	6	5983-C1	0.00002	0.001	1.76%	YES	1.81%
20	2,3-Dihydrofuran	8	5983-D1	0.00002	0.001	1.71%	YES	1.81%
20	2,3-Dihydrofuran	10	5983-E1	0.00002	0.001	1.74%	YES	1.81%
20	2,3-Dihydrofuran	12	5983-F1	0.00002	0.001	1.74%	YES	1.81%
20	2,3-Dihydrofuran	14	5983-G1	0.00002	0.001	1.71%	YES	1.81%
20	2,3-Dihydrofuran	16	5983-H2	0.00002	0.001	1.75%	YES	1.81%
21	2,5-Dihydrofuran	2	5982-A1	0.00021	0.001	20.7%		2.31%
21	2,5-Dihydrofuran	16	5982-H1	0.00002	0.001	2.14%	YES	2.31%
21	2,5-Dihydrofuran	2	5982-A2	0.00002	0.001	2.31%	YES	2.31%
21	2,5-Dihydrofuran	4	5982-B1	0.00002	0.001	2.30%	YES	2.31%
21	2,5-Dihydrofuran	6	5982-C1	0.00002	0.001	2.28%	YES	2.31%
21	2,5-Dihydrofuran	8	5982-D1	0.00002	0.001	2.31%	YES	2.31%
21	2,5-Dihydrofuran	10	5982-E1	0.00002	0.001	2.17%	YES	2.31%
21	2,5-Dihydrofuran	12	5982-F1	0.00003	0.001	3.09%		2.31%
21	2,5-Dihydrofuran	14	5982-G1	0.00002	0.001	2.17%	YES	2.31%
21	2,5-Dihydrofuran	16	5982-H2	0.00002	0.001	2.16%	YES	2.31%
21	2,5-Dihydrofuran	2	5983-A1	0.00014	0.001	14.2%		2.31%
21	2,5-Dihydrofuran	16	5983-H1	0.00016	0.001	16.3%		2.31%
21	2,5-Dihydrofuran	2	5983-A2	0.00002	0.001	2.20%	YES	2.31%
21	2,5-Dihydrofuran	4	5983-B1	0.00002	0.001	2.18%	YES	2.31%
21	2,5-Dihydrofuran	6	5983-C1	0.00002	0.001	2.25%	YES	2.31%
21	2,5-Dihydrofuran	8	5983-D1	0.00002	0.001	2.19%	YES	2.31%
21	2,5-Dihydrofuran	10	5983-E1	0.00002	0.001	2.22%	YES	2.31%
21	2,5-Dihydrofuran	12	5983-F1	0.00002	0.001	2.22%	YES	2.31%
21	2,5-Dihydrofuran	14	5983-G1	0.00002	0.001	2.19%	YES	2.31%
21	2,5-Dihydrofuran	16	5983-H2	0.00002	0.001	2.23%	YES	2.31%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
22	2-Methylfuran	2	5982-A1	0.00010	0.001	10.5%		1.98%
22	2-Methylfuran	16	5982-H1	0.00011	0.001	11.1%		1.98%
22	2-Methylfuran	2	5982-A2	0.00002	0.001	1.97%	YES	1.98%
22	2-Methylfuran	4	5982-B1	0.00002	0.001	1.96%	YES	1.98%
22	2-Methylfuran	6	5982-C1	0.00002	0.001	1.95%	YES	1.98%
22	2-Methylfuran	8	5982-D1	0.00002	0.001	1.98%	YES	1.98%
22	2-Methylfuran	10	5982-E1	0.00002	0.001	1.85%	YES	1.98%
22	2-Methylfuran	12	5982-F1	0.00002	0.001	1.79%	YES	1.98%
22	2-Methylfuran	14	5982-G1	0.00002	0.001	1.85%	YES	1.98%
22	2-Methylfuran	16	5982-H2	0.00004	0.001	4.40%		1.98%
22	2-Methylfuran	2	5983-A1	0.00009	0.001	9.12%		1.98%
22	2-Methylfuran	16	5983-H1	0.00012	0.001	12.3%		1.98%
22	2-Methylfuran	2	5983-A2	0.00002	0.001	1.88%	YES	1.98%
22	2-Methylfuran	4	5983-B1	0.00002	0.001	1.86%	YES	1.98%
22	2-Methylfuran	6	5983-C1	0.00002	0.001	1.92%	YES	1.98%
22	2-Methylfuran	8	5983-D1	0.00002	0.001	1.87%	YES	1.98%
22	2-Methylfuran	10	5983-E1	0.00002	0.001	1.90%	YES	1.98%
22	2-Methylfuran	12	5983-F1	0.00002	0.001	1.90%	YES	1.98%
22	2-Methylfuran	14	5983-G1	0.00002	0.001	1.87%	YES	1.98%
22	2-Methylfuran	16	5983-H2	0.00002	0.001	1.91%	YES	1.98%
23	2,5-Dimethylfuran	2	5982-A1	0.00003	0.001	2.95%	YES	3.16%
23	2,5-Dimethylfuran	16	5982-H1	0.00003	0.001	2.91%	YES	3.16%
23	2,5-Dimethylfuran	2	5982-A2	0.00003	0.001	3.14%	YES	3.16%
23	2,5-Dimethylfuran	4	5982-B1	0.00003	0.001	3.13%	YES	3.16%
23	2,5-Dimethylfuran	6	5982-C1	0.00003	0.001	3.11%	YES	3.16%
23	2,5-Dimethylfuran	8	5982-D1	0.00003	0.001	3.16%	YES	3.16%
23	2,5-Dimethylfuran	10	5982-E1	0.00003	0.001	2.96%	YES	3.16%
23	2,5-Dimethylfuran	12	5982-F1	0.00003	0.001	2.85%	YES	3.16%
23	2,5-Dimethylfuran	14	5982-G1	0.00003	0.001	2.95%	YES	3.16%
23	2,5-Dimethylfuran	16	5982-H2	0.00003	0.001	2.94%	YES	3.16%
23	2,5-Dimethylfuran	2	5983-A1	0.00003	0.001	2.79%	YES	3.16%
23	2,5-Dimethylfuran	16	5983-H1	0.00003	0.001	3.01%	YES	3.16%
23	2,5-Dimethylfuran	2	5983-A2	0.00003	0.001	3.00%	YES	3.16%
23	2,5-Dimethylfuran	4	5983-B1	0.00003	0.001	2.98%	YES	3.16%
23	2,5-Dimethylfuran	6	5983-C1	0.00003	0.001	3.07%	YES	3.16%
23	2,5-Dimethylfuran	8	5983-D1	0.00003	0.001	2.98%	YES	3.16%
23	2,5-Dimethylfuran	10	5983-E1	0.00003	0.001	3.03%	YES	3.16%
23	2,5-Dimethylfuran	12	5983-F1	0.00003	0.001	3.03%	YES	3.16%
23	2,5-Dimethylfuran	14	5983-G1	0.00003	0.001	2.98%	YES	3.16%
23	2,5-Dimethylfuran	16	5983-H2	0.00003	0.001	3.04%	YES	3.16%
27	2-Pentylfuran	2	5982-A1	0.00002	0.001	1.63%	YES	1.74%
27	2-Pentylfuran	16	5982-H1	0.00002	0.001	1.62%	YES	1.74%
27	2-Pentylfuran	2	5982-A2	0.00002	0.001	1.73%	YES	1.74%
27	2-Pentylfuran	4	5982-B1	0.00002	0.001	2.48%		1.74%
27	2-Pentylfuran	6	5982-C1	0.00002	0.001	2.21%		1.74%
27	2-Pentylfuran	8	5982-D1	0.00002	0.001	1.74%	YES	1.74%
27	2-Pentylfuran	10	5982-E1	0.00002	0.001	2.06%		1.74%
27	2-Pentylfuran	12	5982-F1	0.00002	0.001	1.57%	YES	1.74%
27	2-Pentylfuran	14	5982-G1	0.00002	0.001	1.62%	YES	1.74%
27	2-Pentylfuran	16	5982-H2	0.00002	0.001	1.65%		1.74%
27	2-Pentylfuran	2	5983-A1	0.00004	0.001	3.57%		1.74%
27	2-Pentylfuran	16	5983-H1	0.00002	0.001	1.67%	YES	1.74%
27	2-Pentylfuran	2	5983-A2	0.00002	0.001	1.65%	YES	1.74%
27	2-Pentylfuran	4	5983-B1	0.00002	0.001	2.21%		1.74%
27	2-Pentylfuran	6	5983-C1	0.00002	0.001	1.98%		1.74%
27	2-Pentylfuran	8	5983-D1	0.00002	0.001	2.41%		1.74%
27	2-Pentylfuran	10	5983-E1	0.00002	0.001	1.66%	YES	1.74%
27	2-Pentylfuran	12	5983-F1	0.00002	0.001	1.67%	YES	1.74%
27	2-Pentylfuran	14	5983-G1	0.00002	0.001	1.69%		1.74%
27	2-Pentylfuran	16	5983-H2	0.00002	0.001	1.66%	YES	1.74%



COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
28	2-Heptylfuran	2	5982-A1	0.00002	0.001	1.87%		1.15%
28	2-Heptylfuran	16	5982-H1	0.00001	0.001	1.07%	YES	1.15%
28	2-Heptylfuran	2	5982-A2	0.00001	0.001	1.14%	YES	1.15%
28	2-Heptylfuran	4	5982-B1	0.00001	0.001	1.14%	YES	1.15%
28	2-Heptylfuran	6	5982-C1	0.00001	0.001	1.13%	YES	1.15%
28	2-Heptylfuran	8	5982-D1	0.00001	0.001	1.15%	YES	1.15%
28	2-Heptylfuran	10	5982-E1	0.00001	0.001	1.07%	YES	1.15%
28	2-Heptylfuran	12	5982-F1	0.00001	0.001	1.04%	YES	1.15%
28	2-Heptylfuran	14	5982-G1	0.00001	0.001	1.35%		1.15%
28	2-Heptylfuran	16	5982-H2	0.00001	0.001	1.06%	YES	1.15%
28	2-Heptylfuran	2	5983-A1	0.00005	0.001	4.51%		1.15%
28	2-Heptylfuran	16	5983-H1	0.00001	0.001	1.10%	YES	1.15%
28	2-Heptylfuran	2	5983-A2	0.00001	0.001	1.09%	YES	1.15%
28	2-Heptylfuran	4	5983-B1	0.00001	0.001	1.08%	YES	1.15%
28	2-Heptylfuran	6	5983-C1	0.00001	0.001	1.11%	YES	1.15%
28	2-Heptylfuran	8	5983-D1	0.00001	0.001	1.08%	YES	1.15%
28	2-Heptylfuran	10	5983-E1	0.00001	0.001	1.10%	YES	1.15%
28	2-Heptylfuran	12	5983-F1	0.00001	0.001	1.10%	YES	1.15%
28	2-Heptylfuran	14	5983-G1	0.00001	0.001	1.32%		1.15%
28	2-Heptylfuran	16	5983-H2	0.00001	0.001	1.10%	YES	1.15%
29	2-Propylfuran	2	5982-A1	0.00003	0.001	2.64%	YES	2.82%
29	2-Propylfuran	16	5982-H1	0.00003	0.001	2.62%	YES	2.82%
29	2-Propylfuran	2	5982-A2	0.00003	0.001	2.81%	YES	2.82%
29	2-Propylfuran	4	5982-B1	0.00003	0.001	2.80%	YES	2.82%
29	2-Propylfuran	6	5982-C1	0.00003	0.001	2.77%	YES	2.82%
29	2-Propylfuran	8	5982-D1	0.00003	0.001	2.82%	YES	2.82%
29	2-Propylfuran	10	5982-E1	0.00003	0.001	2.64%	YES	2.82%
29	2-Propylfuran	12	5982-F1	0.00003	0.001	2.55%	YES	2.82%
29	2-Propylfuran	14	5982-G1	0.00003	0.001	2.64%	YES	2.82%
29	2-Propylfuran	16	5982-H2	0.00003	0.001	2.60%	YES	2.82%
29	2-Propylfuran	2	5983-A1	0.00002	0.001	2.49%	YES	2.82%
29	2-Propylfuran	16	5983-H1	0.00011	0.001	11.1%		2.82%
29	2-Propylfuran	2	5983-A2	0.00003	0.001	2.68%	YES	2.82%
29	2-Propylfuran	4	5983-B1	0.00003	0.001	2.66%	YES	2.82%
29	2-Propylfuran	6	5983-C1	0.00003	0.001	2.74%	YES	2.82%
29	2-Propylfuran	8	5983-D1	0.00003	0.001	2.66%	YES	2.82%
29	2-Propylfuran	10	5983-E1	0.00003	0.001	2.70%	YES	2.82%
29	2-Propylfuran	12	5983-F1	0.00003	0.001	2.70%	YES	2.82%
29	2-Propylfuran	14	5983-G1	0.00003	0.001	2.66%	YES	2.82%
29	2-Propylfuran	16	5983-H2	0.00003	0.001	2.70%	YES	2.82%
33	Diethylphthalate	2	5982-A1	0.00009	0.55	0.017%	YES	0.017%
33	Diethylphthalate	16	5982-H1	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	2	5982-A2	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	4	5982-B1	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	6	5982-C1	0.00009	0.55	0.016%	YES	0.017%
33	Diethylphthalate	8	5982-D1	0.00009	0.55	0.017%	YES	0.017%
33	Diethylphthalate	10	5982-E1	0.00009	0.55	0.015%	YES	0.017%
33	Diethylphthalate	12	5982-F1	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	16	5982-H2	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	2	5983-A1	0.00021	0.55	0.039%	YES	0.041%
33	Diethylphthalate	16	5983-H1	0.00021	0.55	0.039%	YES	0.041%
33	Diethylphthalate	2	5983-A2	0.00020	0.55	0.036%	YES	0.041%
33	Diethylphthalate	4	5983-B1	0.00021	0.55	0.038%	YES	0.041%
33	Diethylphthalate	6	5983-C1	0.00021	0.55	0.038%	YES	0.041%
33	Diethylphthalate	8	5983-D1	0.00022	0.55	0.040%	YES	0.041%
33	Diethylphthalate	10	5983-E1	0.00022	0.55	0.041%	YES	0.041%
33	Diethylphthalate	12	5983-F1	0.00022	0.55	0.040%	YES	0.041%
33	Diethylphthalate	14	5983-G1	0.00022	0.55	0.040%	YES	0.041%
33	Diethylphthalate	16	5983-H2	0.00021	0.55	0.039%	YES	0.041%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
34	Acetonitrile	2	5982-A1	0.085	20	0.424%		0.001%
34	Acetonitrile	16	5982-H1	0.14	20	0.695%		0.001%
34	Acetonitrile	2	5982-A2	0.021	20	0.105%		0.001%
34	Acetonitrile	4	5982-B1	0.46	20	2.29%		0.001%
34	Acetonitrile	6	5982-C1	0.076	20	0.380%		0.001%
34	Acetonitrile	8	5982-D1	0.12	20	0.587%		0.001%
34	Acetonitrile	10	5982-E1	0.091	20	0.454%		0.001%
34	Acetonitrile	14	5982-G1	0.18	20	0.885%		0.001%
34	Acetonitrile	16	5982-H2	0.23	20	1.13%		0.001%
34	Acetonitrile	2	5983-A1	0.15	20	0.767%		0.001%
34	Acetonitrile	16	5983-H1	0.10	20	0.502%		0.001%
34	Acetonitrile	2	5983-A2	0.050	20	0.252%		0.001%
34	Acetonitrile	4	5983-B1	1.9	20	9.45%		0.001%
34	Acetonitrile	6	5983-C1	0.18	20	0.922%		0.001%
34	Acetonitrile	8	5983-D1	0.18	20	0.893%		0.001%
34	Acetonitrile	10	5983-E1	0.29	20	1.43%		0.001%
34	Acetonitrile	12	5983-F1	0.56	20	2.78%		0.001%
34	Acetonitrile	14	5983-G1	0.15	20	0.767%		0.001%
34	Acetonitrile	16	5983-H2	0.15	20	0.755%		0.001%
35	Propanenitrile	2	5982-A1	0.018	6.0	0.306%		0.003%
35	Propanenitrile	16	5982-H1	0.023	6.0	0.386%		0.003%
35	Propanenitrile	2	5982-A2	0.00018	6.0	0.003%	YES	0.003%
35	Propanenitrile	4	5982-B1	0.00018	6.0	0.003%	YES	0.003%
35	Propanenitrile	6	5982-C1	0.00034	6.0	0.006%		0.003%
35	Propanenitrile	8	5982-D1	0.00167	6.0	0.028%		0.003%
35	Propanenitrile	10	5982-E1	0.00501	6.0	0.084%		0.003%
35	Propanenitrile	14	5982-G1	0.032	6.0	0.540%		0.003%
35	Propanenitrile	16	5982-H2	0.054	6.0	0.899%		0.003%
35	Propanenitrile	2	5983-A1	0.018	6.0	0.308%		0.003%
35	Propanenitrile	16	5983-H1	0.017	6.0	0.286%		0.003%
35	Propanenitrile	2	5983-A2	0.00038	6.0	0.006%		0.003%
35	Propanenitrile	4	5983-B1	0.00049	6.0	0.008%		0.003%
35	Propanenitrile	6	5983-C1	0.00029	6.0	0.005%		0.003%
35	Propanenitrile	8	5983-D1	0.00080	6.0	0.013%		0.003%
35	Propanenitrile	10	5983-E1	0.00264	6.0	0.044%		0.003%
35	Propanenitrile	12	5983-F1	0.00628	6.0	0.105%		0.003%
35	Propanenitrile	14	5983-G1	0.013	6.0	0.223%		0.003%
35	Propanenitrile	16	5983-H2	0.038	6.0	0.633%		0.003%
36	Butanenitrile	2	5982-A1	0.010	8.0	0.126%		0.003%
36	Butanenitrile	16	5982-H1	0.018	8.0	0.231%		0.003%
36	Butanenitrile	2	5982-A2	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	4	5982-B1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	6	5982-C1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	8	5982-D1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	10	5982-E1	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	14	5982-G1	0.00020	8.0	0.003%	YES	0.003%
36	Butanenitrile	16	5982-H2	0.00032	8.0	0.004%		0.003%
36	Butanenitrile	2	5983-A1	0.014	8.0	0.172%		0.003%
36	Butanenitrile	16	5983-H1	0.011	8.0	0.135%		0.003%
36	Butanenitrile	2	5983-A2	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	4	5983-B1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	6	5983-C1	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	8	5983-D1	0.00013	8.0	0.002%	YES	0.003%
36	Butanenitrile	10	5983-E1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	12	5983-F1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	14	5983-G1	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	16	5983-H2	0.00014	8.0	0.002%	YES	0.003%



COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
37	Pentanenitrile	2	5982-A1	0.00335	6.0	0.056%		0.003%
37	Pentanenitrile	16	5982-H1	0.011	6.0	0.188%		0.003%
37	Pentanenitrile	2	5982-A2	0.00014	6.0	0.002%	YES	0.003%
37	Pentanenitrile	4	5982-B1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	6	5982-C1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	8	5982-D1	0.00014	6.0	0.002%	YES	0.003%
37	Pentanenitrile	10	5982-E1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	14	5982-G1	0.00048	6.0	0.008%		0.003%
37	Pentanenitrile	16	5982-H2	0.00021	6.0	0.003%	YES	0.003%
37	Pentanenitrile	2	5983-A1	0.00635	6.0	0.106%		0.003%
37	Pentanenitrile	16	5983-H1	0.00496	6.0	0.083%		0.003%
37	Pentanenitrile	2	5983-A2	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	4	5983-B1	0.00014	6.0	0.002%	YES	0.003%
37	Pentanenitrile	6	5983-C1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	8	5983-D1	0.00014	6.0	0.002%	YES	0.003%
37	Pentanenitrile	10	5983-E1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	12	5983-F1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	14	5983-G1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	16	5983-H2	0.00015	6.0	0.003%	YES	0.003%
38	Hexanenitrile	2	5982-A1	0.00221	6.0	0.037%		0.003%
38	Hexanenitrile	16	5982-H1	0.00159	6.0	0.026%		0.003%
38	Hexanenitrile	2	5982-A2	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	4	5982-B1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	6	5982-C1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	8	5982-D1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	10	5982-E1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	14	5982-G1	0.00018	6.0	0.003%	YES	0.003%
38	Hexanenitrile	16	5982-H2	0.00018	6.0	0.003%	YES	0.003%
38	Hexanenitrile	2	5983-A1	0.00275	6.0	0.046%		0.003%
38	Hexanenitrile	16	5983-H1	0.00188	6.0	0.031%		0.003%
38	Hexanenitrile	2	5983-A2	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	4	5983-B1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	6	5983-C1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	8	5983-D1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	10	5983-E1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	12	5983-F1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	14	5983-G1	0.00010	6.0	0.002%	YES	0.003%
38	Hexanenitrile	16	5983-H2	0.00012	6.0	0.002%	YES	0.003%
42	Ethylamine	2	5982-A1	0.18	5.0	3.63%		0.103%
42	Ethylamine	16	5982-H1	0.020	5.0	0.403%		0.103%
42	Ethylamine	2	5982-A2	0.00459	5.0	0.092%	YES	0.103%
42	Ethylamine	4	5982-B1	0.00501	5.0	0.100%	YES	0.103%
42	Ethylamine	6	5982-C1	0.00494	5.0	0.099%	YES	0.103%
42	Ethylamine	8	5982-D1	0.00515	5.0	0.103%	YES	0.103%
42	Ethylamine	10	5982-E1	0.00479	5.0	0.096%	YES	0.103%
42	Ethylamine	12	5982-F1	0.00460	5.0	0.092%	YES	0.103%
42	Ethylamine	14	5982-G1	0.00464	5.0	0.093%	YES	0.103%
42	Ethylamine	16	5982-H2	0.00473	5.0	0.095%	YES	0.103%
42	Ethylamine	2	5983-A1	0.021	5.0	0.421%		0.103%
42	Ethylamine	16	5983-H1	0.014	5.0	0.286%		0.103%
42	Ethylamine	2	5983-A2	0.00420	5.0	0.084%	YES	0.103%
42	Ethylamine	4	5983-B1	0.00474	5.0	0.095%	YES	0.103%
42	Ethylamine	6	5983-C1	0.00479	5.0	0.096%	YES	0.103%
42	Ethylamine	8	5983-D1	0.00474	5.0	0.095%	YES	0.103%
42	Ethylamine	10	5983-E1	0.00488	5.0	0.098%	YES	0.103%
42	Ethylamine	12	5983-F1	0.00487	5.0	0.097%	YES	0.103%
42	Ethylamine	14	5983-G1	0.00480	5.0	0.096%	YES	0.103%
42	Ethylamine	16	5983-H2	0.00487	5.0	0.097%	YES	0.103%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
43	N-Nitrosodimethylamine	2	5982-A1	0.00040	0.0003	134%		11.7%
43	N-Nitrosodimethylamine	16	5982-H1	0.00009	0.0003	29.3%		11.7%
43	N-Nitrosodimethylamine	2	5982-A2	0.00003	0.0003	11.4%	YES	11.7%
43	N-Nitrosodimethylamine	4	5982-B1	0.00004	0.0003	11.7%	YES	11.7%
43	N-Nitrosodimethylamine	6	5982-C1	0.00003	0.0003	11.6%	YES	11.7%
43	N-Nitrosodimethylamine	8	5982-D1	0.00004	0.0003	11.7%	YES	11.7%
43	N-Nitrosodimethylamine	10	5982-E1	0.00003	0.0003	11.3%	YES	11.7%
43	N-Nitrosodimethylamine	12	5982-F1	0.00003	0.0003	10.9%	YES	11.7%
43	N-Nitrosodimethylamine	14	5982-G1	0.00003	0.0003	11.2%	YES	11.7%
43	N-Nitrosodimethylamine	16	5982-H2	0.00003	0.0003	11.2%	YES	11.7%
43	N-Nitrosodimethylamine	2	5983-A1	0.00018	0.0003	60.6%		11.7%
43	N-Nitrosodimethylamine	16	5983-H1	0.00028	0.0003	94.0%		11.7%
43	N-Nitrosodimethylamine	2	5983-A2	0.00003	0.0003	11.4%	YES	11.7%
43	N-Nitrosodimethylamine	4	5983-B1	0.00004	0.0003	11.7%	YES	11.7%
43	N-Nitrosodimethylamine	6	5983-C1	0.00004	0.0003	11.7%	YES	11.7%
43	N-Nitrosodimethylamine	8	5983-D1	0.00003	0.0003	11.3%	YES	11.7%
43	N-Nitrosodimethylamine	10	5983-E1	0.00003	0.0003	11.4%	YES	11.7%
43	N-Nitrosodimethylamine	12	5983-F1	0.00003	0.0003	11.3%	YES	11.7%
43	N-Nitrosodimethylamine	14	5983-G1	0.00003	0.0003	11.2%	YES	11.7%
43	N-Nitrosodimethylamine	16	5983-H2	0.00003	0.0003	11.3%	YES	11.7%
44	N-Nitrosodiethylamine	2	5982-A1	0.00003	0.0001	26.5%		24.4%
44	N-Nitrosodiethylamine	16	5982-H1	0.00002	0.0001	23.3%	YES	24.4%
44	N-Nitrosodiethylamine	2	5982-A2	0.00002	0.0001	23.7%	YES	24.4%
44	N-Nitrosodiethylamine	4	5982-B1	0.00002	0.0001	24.4%	YES	24.4%
44	N-Nitrosodiethylamine	6	5982-C1	0.00002	0.0001	24.2%	YES	24.4%
44	N-Nitrosodiethylamine	8	5982-D1	0.00002	0.0001	24.3%	YES	24.4%
44	N-Nitrosodiethylamine	10	5982-E1	0.00002	0.0001	23.5%	YES	24.4%
44	N-Nitrosodiethylamine	12	5982-F1	0.00002	0.0001	22.7%	YES	24.4%
44	N-Nitrosodiethylamine	14	5982-G1	0.00002	0.0001	23.4%	YES	24.4%
44	N-Nitrosodiethylamine	16	5982-H2	0.00002	0.0001	23.3%	YES	24.4%
44	N-Nitrosodiethylamine	2	5983-A1	0.00003	0.0001	34.5%		24.4%
44	N-Nitrosodiethylamine	16	5983-H1	0.00002	0.0001	23.4%	YES	24.4%
44	N-Nitrosodiethylamine	2	5983-A2	0.00002	0.0001	23.7%	YES	24.4%
44	N-Nitrosodiethylamine	4	5983-B1	0.00002	0.0001	24.4%	YES	24.4%
44	N-Nitrosodiethylamine	6	5983-C1	0.00002	0.0001	24.4%	YES	24.4%
44	N-Nitrosodiethylamine	8	5983-D1	0.00002	0.0001	23.6%	YES	24.4%
44	N-Nitrosodiethylamine	10	5983-E1	0.00002	0.0001	23.7%	YES	24.4%
44	N-Nitrosodiethylamine	12	5983-F1	0.00002	0.0001	23.6%	YES	24.4%
44	N-Nitrosodiethylamine	14	5983-G1	0.00002	0.0001	23.2%	YES	24.4%
44	N-Nitrosodiethylamine	16	5983-H2	0.00002	0.0001	23.5%	YES	24.4%
45	N-Nitrosomethylethylamine	2	5982-A1	0.00040	0.0003	132%		9.85%
45	N-Nitrosomethylethylamine	16	5982-H1	0.00003	0.0003	10.2%		9.85%
45	N-Nitrosomethylethylamine	2	5982-A2	0.00003	0.0003	9.56%	YES	9.85%
45	N-Nitrosomethylethylamine	4	5982-B1	0.00003	0.0003	9.85%	YES	9.85%
45	N-Nitrosomethylethylamine	6	5982-C1	0.00003	0.0003	9.77%	YES	9.85%
45	N-Nitrosomethylethylamine	8	5982-D1	0.00003	0.0003	9.82%	YES	9.85%
45	N-Nitrosomethylethylamine	10	5982-E1	0.00003	0.0003	9.47%	YES	9.85%
45	N-Nitrosomethylethylamine	12	5982-F1	0.00003	0.0003	9.15%	YES	9.85%
45	N-Nitrosomethylethylamine	14	5982-G1	0.00003	0.0003	9.45%	YES	9.85%
45	N-Nitrosomethylethylamine	16	5982-H2	0.00003	0.0003	9.42%	YES	9.85%
45	N-Nitrosomethylethylamine	2	5983-A1	0.00030	0.0003	101%		9.85%
45	N-Nitrosomethylethylamine	16	5983-H1	0.00005	0.0003	17.7%		9.85%
45	N-Nitrosomethylethylamine	2	5983-A2	0.00003	0.0003	9.59%	YES	9.85%
45	N-Nitrosomethylethylamine	4	5983-B1	0.00003	0.0003	9.85%	YES	9.85%
45	N-Nitrosomethylethylamine	6	5983-C1	0.00003	0.0003	9.85%	YES	9.85%
45	N-Nitrosomethylethylamine	8	5983-D1	0.00003	0.0003	9.52%	YES	9.85%
45	N-Nitrosomethylethylamine	10	5983-E1	0.00003	0.0003	9.56%	YES	9.85%
45	N-Nitrosomethylethylamine	12	5983-F1	0.00003	0.0003	9.54%	YES	9.85%
45	N-Nitrosomethylethylamine	14	5983-G1	0.00003	0.0003	9.38%	YES	9.85%
45	N-Nitrosomethylethylamine	16	5983-H2	0.00003	0.0003	9.50%	YES	9.85%



COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
46	N-Nitrosomorpholine	2	5982-A1	0.00011	0.0006	18.3%		3.58%
46	N-Nitrosomorpholine	16	5982-H1	0.00002	0.0006	3.42%		3.58%
46	N-Nitrosomorpholine	2	5982-A2	0.00002	0.0006	3.47%	YES	3.58%
46	N-Nitrosomorpholine	4	5982-B1	0.00002	0.0006	3.58%	YES	3.58%
46	N-Nitrosomorpholine	6	5982-C1	0.00002	0.0006	3.54%	YES	3.58%
46	N-Nitrosomorpholine	8	5982-D1	0.00002	0.0006	3.56%	YES	3.58%
46	N-Nitrosomorpholine	10	5982-E1	0.00002	0.0006	3.44%	YES	3.58%
46	N-Nitrosomorpholine	12	5982-F1	0.00002	0.0006	3.32%	YES	3.58%
46	N-Nitrosomorpholine	14	5982-G1	0.00002	0.0006	3.43%	YES	3.58%
46	N-Nitrosomorpholine	16	5982-H2	0.00002	0.0006	3.42%	YES	3.58%
46	N-Nitrosomorpholine	2	5983-A1	0.00005	0.0006	8.74%		3.58%
46	N-Nitrosomorpholine	16	5983-H1	0.00004	0.0006	6.25%		3.58%
46	N-Nitrosomorpholine	2	5983-A2	0.00002	0.0006	3.48%	YES	3.58%
46	N-Nitrosomorpholine	4	5983-B1	0.00002	0.0006	3.58%	YES	3.58%
46	N-Nitrosomorpholine	6	5983-C1	0.00002	0.0006	3.58%	YES	3.58%
46	N-Nitrosomorpholine	8	5983-D1	0.00002	0.0006	3.46%	YES	3.58%
46	N-Nitrosomorpholine	10	5983-E1	0.00002	0.0006	3.47%	YES	3.58%
46	N-Nitrosomorpholine	12	5983-F1	0.00002	0.0006	3.46%	YES	3.58%
46	N-Nitrosomorpholine	14	5983-G1	0.00002	0.0006	3.41%	YES	3.58%
46	N-Nitrosomorpholine	16	5983-H2	0.00002	0.0006	3.45%	YES	3.58%
47	Tributyl phosphate	2	5982-A1	0.00016	0.20	0.081%	YES	0.084%
47	Tributyl phosphate	16	5982-H1	0.00014	0.20	0.072%	YES	0.084%
47	Tributyl phosphate	2	5982-A2	0.00015	0.20	0.073%	YES	0.084%
47	Tributyl phosphate	4	5982-B1	0.00015	0.20	0.075%	YES	0.084%
47	Tributyl phosphate	6	5982-C1	0.00016	0.20	0.080%	YES	0.084%
47	Tributyl phosphate	8	5982-D1	0.00017	0.20	0.084%	YES	0.084%
47	Tributyl phosphate	10	5982-E1	0.00015	0.20	0.076%	YES	0.084%
47	Tributyl phosphate	12	5982-F1	0.00015	0.20	0.073%	YES	0.084%
47	Tributyl phosphate	16	5982-H2	0.00015	0.20	0.076%	YES	0.084%
47	Tributyl phosphate	2	5983-A1	0.00014	0.20	0.071%	YES	0.084%
47	Tributyl phosphate	16	5983-H1	0.00014	0.20	0.071%	YES	0.084%
47	Tributyl phosphate	2	5983-A2	0.00013	0.20	0.067%	YES	0.084%
47	Tributyl phosphate	4	5983-B1	0.00014	0.20	0.069%	YES	0.084%
47	Tributyl phosphate	6	5983-C1	0.00014	0.20	0.070%	YES	0.084%
47	Tributyl phosphate	8	5983-D1	0.00015	0.20	0.074%	YES	0.084%
47	Tributyl phosphate	10	5983-E1	0.00015	0.20	0.074%	YES	0.084%
47	Tributyl phosphate	12	5983-F1	0.00015	0.20	0.073%	YES	0.084%
47	Tributyl phosphate	14	5983-G1	0.00015	0.20	0.073%	YES	0.084%
47	Tributyl phosphate	16	5983-H2	0.00014	0.20	0.071%	YES	0.084%
48	Dibutyl butylphosphonate	2	5982-A1	0.00008	0.007	1.20%	YES	1.46%
48	Dibutyl butylphosphonate	16	5982-H1	0.00007	0.007	1.05%	YES	1.46%
48	Dibutyl butylphosphonate	2	5982-A2	0.00008	0.007	1.07%	YES	1.46%
48	Dibutyl butylphosphonate	4	5982-B1	0.00008	0.007	1.10%	YES	1.46%
48	Dibutyl butylphosphonate	6	5982-C1	0.00008	0.007	1.17%	YES	1.46%
48	Dibutyl butylphosphonate	8	5982-D1	0.00009	0.007	1.24%	YES	1.46%
48	Dibutyl butylphosphonate	10	5982-E1	0.00008	0.007	1.12%	YES	1.46%
48	Dibutyl butylphosphonate	12	5982-F1	0.00008	0.007	1.08%	YES	1.46%
48	Dibutyl butylphosphonate	16	5982-H2	0.00008	0.007	1.11%	YES	1.46%
48	Dibutyl butylphosphonate	2	5983-A1	0.00010	0.007	1.39%	YES	1.46%
48	Dibutyl butylphosphonate	16	5983-H1	0.00010	0.007	1.40%	YES	1.46%
48	Dibutyl butylphosphonate	2	5983-A2	0.00009	0.007	1.30%	YES	1.46%
48	Dibutyl butylphosphonate	4	5983-B1	0.00009	0.007	1.35%	YES	1.46%
48	Dibutyl butylphosphonate	6	5983-C1	0.00010	0.007	1.36%	YES	1.46%
48	Dibutyl butylphosphonate	8	5983-D1	0.00010	0.007	1.45%	YES	1.46%
48	Dibutyl butylphosphonate	10	5983-E1	0.00010	0.007	1.46%	YES	1.46%
48	Dibutyl butylphosphonate	12	5983-F1	0.00010	0.007	1.43%	YES	1.46%
48	Dibutyl butylphosphonate	14	5983-G1	0.00010	0.007	1.43%	YES	1.46%
48	Dibutyl butylphosphonate	16	5983-H2	0.00010	0.007	1.40%	YES	1.46%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
51	Pyridine	2	5982-A1	0.00256	1.0	0.256%		0.15%
51	Pyridine	16	5982-H1	0.00277	1.0	0.277%		0.15%
51	Pyridine	2	5982-A2	0.00141	1.0	0.141%	YES	0.15%
51	Pyridine	4	5982-B1	0.00140	1.0	0.140%	YES	0.15%
51	Pyridine	6	5982-C1	0.00139	1.0	0.139%	YES	0.15%
51	Pyridine	8	5982-D1	0.00142	1.0	0.142%	YES	0.15%
51	Pyridine	10	5982-E1	0.00137	1.0	0.137%	YES	0.15%
51	Pyridine	12	5982-F1	0.00135	1.0	0.135%	YES	0.15%
51	Pyridine	14	5982-G1	0.00140	1.0	0.140%	YES	0.15%
51	Pyridine	16	5982-H2	0.00141	1.0	0.141%	YES	0.15%
51	Pyridine	2	5983-A1	0.00195	1.0	0.195%		0.15%
51	Pyridine	16	5983-H1	0.00200	1.0	0.200%		0.15%
51	Pyridine	2	5983-A2	0.00141	1.0	0.141%	YES	0.15%
51	Pyridine	4	5983-B1	0.00133	1.0	0.133%	YES	0.15%
51	Pyridine	6	5983-C1	0.00148	1.0	0.148%	YES	0.15%
51	Pyridine	8	5983-D1	0.00145	1.0	0.145%	YES	0.15%
51	Pyridine	10	5983-E1	0.00146	1.0	0.146%	YES	0.15%
51	Pyridine	12	5983-F1	0.00146	1.0	0.146%	YES	0.15%
51	Pyridine	14	5983-G1	0.00144	1.0	0.144%	YES	0.15%
51	Pyridine	16	5983-H2	0.00141	1.0	0.141%	YES	0.15%
52	2,4-Dimethylpyridine	2	5982-A1	0.00270	0.50	0.540%		0.22%
52	2,4-Dimethylpyridine	16	5982-H1	0.00266	0.50	0.532%		0.22%
52	2,4-Dimethylpyridine	2	5982-A2	0.00104	0.50	0.208%	YES	0.22%
52	2,4-Dimethylpyridine	4	5982-B1	0.00104	0.50	0.207%	YES	0.22%
52	2,4-Dimethylpyridine	6	5982-C1	0.00103	0.50	0.206%	YES	0.22%
52	2,4-Dimethylpyridine	8	5982-D1	0.00105	0.50	0.210%	YES	0.22%
52	2,4-Dimethylpyridine	10	5982-E1	0.00101	0.50	0.203%	YES	0.22%
52	2,4-Dimethylpyridine	12	5982-F1	0.00099	0.50	0.199%	YES	0.22%
52	2,4-Dimethylpyridine	14	5982-G1	0.00104	0.50	0.207%	YES	0.22%
52	2,4-Dimethylpyridine	16	5982-H2	0.00104	0.50	0.209%	YES	0.22%
52	2,4-Dimethylpyridine	2	5983-A1	0.00217	0.50	0.434%		0.22%
52	2,4-Dimethylpyridine	16	5983-H1	0.00235	0.50	0.470%		0.22%
52	2,4-Dimethylpyridine	2	5983-A2	0.00104	0.50	0.208%	YES	0.22%
52	2,4-Dimethylpyridine	4	5983-B1	0.00098	0.50	0.196%	YES	0.22%
52	2,4-Dimethylpyridine	6	5983-C1	0.00109	0.50	0.218%	YES	0.22%
52	2,4-Dimethylpyridine	8	5983-D1	0.00107	0.50	0.214%	YES	0.22%
52	2,4-Dimethylpyridine	10	5983-E1	0.00107	0.50	0.215%	YES	0.22%
52	2,4-Dimethylpyridine	12	5983-F1	0.00108	0.50	0.216%	YES	0.22%
52	2,4-Dimethylpyridine	14	5983-G1	0.00107	0.50	0.213%	YES	0.22%
52	2,4-Dimethylpyridine	16	5983-H2	0.00104	0.50	0.208%	YES	0.22%

## Appendix E

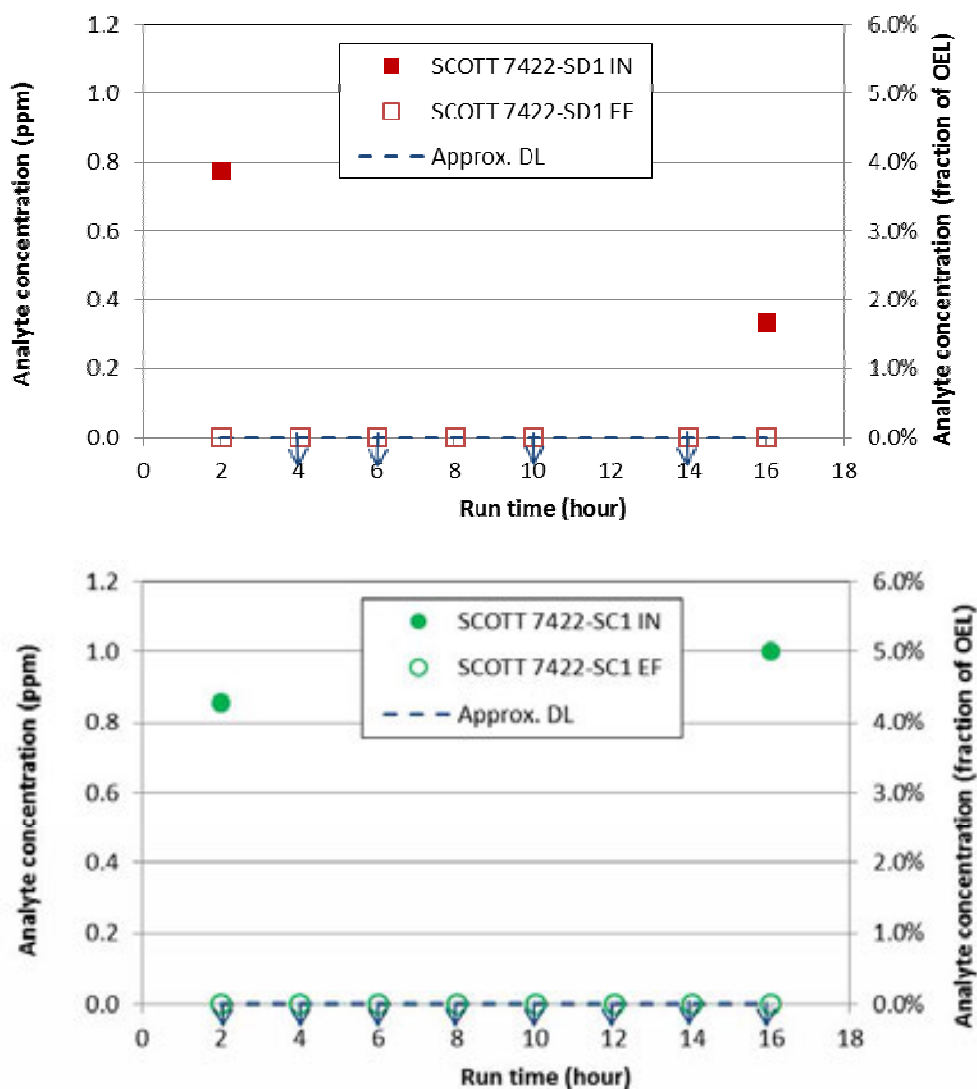
### **Plots of Other COPCs with Significant (2-10% of OEL) Detected Values**



## Appendix E

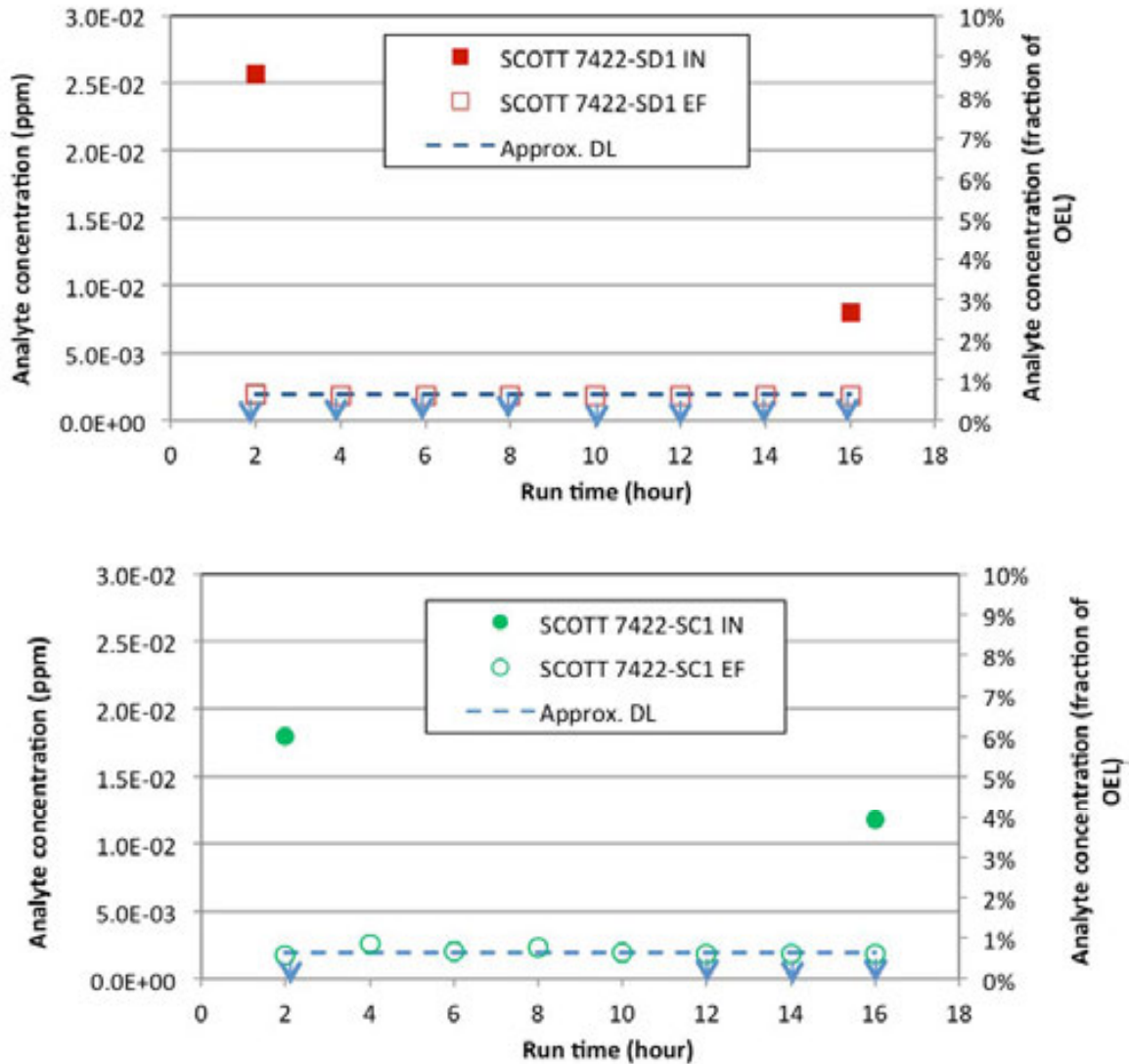
### Plots of Other COPCs with Significant (2-10% of OEL) Detected Values

**1-Butanol** (see Figure E.1) – The detection limit (DL) for 1-butanol corresponds to approximately 0.005% of the OEL. All four respirator inlet measurements were above the DL for 1-butanol but were less than 10% of its OEL. The final inlet measurement for SCOTT 7422-SC1 had the highest measured value at 5.0% of the OEL. The outlet concentrations for both cartridges were at or near the DL, with only three measurements for SCOTT 7422-SD1 reaching up to 0.008% of the OEL, indicating no evidence of breakthrough.



**Figure E.1.** Plot of Measured 1-Butanol 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 DL or RL.

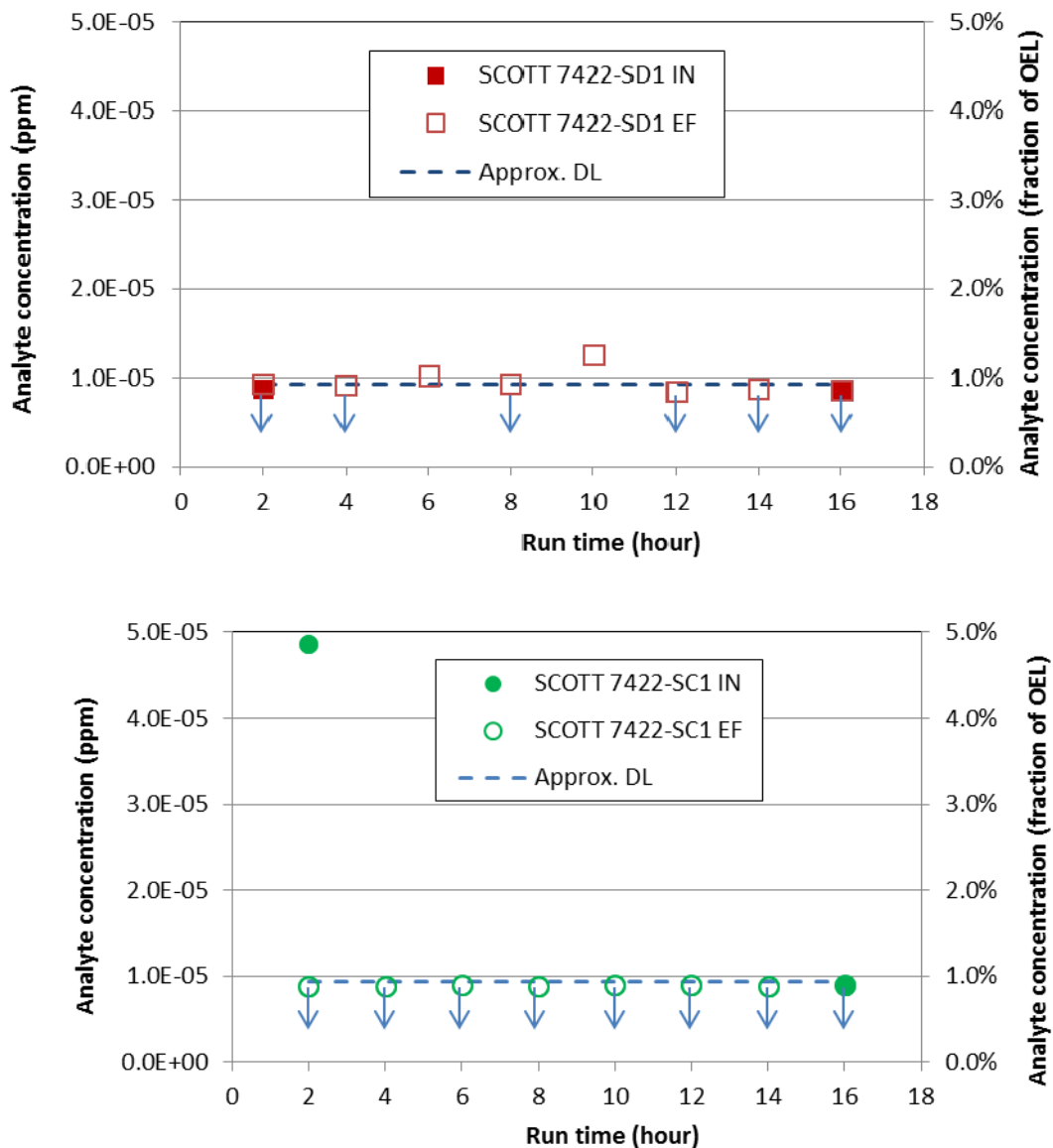
**Formaldehyde** (see Figure E.2) – The DL for formaldehyde corresponds to approximately 0.63% of its OEL. All inlet and outlet values measured for both respirator cartridges were less than 10% of the OEL for formaldehyde—specifically less than 8.6%. The first inlet values for both respirator cartridges were the highest of all of the measurements (8.56% and 6.0% of the OEL, respectively). Inlet measurements were lower at the end of each campaign (2.66% and 3.94% of the OEL, respectively). All outlet measurements were at or slightly above the DL, with only four measurements for SCOTT 7422-SC1 reaching up to 0.85% of the OEL. No evidence of breakthrough was observed during the testing period.



**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 DL or RL.

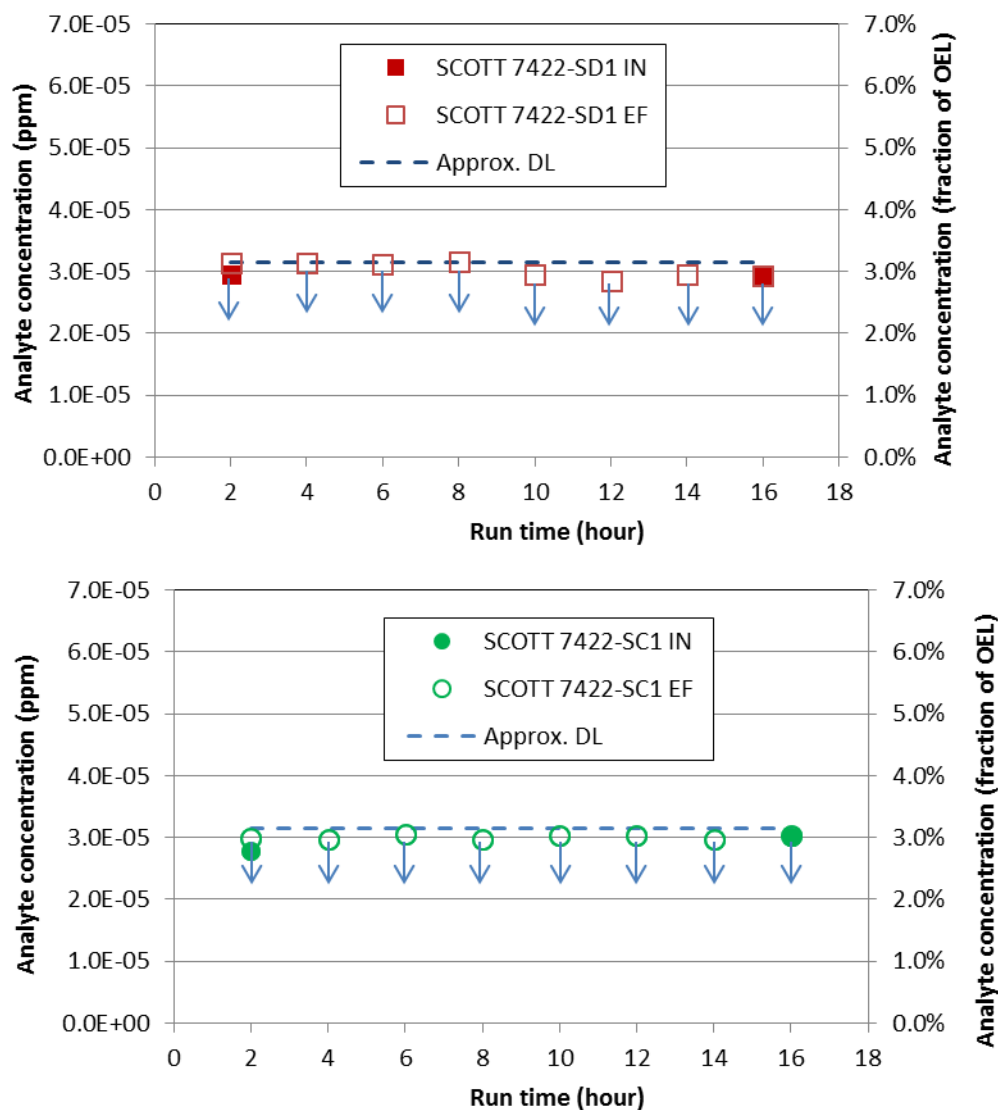


**Furan** (see Figure E.3) – The DL for furan corresponds to approximately 0.93% of its OEL. All inlet and outlet values measured for the two respirator cartridges were less than 10% of the OEL for furan—specifically less than 5%. The first inlet value for the SCOTT 7422-SC1 cartridge measured the highest concentration at 4.86% of OEL. Only two outlet values for SCOTT 7422-SD1 were above the DL, reaching up to 1.3% of OEL, which is much below 10% of OEL. These elevated outlet concentrations do not support a conclusion of respirator cartridge breakthrough.



**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 DL or RL.

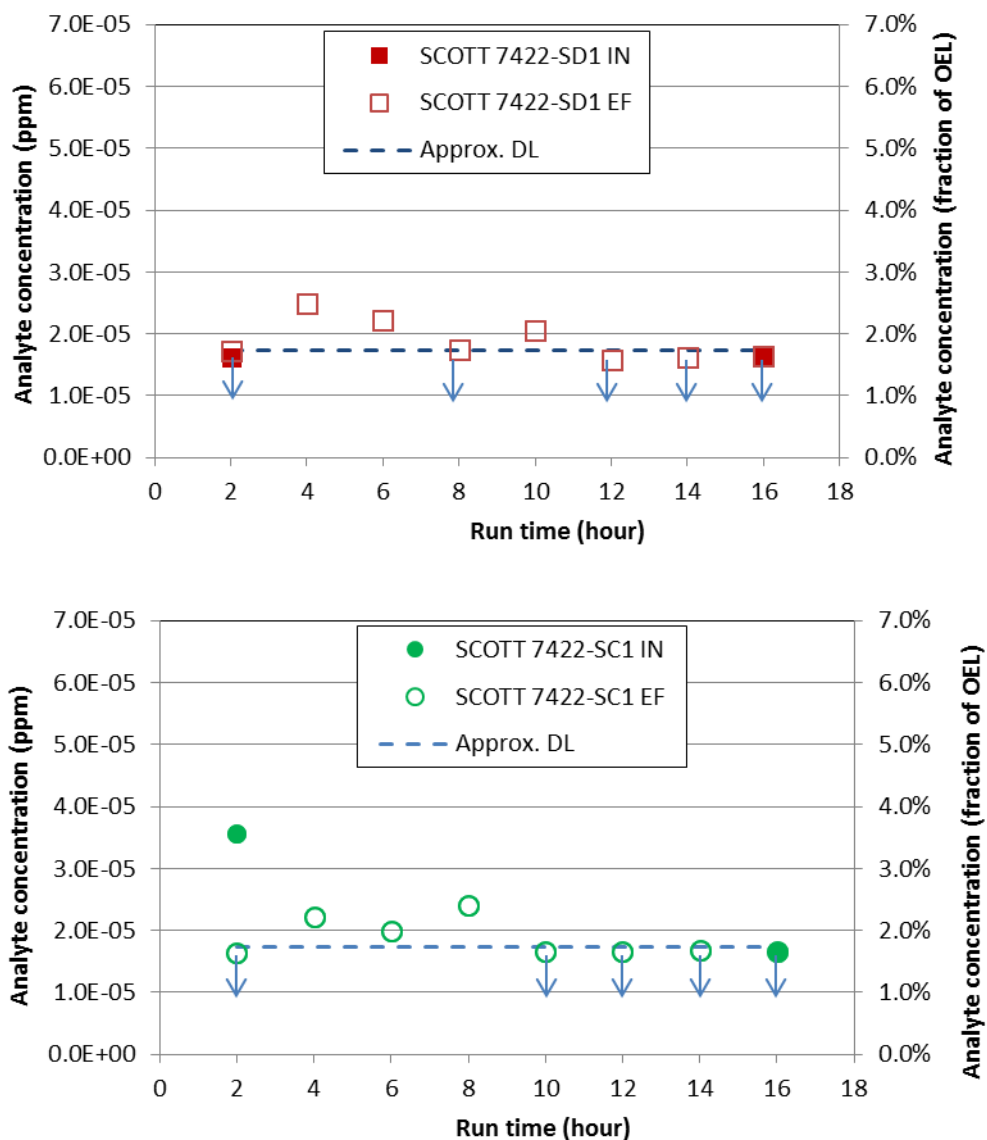
**2,5-Dimethylfuran** (see Figure 4) – The DL for 2,5-Dimethylfuran corresponds to approximately 3.16 % of the OEL for 2,5-Dimethylfuran. All inlet concentrations measured for both cartridges were lower than the DL. All outlet values measured for the two respirator cartridges were less than the DL. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.



**Figure E.4.** 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 DL or RL.

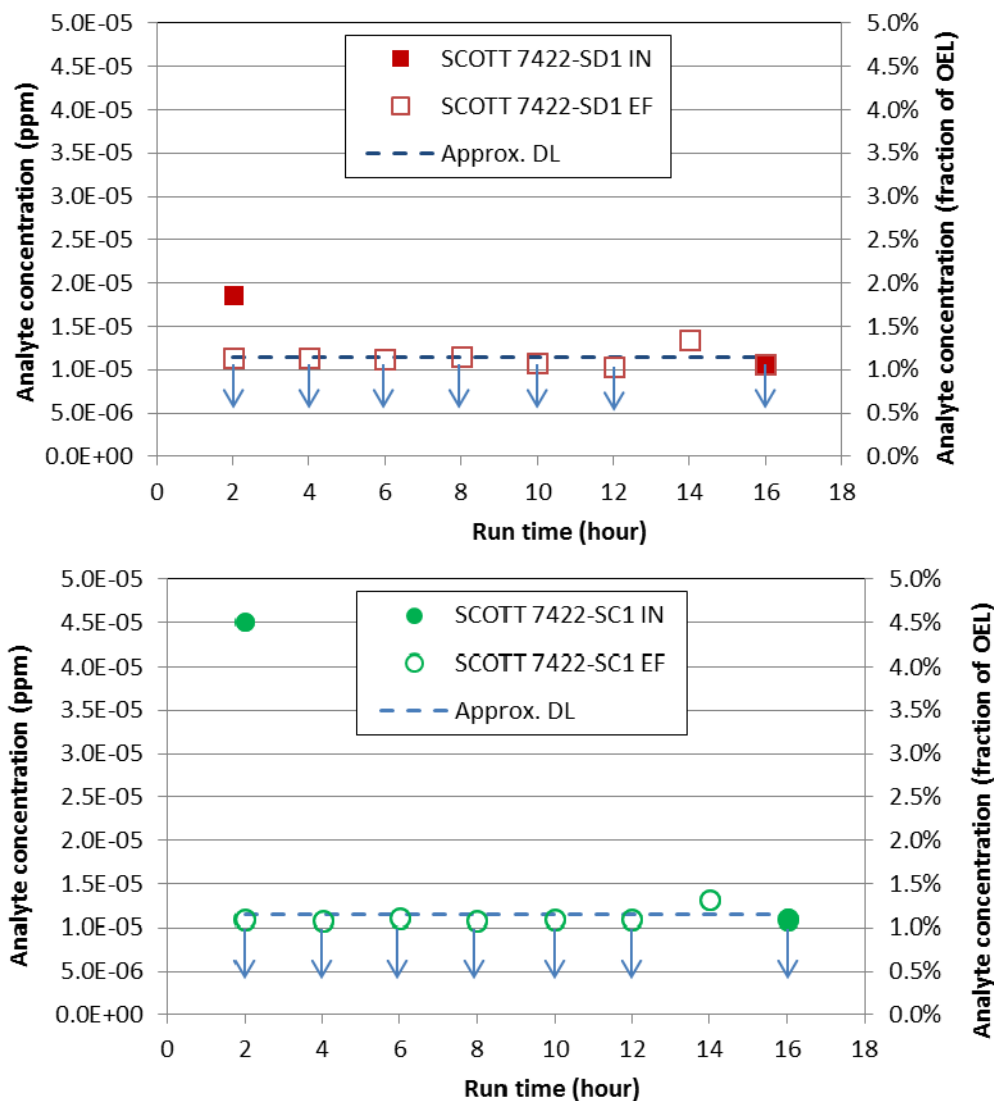


**2-Pentylfuran** (see Figure E.5) – The DL for 2-Pentylfuran corresponds to approximately 1.74% of the OEL. All values (inlet and outlet) were less than 10% of the OEL for 2-Pentylfuran—specifically, less than 3.6%. Multiple inlet and outlet values were greater than the DL, but all of these except one inlet (3.6%) were less than 2.5% of the OEL. The general trends of the data do not support evidence of breakthrough because there was no steady increase in outlet concentrations with time. The decreasing outlet concentrations could indicate a 2-Pentylfuran background concentration in the system. Even if the outlet readings above the DL resulted from some breakthrough mechanism, all of the measurements were below 3% of the OEL.



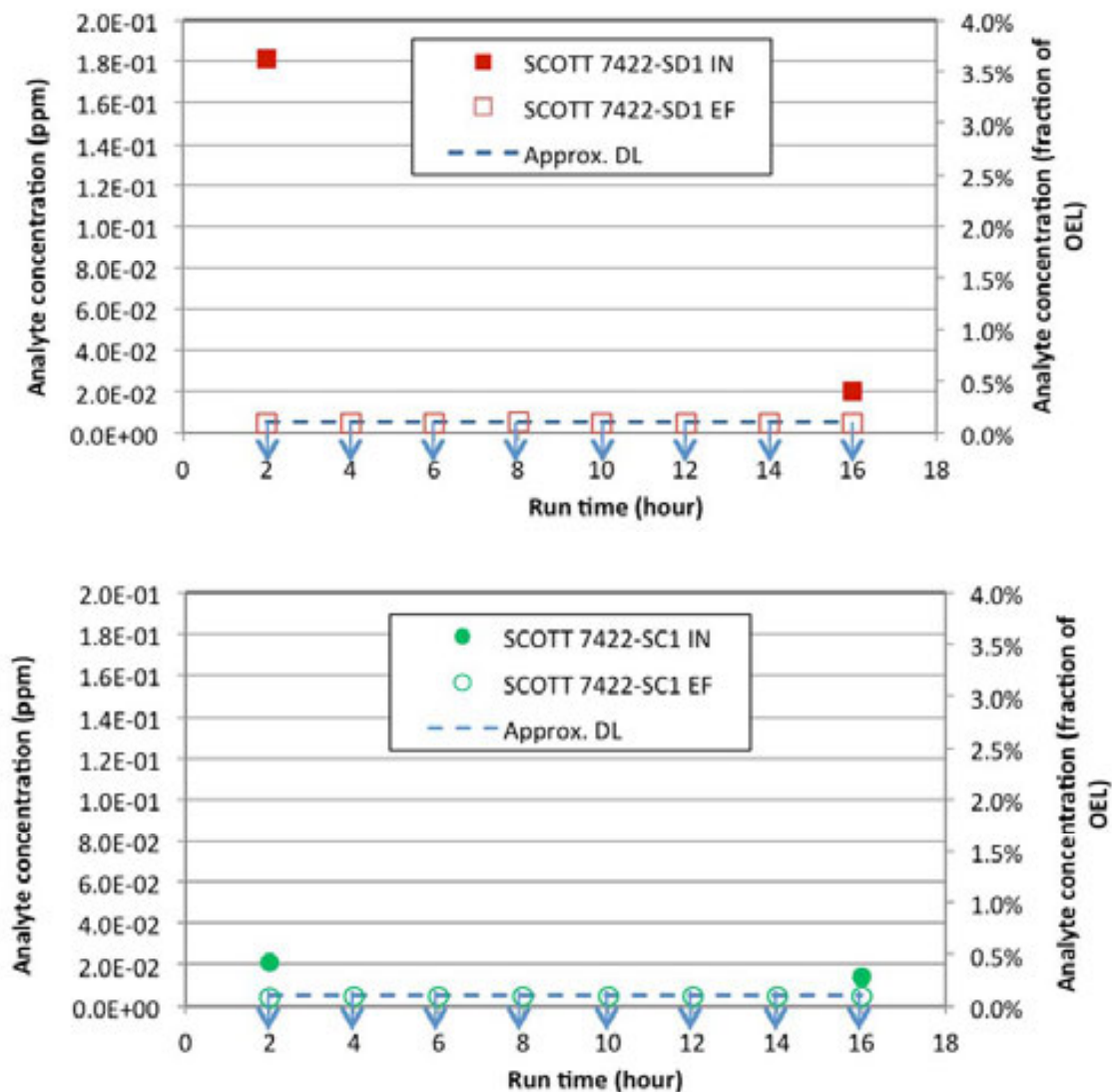
**Figure E.5.** Plot of Measured 2-Pentylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

**2-Heptylfuran** (see Figure E.6) – The DL for 2-Heptylfuran corresponds to approximately 1.15% of the OEL for 2-Heptylfuran. The first two initial inlet concentrations for the two respirator cartridges had measurements above the DL (1.87% and 4.51% of the OEL, respectively), whereas the inlet measurements after 16 hours for both cartridges were less than the DL. Outlet measurements at 14 hours for each cartridge were slightly above the DL at 1.35% and 1.32% of OEL, respectively. All other outlet measurements were below the DL. Therefore, no evidence of breakthrough is observed in the data.



**Figure E.6.** Plot of Measured 2-Heptylfuran 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 DL or RL.

**Ethylamine** (see Figure E.7) – The DL for ethylamine corresponds to approximately 0.10% of the OEL for ethylamine. All inlet concentrations were above the DL. The the initial inlet concentration for the SCOTT 7422-SD1 cartridge was 3.63% of the OEL. All other inlet concentrations for both cartridges were substantially lower, ranging from 0.29 to 0.42% of the OEL. All outlet measurements were below DLs. Therefore, no evidence of breakthrough is observed in the data.



**Figure E.7.** Plot of Measured Ethylamine 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 DL or RL.



## 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-BY-108 (BY-108) and its exhaust system were obtained via a TWINS query on June 20, 2016, for TWINS HS,<sup>1</sup> 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, 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 were:

- 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).

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<sup>1</sup> No data have been added to TWINS HS since April 2005, so the June 2016 download does not require updating.

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 Chemical ID consisted of a Chemical Abstracts Service number followed by M, the molecular weight of the identified chemical was added to the data record, the 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/m<sup>3</sup> 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-25880,<sup>1</sup> 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 BY-108 headspace, only headspace measurements were appropriate. This required no scrutiny for the TWINS HS or SWIHD HS databases because they were headspace only for BY Farm tanks, but the TWINS IH database required sorting so that only headspace data were used. The BY Farm data in the TWINS IH database were all attributed to individual tank locations (i.e., there were no Location designations such as “Inside Farm”, “Outside Farm”, etc.). Of the data that had BY-108 as a Location, all had Survey Titles that included phrases such as “BY-108 BF COPC Sampling,” “BY-108 COPC Sampling,” or “BY-108 BF COPC Make-up.” Because the Location was specified as BY-108, and many of the surveys contained BF (i.e., “Breather Filter”) in the title, all of the TWINS IH BY-108 data were considered to be from the tank headspace.

Maximum and average<sup>2</sup> headspace concentrations were found for each analyte for the combined TWINS IH and SWIHD HS databases.<sup>(3)</sup> 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 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.

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<sup>1</sup> Hoppe, EW, LA Mahoney, J Cole, and KS Rohlfling. 2016. *Hanford Tank Vapors COPCs Update*. PNNL-25880, Pacific Northwest National Laboratory, Richland, Washington.

<sup>2</sup> Arithmetic average.

<sup>3</sup> Because the SWIHD HS database contained no BY-108 data, the TWINS IH data were the only concentrations present in the two-database combination.



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 non-reports in the databases had concentrations equal to RLs of the measurements. 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 BY-108 Measurements**

COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements <sup>1</sup>					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 <sup>2</sup> (%OEL)
<b>Inorganics</b>													
1. Ammonia	7064-41-7	-28	Poling et al., 2007 <sup>2</sup>	25 ppm	1	644	644	2576%	2576%	1915%	1731%	1912%	2.35% (RL)
2. Nitrous Oxide	10024-97-2	-127	Poling et al., 2007	50 ppm	1	1.8	1.8	3.6%	3.6%	Not Measured			
					40	831	545	1662%	1662%				
3. Mercury	7439-97-6	674	Poling et al., 2007	0.025 mg/m <sup>3</sup>	1	0.0161	0.0161	64%	64%	52.0%	48.9%	13.5%	7.43% (RL)
<b>Hydrocarbons</b>													
4. 1,3-Butadiene	106-99-0	24	Poling et al., 2007	1 ppm	2	3.38	1.7	318%	170%	138%	119%	268%	2.02% (RL)
					32	3.38	0.174*	308%	27%*				
5. Benzene	71-43-2	176	Poling et al., 2007	0.5 ppm	4	<RL	<RL	<RL	<RL	0.85%	0.72%	0.049%	0.024%
6. Biphenyl	92-52-4	491	Poling et al., 2007	0.2 ppm	4	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.048-0.092%
<b>Alcohols</b>													
7. 1-Butanol	71-36-3	243	NIOSH	20 ppm	4	4.32	3.81	22%	19%	5.02%	3.72%	0.008%	0.005%
					78	63.5	14.6	318%	73%				
8. Methanol	67-56-1	148	Poling et al., 2007	200 ppm	1	<RL	<RL	<RL	<RL	Not Measured			
<b>Ketones</b>													
9. 2-Hexanone	591-78-6	262	NIOSH	5 ppm	4	<RL	0.0281	<RL	0.56%	0.37%	0.34%	<DL	0.003%
10. 3-Methyl-3-buten-2-one	814-78-8	208	CRC Handbook 1983 <sup>4</sup>	0.02 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC <sup>3</sup>			
11. 4-Methyl-2-hexanone	105-42-0	282	Predicted ACD/Labs <sup>5</sup>	0.5 ppm	0	n/a	n/a	n/a	n/a	0.27%	0.24%	<DL	0.030%
12. 6-Methyl-2-heptanone	918-68-7	333	Predicted ACD/Labs	8 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
13. 3-Buten-2-one	78-84-4	179	CRC Handbook 1989	0.2 ppm	4	<RL	<RL	<RL	<RL	23.5%	11.0%	1.86%	0.090%
<b>Aldehydes</b>													
14. Formaldehyde	50-00-0	-6	NIOSH	0.3 ppm	1	0.00381	0.00381	1.3%	1.3%	8.56%	5.29%	0.85%	0.63% (RL)
15. Acetaldehyde	75-07-0	69	NIOSH	25 ppm	1	2.82	2.82	11%	11%	1.12%	1.08%	0.78%	0.005% (RL)
16. Butanal	123-72-8	167	Oxford safety data <sup>6</sup>	25 ppm	5	0.0727	0.0566	0.29%	0.23%	0.13%	0.094%	0.001%	0.001%
17. 2-Methyl-2-butanal	1115-11-3	244	United Nations <sup>7</sup>	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 BY-108 Measurements (continued)**

COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements <sup>a</sup>					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 <sup>10</sup> (%OEL)
Furans													
19 Furan	110-00-9	88	Pollig et al., 2007	1 ppb	5	<RL 547	23.1* 110*	<RL 54700%	23.0%* 11000%*	4.85%	1.87%	1.25%	0.93%
20 2,3-Dihydrofuran	1191-99-7	130	Alfa Aesar <sup>b</sup>	1 ppb	1	<RL	<RL	<RL	<RL	74.5%	36.9%	<DL	1.81%
21 2,5-Dihydrofuran	1708-29-8	152	Aldrich <sup>b</sup>	1 ppb	5	<RL	<RL	<RL	<RL	20.7%	13.4%	3.09%	2.31%
22 2-Methylfuran	534-22-5	147	Oxford safety data	1 ppb	5	<RL	<RL	<RL	<RL	12.3%	10.7%	4.37%	1.98%
23 2,5-Dimethylfuran	625-86-5	199	Alfa Aesar	1 ppb	1	<RL	<RL	<RL	<RL	<DL	<DL	<DL	3.16%
24 2-Ethyl-5-methylfuran	1705-52-2	245	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
25 4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9	328	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
26 3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4	306	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
27 2-Pernylfuran	3777-69-3	333	Alfa Aesar	1 ppb	1	<RL	<RL	<RL	<RL	3.57%	2.12%	2.48%	1.74%
28 2-Heptylfuran	3777-71-7	410	Alfa Aesar	1 ppb	1	<RL 61.2	<RL 29.7	<RL 5120%	<RL 2970%	4.51%	2.14%	1.35%	1.15%
29 2-Propylfuran	4125-91-8	231	Alfa Aesar	1 ppb	1	<RL	<RL	<RL	<RL	11.1%	4.71%	<DL	2.82%
30 2-Octylfuran	4179-38-8	452	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
31 2-(3-Cyano-3-phenylprop-1-enyl)furan	717-21-5	605	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
32 2-(2-Methyl-6-oxohexyl)furan	51595-87-0	Not available	Not available	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Phthaloxides													
33 Diethylenichalare	84-66-2	563	NIOSH	5 mg/m <sup>3</sup>	4	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.017-0.041%

**Table F.1. COPC Comparison to Historical BY-108 Measurements (continued)**

COPC Number and Name	Historical Measurements <sup>1</sup>					Measurements in this study							
	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Number of Values	Maximum Value	Average Value	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL <sup>10</sup> (%OEL)
Nitriles													
34	Acetonitrile	179	NIOSH	20 ppm	5	<RL	0.116	<RL	0.6%	0.77%	0.60%	9.45%	0.001%
35	Propanenitrile	107-12-0	NIOSH	6 ppm	4	<RL	<RL	<RL	<RL	0.39%	0.32%	0.90%	0.003%
36	Butanenitrile	109-74-0	NIOSH	8 ppm	4	<RL	<RL	<RL	<RL	0.23%	0.17%	0.004%	0.003%
37	Pentanenitrile	110-59-8	Alfa Aesar	6 ppm	4	<RL	<RL	<RL	<RL	0.19%	0.11%	0.008%	0.003%
38	Hexanenitrile	628-73-9	Predicted ACD/Labs	6 ppm	4	<RL	<RL	<RL	<RL	0.046%	0.035%	<DL	0.003%
39	Heptanenitrile	629-08-3	Alfa Aesar	6 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
40	2-Methylenebutanenitrile	Not available	Not available	0.3 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
41	2,4-Pentadienenitrile	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	Poling et al., 2007	5 ppm	1	<RL	<RL	<RL	<RL	3.63%	1.18%	<RL	0.10% (RL)
Nitrosamines													
43	N-Nitrosodimethylamine	62-75-9	NIOSH	0.3 ppb	1	0.238	0.238	79%	79%	134%	79.5%	<RL	11.7% (RL)
44	N-Nitrosodiethylamine	55-18-5	Oxford safety data	0.1 ppb	1	0.00809	0.00809	8.1%	8.1%	34.5%	27.0%	<RL	24.4% (RL)
45	N-Nitrosomethylethylamine	10595-95-6	Predicted ACD/Labs	0.3 ppb	1	0.0239	0.0239	8.0%	8.0%	132%	65.1%	<RL	9.85% (RL)
46	N-Nitrosomorpholine	59-89-2	Oxford safety data	0.6 ppb	1	0.0482	0.0482	8.0%	8.0%	18.3%	9.2%	<RL	3.58% (RL)
Organophosphates													
47	Tributyl phosphate	126-73-8	NIOSH	0.2 ppm	4	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.084%
48	Diethyl butylphosphonate	78-46-5	Predicted ACD/Labs	0.007 ppm	4	<RL	<RL	<RL	<RL	<DL	<DL	<DL	1.46%
Halogenated													
49	Chlorinated Biphenyls	Varies	Varies	3 mg/m <sup>3</sup>	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
50	2-Fluoropropene	1184-60-7	SynQuest <sup>11</sup>	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			



**Table F.1. COPC Comparison to Historical BY-108 Measurements (continued)**

COPC Number and Name		CAS Number	Boiling point (°F)	Boiling Point Source	Occupational Exposure Limits (OEL)	Historical Measurements <sup>1</sup>					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 <sup>13</sup> (NOEL)
Pyridines														
51	Pyridine	110-86-1	240	NIOSH	1 ppm	5	<RL	<RL	<RL	<RL	0.28%	0.23%	<DL	0.15% (RL)
52	2,4-Dimethylpyridine	108-47-4	318	Alfa Aesar	0.5 ppm	5	<RL	<RL	<RL	<RL	0.54%	0.49%	<DL	0.22% (RL)
Oxamionitriles														
53	Methyl nitrite	624-91-9	10	Oxford safety data	0.1 ppm	0	n/a	n/a	n/a	n/a			Not Detected - TIC	
54	Butyl nitrite	544-16-1	172	Alfa Aesar	0.1 ppm	0	n/a	n/a	n/a	n/a			Not Detected - TIC	
Oxamionitrates														
55	Butyl nitrate	928-45-0	276	Predicted ACD/Labs	2.5 ppm	0	n/a	n/a	n/a	n/a			Not Detected - TIC	
56	1,4-Butanediol, dinitrate	3457-91-8	499	Predicted ACD/Labs	0.05 ppm	0	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			Not Detected - TIC	
58	1,2,3-Propanetriol, 1,3-dinitrate	623-87-0	338	Predicted ACD/Labs	0.05 ppm	0	n/a	n/a	n/a	n/a			Not Detected - TIC	
Isocyanates														
59	Methyl isocyanate	624-83-9	103	NIOSH	20 ppb	0	n/a	n/a	n/a	n/a			Not Detected - TIC	

<sup>1</sup> Historical data from TWINS 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 TWINS headspace database, all samples earlier than May 2.

\* 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 (SWH and TWINS Industrial Hygiene) were included. Italics mean that the pre-2005 TWINS headspace data were also included.

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

<sup>2</sup> Poling, B. E.; Prausnitz, J. M.; O'Connell, J. P. The Properties of Gases and Liquids. McGraw-Hill, 2007.

<sup>3</sup> NIOSH: National Institute of Occupational Safety and Health

<sup>4</sup> CRC Handbook of Chemistry and Physics, CRC Press, 1983.

<sup>5</sup> ACD/Labs software <http://www.acdlabs.com/products/percepta/predictors.php>

<sup>6</sup> Oxford safety data from The Physical and Theoretical Chemistry Laboratory of Oxford University

<sup>7</sup> Food and Agriculture Organization of the United Nations

<sup>8</sup> Alfa Aesar: <https://www.alfa.com/>

<sup>9</sup> Aldrich: <https://www.aldrich.com/>

<sup>10</sup> OSHA: Occupational Safety and Health Administration

<sup>11</sup> SynQuest: <https://synquestlabs.com/product/4/83330.html>

<sup>12</sup> TIC: Tentatively Identified Compounds that were not observed in this study using the specified analytical method.

<sup>13</sup> 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.







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