PNNL-26131 Rev. 1

Pacific Northwest
NATIONAL LABORATORY

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

July 2020

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U.S. DEPARTMENT OF ENERGY

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

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

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Pacific Northwest National Laboratory
Richland, Washington 99352

Executive Summary

Washington River Protection Solutions (WRPS) conducted tests on 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[1] for APRs used to protect workers when exposed to a mixture of Chemicals of Potential Concern (COPCs) from vapors emanating from the headspace of tank A-101 on the Hanford Site. The Occupational Safety and Health Administration (OSHA) identifies cartridge testing as a valid approach for establishing a cartridge change schedules.[3] Testing is commonly applied in situations where mixtures of COPCs exist and where other approaches, such as manufacturer recommendations and modeling, are less reliable. The tests were designed and conducted to ensure measurement and/or control of the key variables OSHA identified as important to estimate cartridge service life, including temperature, humidity, COPC concentration, breathing rate, and cartridge adsorption capacity.

Testing was conducted over a period from July 22–24, 2016, using headspace vapors from Hanford tank A-101 under static conditions[2] fed to a respirator cartridge test stand developed by WRPS in collaboration with HiLine Engineering (Richland, Washington). Multipurpose respirator cartridges, SCOTT 7422-SD1 and 7422-SC1 (SCOTT Safety, Monroe, North Carolina) were assessed on separate days with A-101 headspace vapors. Sample media (sorbent tubes) were used to collect samples of the vapor stream entering and exiting the respirator cartridge and were subsequently analyzed for COPC concentrations. Pacific Northwest National Laboratory was tasked with conducting an independent analysis of the analytical results and making recommendations based on the results for respiratory cartridge performance and service life. Key conclusions from the assessment of the 59 COPCs in this study are described below:

- Based on measured cartridge inlet vapor concentrations from tank A-101 headspace, both ammonia and N-Nitrosodimethylamine (NDMA) exceeded their Occupational Exposure Limits (OEL).[3] These measurements were generally consistent with maximum A-101 headspace measurements previously obtained for these two compounds.
- Ammonia had respirator cartridge outlet concentrations that exceeded 10% of the OEL for both cartridges tested, indicating breakthrough for each. For the SCOTT 7422-SD1 cartridge, ammonia appeared to breakthrough above 10% of its OEL after 2 hours. For the SCOTT 7422-SC1 cartridge, ammonia breakthrough appeared to occur after 8 hours.

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[1] "Adequate performance" refers to being below the breakthrough criteria used in this analysis. The breakthrough criteria for this analysis is having sustained cartridge outlet concentrations above 10% of the compound's OEL. For some COPCs, an alternate threshold has been applied when necessary due to higher detection limit (DL)/reporting limit (RL) values for specific compounds. Ultimately, Industrial Hygiene professionals will use these results along with specific hazard assessments to determine service life, change schedules, and cartridge selection needed to provide the necessary performance for specific applications in Hanford Tank Farms.

[2] These tests were conducted under static conditions absent waste-disturbing activities in the subject tank or tank farm.

[3] OELs 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, and American Conference of Governmental Industrial Hygienists), or if no U.S. OEL exists, standard toxicological practices are applied to develop OELs based on the best available science. The OEL for NDMA was established in 2005 based on the MAK (Maximale Arbeitsplatzkonzentration) Commission standard adopted in Europe.

- Despite respirator inlet measurements for NDMA that were in excess of its OEL, all corresponding outlet measurements, from both respirator cartridges, were below the analytical DL[4] for the duration of the testing (i.e., 16 hours), indicating no evidence of breakthrough. The analytical DL for NDMA corresponds to ~12% of its OEL.
- The inlet vapor concentration of two additional COPCs—mercury and N-Nitrosodiethylamine—exceeded 10% of their OEL. These measurements were generally consistent with previously obtained average and maximum A-101 headspace measurements. The outlet concentrations of both COPCs were consistently less than their DLs, indicating no breakthrough of the cartridges during the testing period.
- All inlet and outlet measurements for N-Nitrosomethylethylamine (NMEA) from both respirator cartridges were below the analytical DL for the duration of the testing (i.e.,16 hours), indicating no breakthrough for either cartridge. The analytical DL for this COPC corresponds to ~11% of its OEL.
- The inlet vapor concentrations of all other measured COPCs were below 10% of the OEL. For the majority of COPCs, the inlet vapor concentrations during cartridge testing and average measurements from historical A-101 headspace sampling were generally consistent. Five additional COPCs (furan,[5] 1,3-butadiene, nitrous oxide, acetonitrile, and N-Nitrosomorpholine) have been previously measured in A-101 headspace at levels above 10% of their respective OELs and above analytical RLs but did not exceed 10% of the OEL in this study.

Based on the measurements taken for this study, with the exception of ammonia, none of the COPCs indicated breakthrough behavior above 10% OEL during the 16-hour testing period. Breakthrough of ammonia for the SCOTTS 7422-SD1 and 7422-SC1 cartridges tested on A-101 headspace vapors occurred after 2 hours and 8 hours, respectively. However, variations in humidity, temperature, or cartridge inlet concentration for any COPCs, compared to those measured in the current study, could impact breakthrough time, especially if OEL thresholds are exceeded. In these circumstances, additional respirator cartridge evaluations may be necessary to determine proper respiratory protection requirements.

The *Overview of 2016–2018 Testing of Air-Purifying Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhausters*[6] provides additional information on the use of the cartridge testing results for the first 28 cartridge tests with the manufacturers service life models.

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[4] The term "detection limit" is used here to refer either to an analytical reporting limit or a detection limit. The use of either an RL or a DL varied among analytical laboratories. An RL (equivalent to a limit of quantification) was used instead of an analytical method DL by several laboratories for specific COPC analyses. See Appendix C and Appendix F for additional information on the specific use of RLs or DLs for each COPC.

[5] Inlet concentrations for furan using the Carbotrap 300 TDU results were significantly higher than documented in this report though breakthrough was not observed on either cartridge. The inlet maximum using the Volatile Organic Analyte method was 45.5% of the OEL for the 7422-SD1 cartridge. The re-evaluation of the furans using the Carbotrap 300 TDU is discussed in Freeman CJ, J Liu, C Clayton, SK Nune, LA Mahoney, CL Bottenus, TM Brouns, P Humble, and MJ Minette. 2019. *Overview of 2016 Through 2018 Testing of Air-Purifying Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhausters*. PNNL-26821 Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

[6] Freeman CJ, J Liu, C Clayton, SK Nune, LA Mahoney, CL Bottenus, TM Brouns, P Humble, and MJ Minette. 2019. *Overview of 2016 Through 2018 Testing of Air-Purifying Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhausters.* PNNL-26821 Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

Revision History

Revision Number	Effective Date	Description of Change
0		Initial issue
1	December 2019	This report has been revised to address external peer review comments on the Rev. 0 report and subsequent test reports from 2016 cartridge testing, and to correct data reporting errors. The principal changes included: 1. Addressing several external peer review comments including: a. Referencing the *Overview of 2016 Through 2018 Testing of Air-Purifying Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhausters* (PNNL-26821 Rev. 1),[6] which provided additional information on historic COPC source concentrations and the significance of any differences between cartridge-testing results and historic maxima. b. Adding descriptive information to Appendices A, B, and C to provide additional clarity on the contents and methods applied c. Clarifying terminology regarding breakthrough time vs. service life and change-out schedule. 2. A furans analytical methods review was conducted in 2018 ("Assessment of the Use of Alternate Furan Measurements for Respirator Cartridge Performance Determinations" letter report 69802-01). The assessment recommended the use of the Carbotrap 300 TDU tube analytical results for furan, 2,5-dihydrofuran, and 2-methylfuran in lieu of the TDU Tenax TA tube. All of the furan; 2,5-dihydrofuran; and 2-methylfuran results for the 2016 APR cartridge testing have been re-evaluated and documented in Appendix F of Freeman et al.;[6] therefore, values for furan, 2,5-dihydrofuran, and 2-methylfuran have not been updated in this revision of the report. 3. Inlet concentrations for furan, 2,5-dihydrofuran, and 2-methylfuran using the Carbotrap 300 results were higher than documented in this report.[7] No breakthrough of these furan compounds was observed on either cartridge tested.

[7] Only two SD1 influent readings for furan (20.2% and 45.5% of the OEL) were above the reporting limit/detection limit. All other influent and effluent readings for furan, 2,5-dihydrofuran, and 2-methylfuran using the Carbotrap 300 TDU Volatile Organic Carbon method were below the reporting limit/detection limit..

Acronyms and Abbreviations

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

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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. The tests were conducted to determine the period of time that the cartridges would provide adequate performance for APRs used to protect workers when exposed to a mixture of Chemicals of Potential Concern (COPC) from any vapors exiting headspaces in the tanks. Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulations (CFR) 1910.134(d)(3)(iii)(b)(2) specifies that for protection against gases and vapors, employers shall implement a change schedule for cartridges, based on objective information or data, to ensure that change-outs occur before the end of service life.[1-5] The primary function of the WRPS APR Cartridge Test Program is to obtain objective data to determine service life 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 analyses of cartridge testing on headspace vapors from the A-101 single-shell waste tank at Hanford.

2.0 Regulatory Requirements

2.1 Background on Regulatory Requirements

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

Protective respirator cartridges are frequently used in workplaces with low contaminant concentrations, and where respirators provide essential protection for longer periods of time (greater than 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 (approximately 30 pounds), back-mounted compressed air cylinder.[1]

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

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

- *Conduct experimental tests* – Gather available information about the nature of all contaminants present in the workplace. Obtain breathing rates of workers and estimate worst-case exposures. For most employers, this approach is the most time consuming, and resources needed to perform these tests may not be available. If an employer has the resources needed to pursue this approach, it is the most reliable method of estimating cartridge service life. Concentrations at different points in time are obtained using actual respirator cartridges exposed to actual or simulated gases to gather service-life information. A safety factor that includes the assumptions made, variable factors, or conditions needs to be applied to the service life and used in the respiratory protection program. This approach is commonly used in situations where mixtures of contaminants are present and can also be used to validate an existing cartridge change-out schedule.
- *Use the 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, service lives 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 waste storage tanks at Hanford, manufacturer recommendations may be of limited value, and experimental testing is recommended.

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

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

In addition to the methods described above, "rules of thumb" can be allowed as part of the overall workplace organic vapor assessment for determining a cartridge change-out schedule. Chapter 36 of the American Industrial Hygiene Association publication, *The Occupational Environment: Its Evaluation and Control and Management*, outlines the approach.[12] The "rules of thumb" may not work for every chemical or situation, but can provide an estimate of cartridge service life. The following are rules of thumb outlined in the publication:

- If the compound's boiling point is greater than 70°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[8] can help in interpreting the results obtained from experimental testing of respirator cartridges.

[8] The general drivers (a.k.a., rules of thumb) are applicable to certain compounds, but not to all compounds in a mixture, such as those in specific Hanford tank mixtures. However, an Industrial Hygiene professional can use these rules of thumb to support interpretation of results from both experiments and predictions.

3.0 Description of Testing Program

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

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

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

The APR cartridge test assembly was designed and constructed to operate to the following environmental conditions without negatively impacting system performance:

- 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.

WRPS developed a testing program with the following conservative conditions to support robust cartridge service life estimates:

- The flow rate through each cartridge was set at approximately 30 L/min (equivalent to 60 L/min for a pair of cartridges), which corresponds to more than twice the normal breathing rate and is slightly higher than OSHA recommended testing flow rate of 53.3 L/ min.[3,5]
- Tank farm vapors source sampling was performed on headspace or exhauster stack 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[9] for Survey 2.[16] These cartridges were chosen because they are suitable for capturing organic vapors, acid gases, ammonia, formaldehyde, and particulates.[16]

[9] SCOTT part numbers 7422-SC1 and 7422-SD1 are multipurpose APR respirator cartridges for use on Xcel Half-Mask and all SCOTT full facepieces with NIOSH approval for OV/AM/MA/CL/HC/SD/CD/HF/FM/HS applications. The -SD1 cartridge has the same multipurpose features as the -SC1, but also includes a P100 particulate filter. https://www.3mscott.com/download/742-series-cartridges-user-instructions-english/

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 >10% of their 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

Respirator cartridge testing on the Hanford waste tank A-101 headspace was conducted from July 22–24, 2016. Each cartridge was tested for approximately 16 hours of continuous run time. Testing and analysis focused on the 59 COPCs identified in Table 1 and other hazardous airborne contaminants. Sorbent tubes were changed every 2 hours, and more than 200 sorbent tubes were sent to the 222S Laboratory at Hanford and dispositioned for analysis. Appendix C lists the raw data for all of contaminants analyzed during the tests, and Appendix D lists the corresponding calculated concentrations for the detected COPCs. Appendix C also gives the average temperatures of the sample slipstream during testing, which ranged from 69 to 90°F as well as the average relative humidity measurements, which ranged from 45 to 94%. Table 1 provides an overview of the results for each of the 59 COPCs. Note that nitrous oxide was not analyzed as it is not susceptible to respirator filtration, and there are no known NIOSH-approved respirator filtration cartridges approved for nitrous oxide. Additionally, methanol was not quantified as part of the COPC data set because it is used as a standard solvent and calibration standard in the analytical procedure for volatile organic compounds (VOC).

Table 1 shows the measured concentrations in the current study for all of the COPCs tested. The table further provides a summary of the test information. For example, if all of the measurements for a specific compound were less than detection limits (DL),[10] that compound is marked accordingly. Further, if concentrations were detected for a compound, the extent of the detection is also described. Based on the summary in Table 1, there were six COPCs with detected concentrations >10% of their corresponding OEL. These compounds were ammonia, mercury, acetonitrile, N-Nitrosodimethylamine (NDMA), N-Nitrosodiethylamine (NDEA), and N-Nitrosomethylethylamine (NMEA). All six of these COPCs are highlighted in yellow in Table 1 and assessed in more detail in Section 5.0.

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

Table 1. Summary of Analyzed COPCs

COPC Number and Name	CAS Number	Highest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL[1] (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
Inorganic						
1 Ammonia	7664-41-7	121 ppm	25 ppm	2.55%		Up to 484% of OEL for inlet values and 348% for outlets
2 Nitrous Oxide	10024-97-2	Not Measured	50 ppm			
3 Mercury	7439-97-6	8.32 ug/m3	25 ug/m3	7.38%		Up to 34% of OEL for inlet values. All outlets <DL
Hydrocarbons						
4 1,3-Butadiene	106-99-0	0.024 ppm	1 ppm	2.44-2.64%		Up to 2.4% of OEL for inlet and oulet values
5 Benzene	71-43-2	0.0007 ppm	0.5 ppm	0.030%		Up to 0.13% of OEL for inlet values and 0.03% for outlets
6 Biphenyl	92-52-4	0.0006 ppm	0.2 ppm	0.290%	X	
Alcohols						
7 1-Butanol	71-36-3	0.026 ppm	20 ppm	0.004%		Up to 0.13% of OEL for inlet values and 0.004% for outlets
8 Methanol	67-56-1	Not Measured	200 ppm			
Ketones						
9 2-Hexanone	591-78-6	0.0010 ppm	5 ppm	0.016%		Up to 0.02% of OEL for inlet values and 0.003% for outlets
10 3-Methyl-3-butene-2-one	814-78-8	Not Detected	0.02 ppm	TIC[2]	X	
11 4-Methyl-2-hexanone	105-42-0	0.0002 ppm	0.5 ppm	0.033%	X	
12 6-Methyl-2-heptanone	928-68-7	Not Detected	8 ppm	TIC	X	
13 3-Buten-2-one	78-94-4	0.0013 ppm	0.2 ppm	0.093%		Up to 0.64% of OEL for inlet and outlet values
Aldehydes						
14 Formaldehyde	50-00-0	0.0157 ppm	0.3 ppm	0.607%		Up to 5.22% of OEL for inlet values and 2.08% for outlets
15 Acetaldehyde	75-07-0	0.0555 ppm	25 ppm	0.005%		Up to 0.22% of OEL for inlet values and 0.13% for outlets
16 Butanal	123-72-8	0.0019 ppm	25 ppm	0.001%		Up to 0.008% of OEL for inlet values and 0.002% for outlets
17 2-Methyl-2-butenal	1115-11-3	Not Detected	0.03 ppm	TIC	X	
18 2-Ethyl-hex-2-enal	645-62-5	Not Detected	0.1 ppm	TIC	X	

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

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

[3] The maximum furan measurement by using the Carbotrap 300 TDU method was 450 ppb (see Freeman et.al. [19]). Also in Freeman et. al. [19], 2,5-dihydrofuran, and 2-methylfuran maximums were both below the RL/DL.

Table 1. (continued)

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

Table 1. (continued)

COPC Number and Name	CAS Number	Highest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL[1] (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
Amines						
42 Ethylamine	75-04-7	0.0168 ppm	5 ppm	0.10%		Up to 0.34% of OEL for inlet values. All outlets <DL
Nitrosamines						
43 N-Nitrosodimethylamine	62-75-9	0.67 ppb	0.3 ppb	8.4-12.1%		Up to 224% of OEL for inlet values. All outlets <DL
44 N-Nitrosodiethylamine	55-18-5	0.07 ppb	0.1 ppb	28.7%		Up to 73.6% of OEL for inlet values. All outlets <DL
45 N-Nitrosomethylethylamine	10595-95-6	0.03 ppb	0.3 ppb	11.1%	X	11.1% of OEL for one outlet value. All values <DL
46 N-Nitrosomorpholine	59-89-2	0.05 ppb	0.6 ppb	3.33%		Up to 7.97% of OEL for inlet values. All outlets <DL
Organophospates						
47 Tributyl phosphate	126-73-8	0.0005 ppm	0.2 ppm	0.230%	X	
48 Dibutyl butylphosphonate	78-46-6	0.0003 ppm	0.007 ppm	4.54%	X	
Halogenated						
49 Chlorinated Biphenyls	Varies	Not Detected	1 mg/m3	TIC	X	
50 2-Fluoropropene	1184-60-7	Not Detected	0.1 ppm	TIC	X	
Pyridines						
51 Pyridine	110-86-1	0.0016 ppm	1 ppm	0.030%		Up to 0.16% of OEL for inlet values. All outlets <DL
52 2,4-Dimethylpyridine	108-47-4	0.0003 ppm	0.5 ppm	0.060%	X	
Organonitrites						
53 Methyl nitrite	624-91-9	Not Detected	0.1 ppm	TIC	X	
54 Butyl nitrite	544-16-1	Not Detected	0.1 ppm	TIC	X	
Organonitrates						
55 Butyl nitrate	928-45-0	Not Detected	2.5 ppm	TIC	X	
56 1,4-Butanediol, dinitrate	3457-91-8	Not Detected	0.05 ppm	TIC	X	
57 2-Nitro-2-methylpropane	594-70-7	Not Detected	0.3 ppm	TIC	X	
58 1,2,3-Propanetriol, 1,3-dinitrate	623-87-0	Not Detected	0.05 ppm	TIC	X	
Isocyanates						
59 Methyl Isocyanate	624-83-9	Not Detected	20 ppb	TIC	X	

5.0 Plots of COPCs with Significant Detected Values

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

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

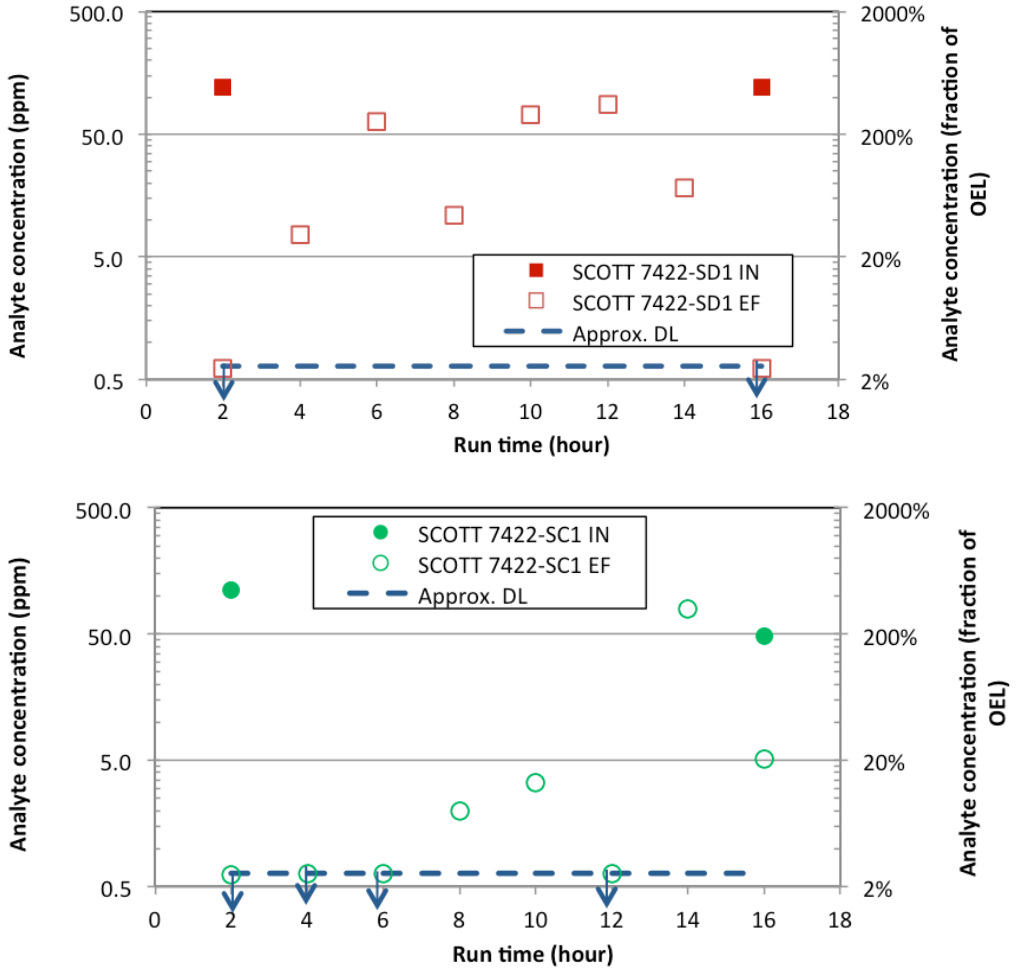

Figure 1. Plot of Measured Ammonia Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1**)**. Data points noted with ↓ indicates measurements less than the DL or RL.

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

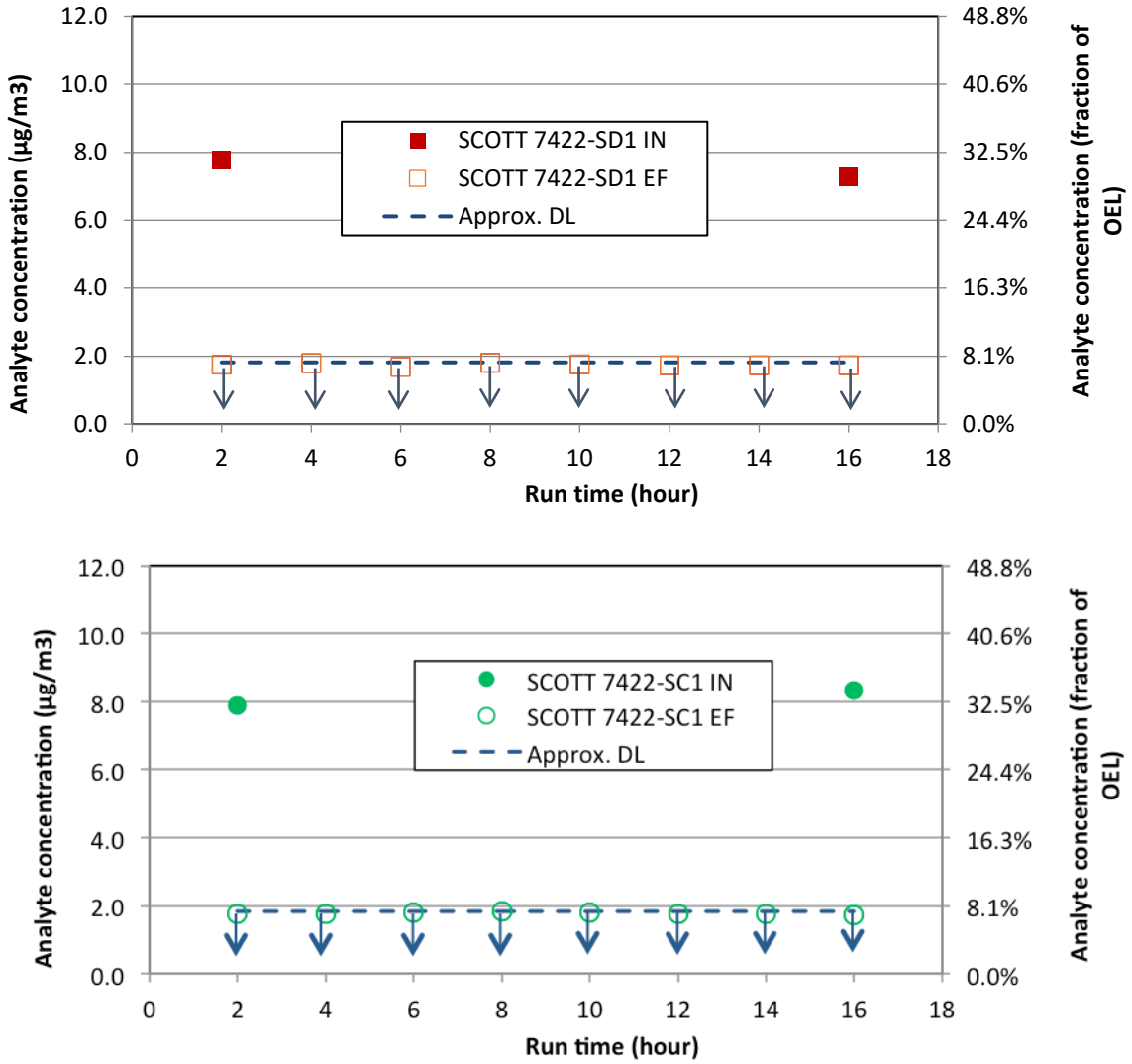

Figure 2. Plot of Measured Mercury Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1**)**. Data points noted with ↓ indicates measurements less than the DL or RL.

Acetonitrile *(see Figure 3)* – The DL for acetonitrile corresponds to ~0.001% of the OEL. For both respirator cartridges, inlet concentrations ranged from 0.2 to 0.7% of the OEL.[11] All of the measured outlet concentrations from both respirator cartridges were greater than the DL for acetonitrile, but <1.5% of the OEL, with the exception of a single data point. The outlet concentration over the 8-hour period for SCOTT 7422-SC1 was measured at 12.4% of the OEL. However, because this data point is much higher than all of the other inlet and outlet values, analytical error is suspected. Future measurements, with higher inlet concentrations for acetonitrile, are recommended to fully ascertain respirator performance.

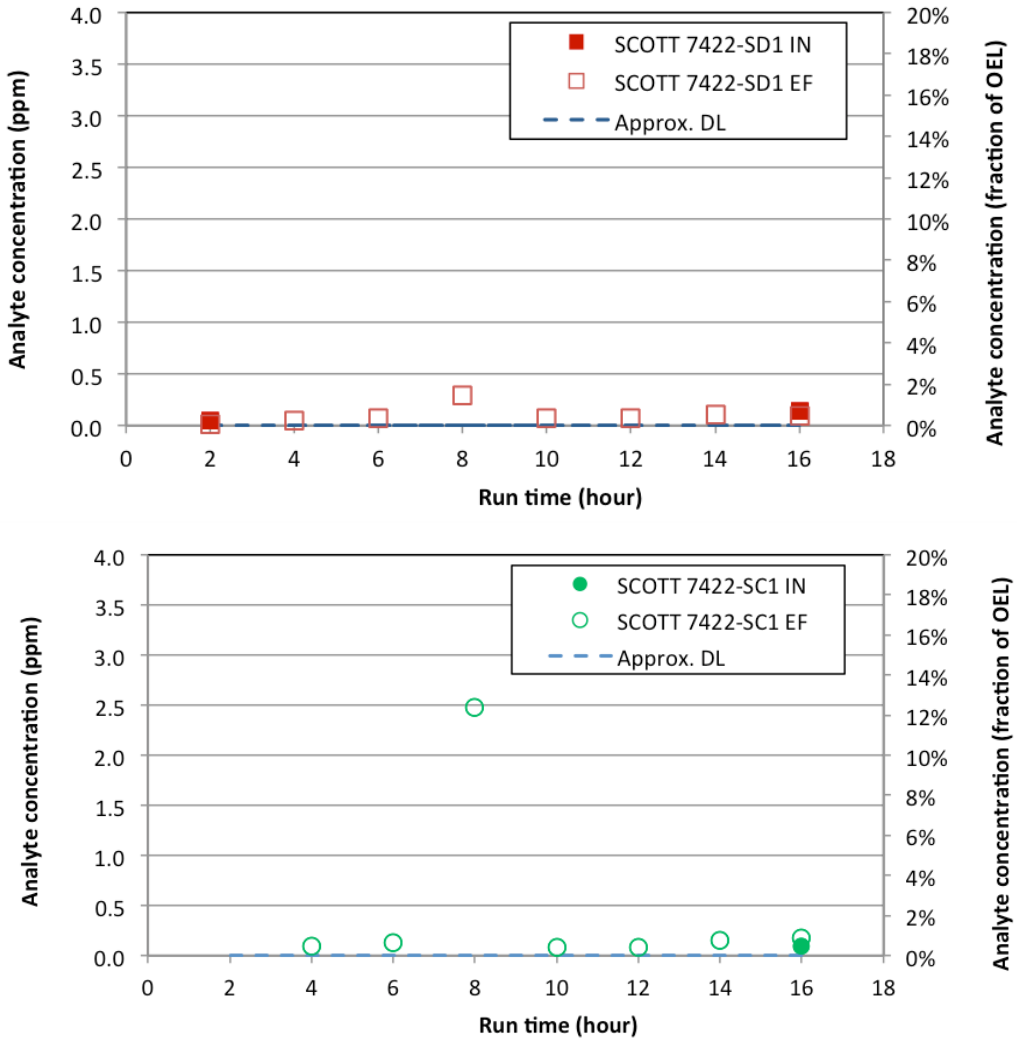

Figure 3. Plot of Measured Acetonitrile Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1**)**.

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

N-Nitrosodimethylamine *(see Figure 4)* – The DL for NDMA corresponded to ~8.4%, with an increase to 12.1% for the last few data points for the second respirator cartridge.[12] For both respirator cartridges, inlet concentrations ranged from 43 to 224% of the OEL. All of the respirator outlet measurements were below the analytical DL for NDMA. Therefore, there is no evidence of NDMA breakthrough over the measured time period.

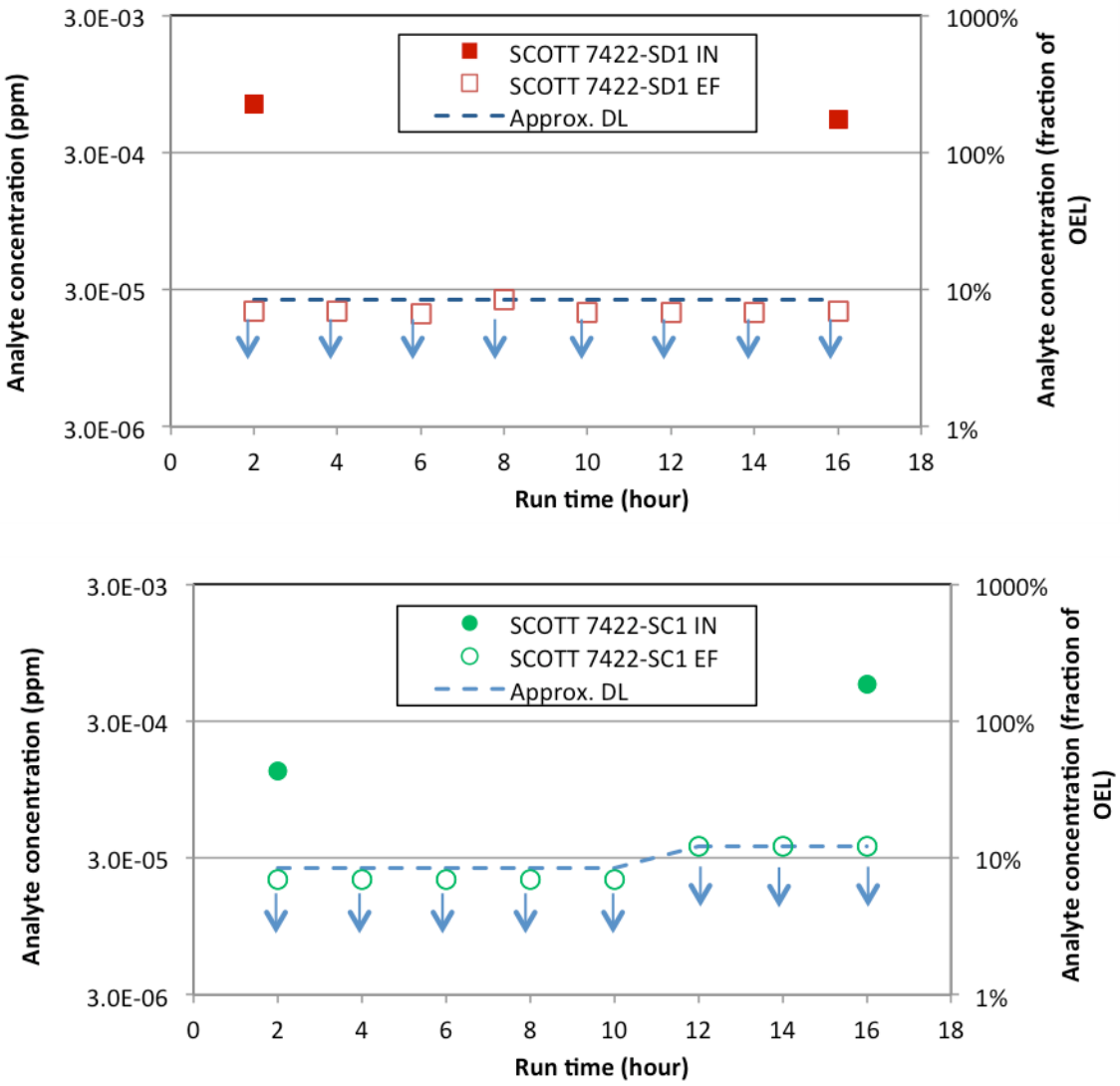

Figure 4. Plot of Measured N-Nitrosodimethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1**)**. Data points noted with ↓ indicates measurements less than the DL or RL.

[12] The increase in DL for samples from the SCOTT 7422-SC1 testing resulted from a change in the calculated RL from the analytical laboratory. The RL can vary for any sample batch based on the instrument performance and desorption efficiency of laboratory control samples.

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

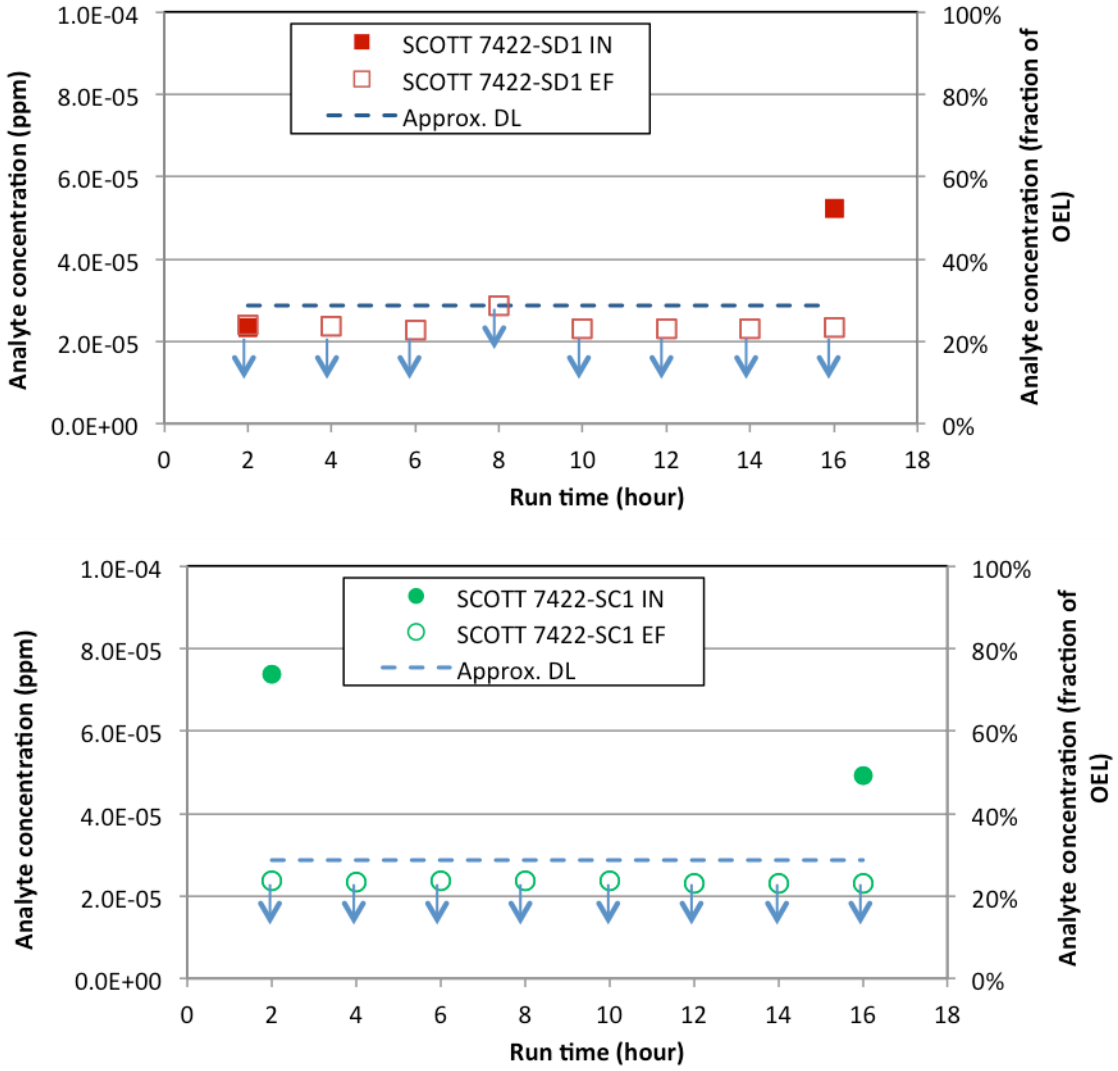

Figure 5. Plot of Measured N-Nitrosodiethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1**)**. Data points noted with ↓ indicates measurements less than the DL or RL.

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

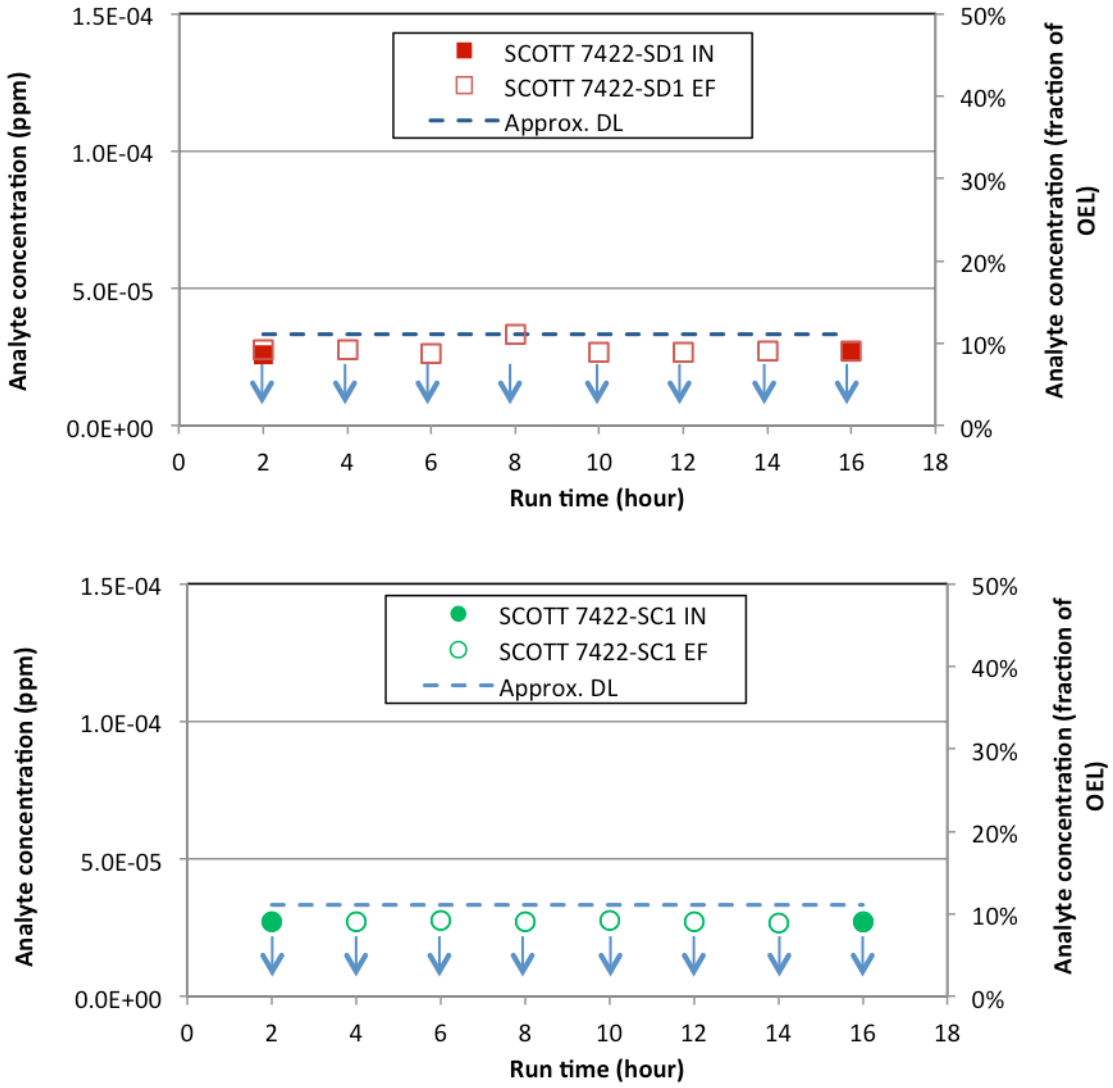

Figure 6. Plot of Measured N-Nitrosomethylethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1**)**. Data points noted with ↓ indicates measurements less than the DL or RL.

6.0 Factoring in Historical Concentration Data

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

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

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

- Ammonia, mercury, NDMA, and NDEA average and maximum inlet concentrations measured in this cartridge study were generally consistent[13] with historic headspace measurements.
- Furan average and maximum inlet concentrations were consistently <5% of the OEL in the cartridge study, significantly lower than the historic average headspace concentration of 317% of the OEL.[14] Historic measurements of other furan-based compounds (i.e., substituted furans) have consistently been found to be less than the RL.
- 1,3-butadiene cartridge inlet concentrations were comparable to the historical average headspace concentration of 2.9% of the OEL but less than the maximum historic concentration of 51% of the OEL.
- Acetonitrile cartridge inlet concentrations were consistently <1% of the OEL, whereas historic headspace measurements ranged from an average of 4.4% to a maximum of 26% of the OEL.
- N-Nitrosomorpholine cartridge inlet concentrations were generally consistent with the historical average headspace concentration of 11% of the OEL, but less than the maximum historic concentration of 24% of the OEL.
- Methyl nitrite was not detected in this cartridge study but has been reported in three pre-2006 headspace samples as a TIC at a concentration >300% of the OEL. This COPC has not been detected in more recent analyses of the A-101 headspace.
- Nitrous oxide was not measured in this cartridge study as previously noted but has been reported in pre-2006 headspace samples at a concentration >300% of the OEL. This COPC has only been reported as less than the RL in the more recent single analysis result from A-101.

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[13] Inlet concentrations were considered generally consistent if they were within ±100% of historic maximum and average headspace concentrations. Maximum inlet concentrations for these COPCs were 18 to 46% less than historic maxima, and average inlet concentrations ranged from 60% less to 70% more than the historic average.
[14] The maximum furan measurement by using the Carbotrap 300 TDU method was 450 ppb (see Freeman et.al. [19]). Also in Freeman et. al. [19], 2,5-dihydrofuran, and 2-methylfuran maximums were both below the RL/DL.

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

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

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

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

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

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

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

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

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

7.0 Conclusions

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

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

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

- Based on measurements of the cartridge inlet vapor concentrations from tank A-101, four compounds had measured values that were >10% of their corresponding OELs.[15] These COPCs were ammonia, mercury, NDMA, and NDEA. The inlet concentrations for ammonia and NDMA were >100% of their respective OELs.
- Of the compounds identified above, only ammonia had respirator cartridge outlet concentrations (for both cartridges tested) that were >10% of the OELs. These measurements indicate breakthrough for each of the cartridges tested. For the SCOTT 7422-SD1 cartridge, ammonia breakthrough above 10% OEL appeared to occur after 2 hours. For the SCOTT 7422-SC1 cartridge, ammonia breakthrough above 10% OEL appeared to occur after 8 hours.
- Inlet vapor concentrations of all other measured COPCs were below 10% of OEL thresholds, and in many cases, they also were less than the corresponding analytical DLs, indicating no COPC breakthrough above 10% of OELs for any compounds over the 16 hours of testing.

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

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

8.0 Recommendations

- Based on the measurements taken for this study, none of the COPCs, other than ammonia, indicated breakthrough behavior above 10% their OELs during the 16-hour testing period. Breakthrough of ammonia for the SCOTTS 7422-SD1 and 7422-SC1 cartridges tested on A-101 headspace vapors occurred after 2 hours and 8 hours, respectively.
- However, variations in humidity, temperature, or cartridge inlet concentration for any COPCs, compared to those measured in the current study, could impact breakthrough time, especially if OEL thresholds are exceeded.
- Additional recommendations related to NDMA and NDEA DLs, TICs, further data assessments, and future testing documented in PNNL-25860[16] for respirator cartridge testing on a slipstream from the Hanford AP tank exhauster are also relevant to testing the A-101 headspace. Future testing and analysis of tank vapors with higher concentrations of COPCs such as furans should help improve understanding of cartridge performance.

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

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Appendix A

Description of Respirator Cartridge Testing Setup

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Description of Respirator Cartridge Testing Setup

The respirator cartridge-testing system was developed by Washington River Protection Solutions and HiLine Engineering (Richland, Washington) as a means to comprehensively test respirator cartridge performance with actual Hanford tank headspace or exhauster slip stream gases. Tank headspace or exhauster slip stream vapors are pulled direct from the source through a flexible hose connecting the tank or exhauster sampling port within the tank farm/exhauster fence line to the respirator cartridge-testing system outside the farm.[13,14] Multiple inline particulate filters are installed in the line between the tank/exhauster and test system to remove potential radioactive particulates. Each filter unit contains a hydrophobic Fluoropore™ polytetrafluoroethylene filter (Millipore Sigma, Billerica, Massachusetts) that is required pursuant to the radiological work permit. This polytetrafluoroethylene filter medium is the same material used for routine tank vapor area monitoring as well as sampling and analysis of sources (headspace and exhausters) and was selected because of its broad chemical compatibility that minimizes sorption of, or reactions with, chemical compounds. The filter medium is not expected to adversely impact the test objectives because all tank farm vapor sampling uses this type of filter medium.

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 is 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 to draw tank gases/vapors into the unit so the potential for leakage to the atmosphere is minimized until the gases/vapors are under positive pressure downstream of the vacuum pumps. By the time gases reach the vacuum pump, COPCs are essentially captured or 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. DryCal flow meters also were used downstream of the sorbent tubes to measure the flow through each sorbent tube. 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 are used 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.

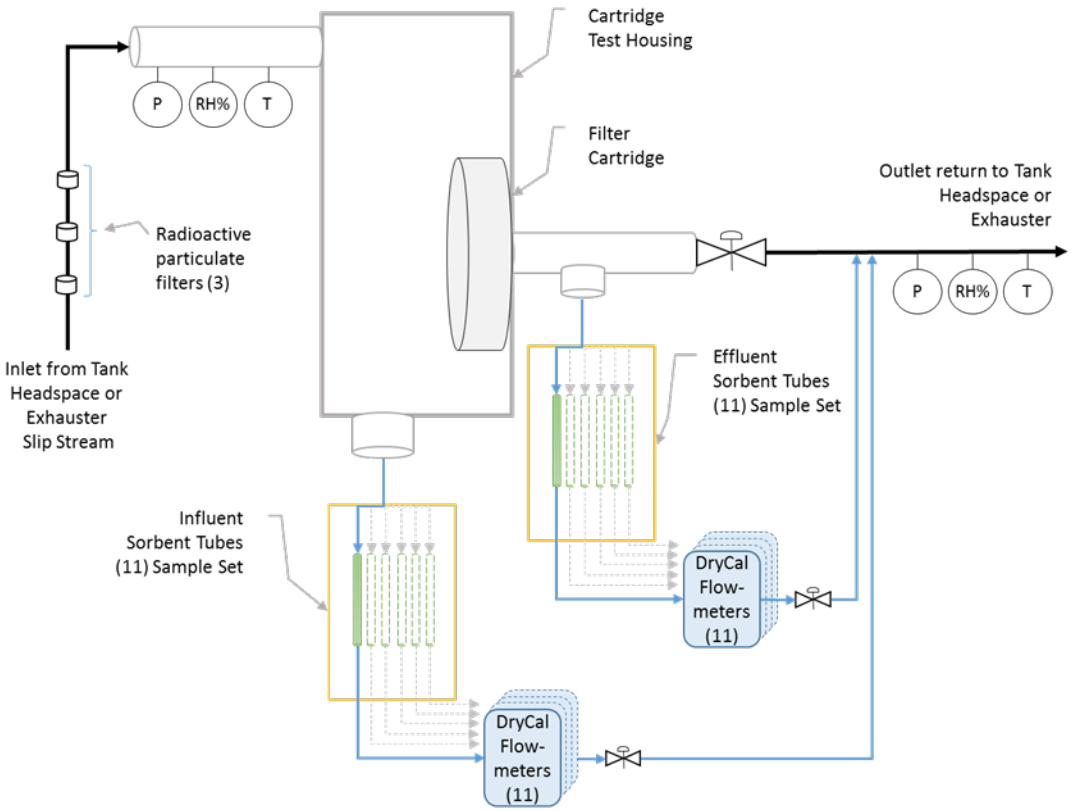

Figure A.1. General Schematic of Respirator Cartridge Test Apparatus

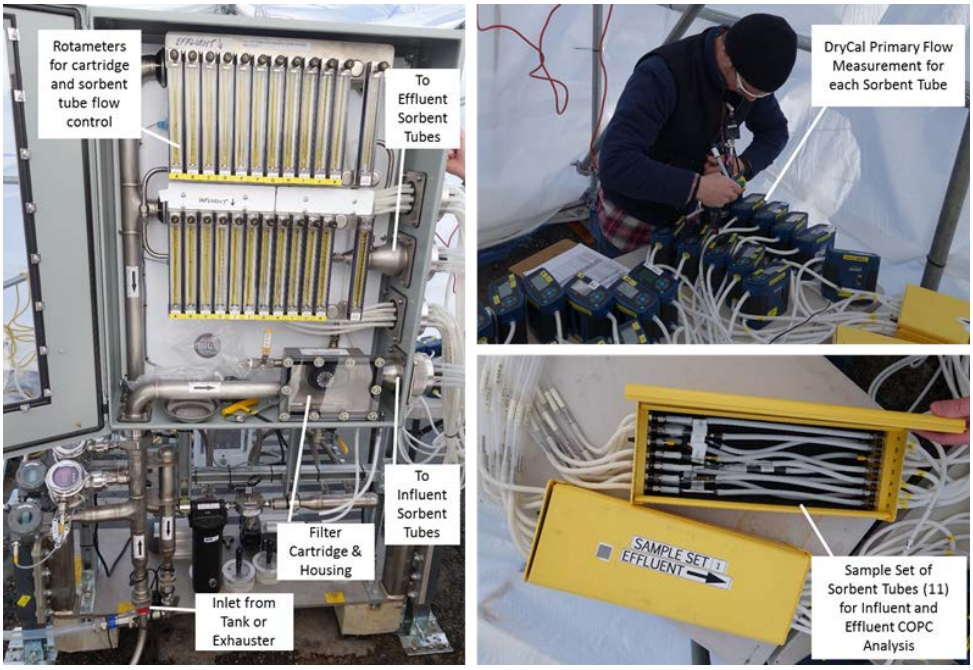

Figure A.2. Photographs of the Respirator Cartridge Test Equipment

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

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

[a] Analytical Method
NIOSH: National Institute of Occupation Safety and Health
EPA: U.S. Environmental Protection Agency
OSHA: Occupational Safety and Health Administration

[b] Instrument Used
GC-FID: Gas Chromatography-Flame Ionization Detector
GC/MS: Gas Chromatography-Mass Spectrometry
CVAA: Cold Vapor Atomic Absorption
IC: Ion Chromatography
HPLC: High Performance Liquid Chromatography
GC-TEA: Gas Chromatography-Thermal Energy Analyzer
HPLC-UV: High Performance Liquid Chromatography-Ultraviolet Detector

[c] Analysis Location
ALS: ALS Environmental Salt Lake City
WRPS-222S: Washington River Protection Solutions, Organic Studies Group
WHL-222S: Wastren Hanford Laboratory
CBAL: Columbia Basin Analytical Laboratory, part of the RJ Lee Group

Appendix C

Raw Analytical Data

Appendix C

Raw Analytical Data

C.1 Description

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

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

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

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

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

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

WRPS provided the temperature and humidity information in files 'A-101 DRI July 22-23.xls' and ' A-101 DRI July 23-24.xls.'

The information is shown in the tables provided in this appendix. Several terms used in the DRI files are described below.

- 'Pre' and 'Post' indicate the general time signature when the direct read instrument measurements were taken. 'Pre' refers to the beginning of the 2-hour sample duration, and 'Post' refers to the end of the 2-hour sample duration.
- 'Influent' and 'Effluent' indicate the location of the measurement within the test system. 'Influent' measurements are taken at the inlet of the system upstream of the respirator cartridge. 'Effluent' measurements are taken downstream of the respirator cartridge. The pressure, temperature, and humidity effluent sensors are located at the end of the test system near the vacuum pump, whereas the DRI measurements for ammonia and VOCs are from a sampling location between the respirator cartridge and the effluent sorbent tube samples.
- The DRI measurements for ammonia and VOCs could not be taken while the test system sample pumps were operational. 'After Sample Taken' refers to the time signature for these direct read results (e.g., Sample A DRI measurements were taken immediately after the Sample A sorbent tubes were taken and replaced with Sample B sorbent tubes).
- Prior to testing with the waste tank vapors, a 2 hour "baseline" samples is collected by running ambient outside air through the sampling system before each cartridge is installed for testing. 'BASE' means measurements obtained for ambient air (fresh air vs. tank vapor) running through the test system before initiation of tank vapor testing.
- Columns labeled Mach. Base 1 and Mach. Base 2 refer to the 'BASE' baseline samples for influent and effluent, respectively, to verify machine cleanliness prior to experimental measurements.
- 'BLANK' means measurements obtained from sorbent tubes that have not had any vapor stream passed through them.

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

- SVOC: Biphenyl, Diethylphthalate, Tributyl phosphate, Dibutyl butylphosphonate, Dodecane, Hexadecane
- SVOCTIC: Undecane, Cyclotetrasiloxane, octamethyl, Decamethlycyclopentasiloxane, Dodecane,4,6-dimethyl
- VOC: 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: 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, Tetrafuran
- 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.

C.2 Experimental Parameters

C.2.1 Flow Rates

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

Volumes Air Collected (L)

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

Flow Rates (ml/min)

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

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

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

Volumes Air Collected (L)

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

Flow Rates (ml/min)

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

C.2.2 Temperature, Pressure, and Relative Humidity

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

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

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

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

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

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

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

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

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

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

C.3 Raw Analytical Data

C.3.1 SVOC and SVOCTIC

22 - Aug - 2016 13:45:29
DSRHardcopyWOLimits 3.0.11b
DSR.Jar v. 3.0.12

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021633			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021633			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021633			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021633			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021633			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021633			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021633			112-40-3	Dodecane	NGS	97	<0.55	30	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021633			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021633			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021633			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021633			629-50-5	Tridecane	NGS	94	<1.6	11	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021633			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021633			629-62-9	Pentadecane	NGS	100	<3.0	3.2	n/a	n/a	n/a	n/a	3.0	n/a	J

8/22/16

T - Tentatively Identified Compound
Q - Qualitative

N - Named TIC

E - Outside Calibration Range

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

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-A2
Customer Sample ID: 16-06173-1-A2

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021634			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021634			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021634			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021634			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021634			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021634			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021634			112-40-3	Dodecane	NGS	97	<0.55	48	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021634			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021634			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021634			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021634			629-50-5	Tridecane	NGS	94	<1.6	15	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021634			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021634			629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

NA = Not Analyzed, ND = Not Detected

T - Tentatively Identified Compound
Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021635			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021635			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021635			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021635			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021635			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021635			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021635			112-40-3	Dodecane	NGS	97	<0.55	87	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021635			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021635			629-59-4	Tetradecane	NGS	100	<3.9	7.4	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021635			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021635			629-50-5	Tridecane	NGS	94	<1.6	26	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021635			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021635			629-62-9	Pentadecane	NGS	100	<3.0	4.3	n/a	n/a	n/a	n/a	3.0	n/a	J

NA = Not Analyzed, ND = Not Detected

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Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021636			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021636			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021636			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021636			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021636			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021636			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021636			112-40-3	Dodecane	NGS	97	<0.55	0.70	n/a	n/a	n/a	n/a	0.55	n/a	J
S16T021636			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021636			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021636			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021636			629-50-5	Tridecane	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021636			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021636			629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

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

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021637			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021637			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021637			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021637			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021637			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021637			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021637			112-40-3	Dodecane	NGS	97	<0.55	110	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021637			544-76-3	Hexadecane-	NGS	94	<3.3	8.9	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021637			629-59-4	Tetradecane	NGS	100	<3.9	12	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021637			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	Q
S16T021637			629-50-5	Tridecane	NGS	94	<1.6	58	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021637			629-78-7	Heptadecane	NGS	91	<2.4	12	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021637			629-62-9	Pentadecane	NGS	100	<3.0	15	n/a	n/a	n/a	n/a	3.0	n/a	

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J - Estimated
Q - Qualitative

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-D1
Customer Sample ID: 16-06173-1-D1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021638			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021638			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021638			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021638			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021638			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021638			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021638			112-40-3	Dodecane	NGS	97	<0.55	33	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021638			544-76-3	Hexadecane-	NGS	94	<3.3	6.7	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021638			629-59-4	Tetradecane	NGS	100	<3.9	7.0	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021638			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021638			629-50-5	Tridecane	NGS	94	<1.6	11	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021638			629-78-7	Heptadecane	NGS	91	<2.4	8.6	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021638			629-62-9	Pentadecane	NGS	100	<3.0	10	n/a	n/a	n/a	n/a	3.0	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021639			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021639			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021639			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021639			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021639			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021639			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021639			112-40-3	Dodecane	NGS	97	<0.55	57	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021639			544-76-3	Hexadecane-	NGS	94	<3.3	4.0	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021639			629-59-4	Tetradecane	NGS	100	<3.9	6.1	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021639			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021639			629-50-5	Tridecane	NGS	94	<1.6	18	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021639			629-78-7	Heptadecane	NGS	91	<2.4	3.6	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021639			629-62-9	Pentadecane	NGS	100	<3.0	7.5	n/a	n/a	n/a	n/a	3.0	n/a	J

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N - Named TIC
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J - Estimated
Q - Qualitative

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021640			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021640			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021640			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021640			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021640			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021640			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021640			112-40-3	Dodecane	NGS	97	<0.55	58	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021640			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021640			629-59-4	Tetradecane	NGS	100	<3.9	6.3	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021640			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021640			629-50-5	Tridecane	NGS	94	<1.6	26	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021640			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021640			629-62-9	Pentadecane	NGS	100	<3.0	7.2	n/a	n/a	n/a	n/a	3.0	n/a	J

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Q - Qualitative

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2														
S16T021641		3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021641		95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021641		108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021641		92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021641		78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021641		84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021641		112-40-3	Dodecane	NGS	97	<0.55	30	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021641		544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021641		629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021641		126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021641		629-50-5	Tridecane	NGS	94	<1.6	9.1	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021641		629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021641		629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-G1
Customer Sample ID: 16-06173-1-G1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021642			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021642			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021642			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021642			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021642			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021642			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021642			112-40-3	Dodecane	NGS	97	<0.55	1.5	n/a	n/a	n/a	n/a	0.55	n/a	J
S16T021642			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021642			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021642			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	Q
S16T021642			629-50-5	Tridecane	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021642			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021642			629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

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Q - Qualitative

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E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-H1
Customer Sample ID: 16-06173-1-H1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021643			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021643			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021643			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021643			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021643			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021643			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021643			112-40-3	Dodecane	NGS	97	<0.55	12	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021643			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021643			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021643			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021643			629-50-5	Tridecane	NGS	94	<1.6	4.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021643			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021643			629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-H2
Customer Sample ID: 16-06173-1-H2

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021644			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021644			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021644			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021644			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021644			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021644			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021644			112-40-3	Dodecane	NGS	97	<0.55	18	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021644			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021644			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021644			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021644			629-50-5	Tridecane	NGS	94	<1.6	6.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021644			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021644			629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021645			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021645			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021645			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021645			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021645			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021645			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021645			112-40-3	Dodecane	NGS	97	<0.55	52	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021645			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021645			629-59-4	Tetradecane	NGS	100	<3.9	4.3	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021645			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021645			629-50-5	Tridecane	NGS	94	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021645			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021645			629-62-9	Pentadecane	NGS	100	<3.0	4.5	n/a	n/a	n/a	n/a	3.0	n/a	J

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142

SDG Number:

Customer Sample ID: 16-06173-1-A1

Customer Sample ID: 16-06173-1-A1

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021633				Unknown-1		4.35	NGS	120	JT
S16T021633				Acetophenone	98-86-2	5.18	NGS	13	JNT
S16T021633				Undecane	1120-21-4	5.45	NGS	41	JNT
S16T021633				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	130	JNT
S16T021633				Ethanol, 2-phenoxy-	122-99-6	6.50	NGS	32	JNT
S16T021633				Benzothiazole	95-16-9	6.59	NGS	31	JNT
S16T021633				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	30	JNT
S16T021633				Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	38	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-A2
Customer Sample ID: 16-06173-1-A2

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021634				Unknown-1		4.35	NGS	110	JT
S16T021634				Undecane	1120-21-4	5.45	NGS	61	JNT
S16T021634				2-Nonen-1-ol	22104-79-6	5.50	NGS	27	JNT
S16T021634				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	120	JNT
S16T021634				Benzothiazole	95-16-9	6.60	NGS	73	JNT
S16T021634				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	44	JNT
S16T021634				Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	30	JNT
S16T021634				Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.26	NGS	36	JNT

C.20

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021635			Benzaldehyde	100-52-7	4.24	NGS	68	JNT
S16T021635			Unknown-1		4.35	NGS	260	JT
S16T021635			Phenol	108-95-2	4.43	NGS	27	JNT
S16T021635			2-Propyl-1-pentanol	58175-57-8	4.84	NGS	55	JNT
S16T021635			1-Octene, 3,7-dimethyl-	4984-01-4	4.89	NGS	45	JNT
S16T021635			Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	78	JNT
S16T021635			Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	24	JNT
S16T021635			Acetophenone	98-86-2	5.19	NGS	57	JNT
S16T021635			Benzene, 1-methyl-4-(2-propeny	3333-13-9	5.35	NGS	80	JNT
S16T021635			Undecane	1120-21-4	5.45	NGS	240	JNT
S16T021635			Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	27	JNT
S16T021635			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	110	JNT
S16T021635			Benzaldehyde, 3-ethyl-	34246-54-3	6.05	NGS	54	JNT
S16T021635			Benzothiazole	95-16-9	6.62	NGS	95	JNT
S16T021635			2-Propenoic acid, octyl ester	2499-59-4	6.67	NGS	46	JNT
S16T021635			Acetic acid, trifluoro-, 3,7-d	28745-07-5	6.72	NGS	25	JNT
S16T021635			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.91	NGS	64	JNT
S16T021635			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	45	JNT
S16T021635			Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.27	NGS	49	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021637				Unknown-1		4.35	NGS	190	JT
S16T021637				2-Propyl-1-pentanol	58175-57-8	4.84	NGS	32	JNT
S16T021637				Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	67	JNT
S16T021637				Acetophenone	98-86-2	5.19	NGS	44	JNT
S16T021637				Undecane	1120-21-4	5.45	NGS	150	JNT
S16T021637				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	26	JNT
S16T021637				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	160	JNT
S16T021637				Hexanoic acid, 2-ethyl-	149-57-5	5.80	NGS	28	JNT
S16T021637				Benzothiazole	95-16-9	6.62	NGS	110	JNT
S16T021637				1-Octanol, 3,7-dimethyl-	106-21-8	6.67	NGS	29	JNT
S16T021637				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.91	NGS	80	JNT
S16T021637				Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	75	JNT
S16T021637				Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.27	NGS	65	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-D1
Customer Sample ID: 16-06173-1-D1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021638			Unknown-1		4.35	NGS	190	JT
S16T021638			Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	51	JNT
S16T021638			Acetophenone	98-86-2	5.19	NGS	36	JNT
S16T021638			Undecane	1120-21-4	5.45	NGS	100	JNT
S16T021638			Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	22	JNT
S16T021638			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	110	JNT
S16T021638			Benzothiazole	95-16-9	6.60	NGS	28	JNT
S16T021638			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	28	JNT
S16T021638			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	50	JNT

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E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021639				Unknown-1		4.35	NGS	150	JT
S16T021639				Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	37	JNT
S16T021639				Acetophenone	98-86-2	5.19	NGS	26	JNT
S16T021639				Undecane	1120-21-4	5.45	NGS	110	JNT
S16T021639				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	24	JNT
S16T021639				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	110	JNT
S16T021639				Benzothiazole	95-16-9	6.61	NGS	79	JNT
S16T021639				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	47	JNT
S16T021639				Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	38	JNT
S16T021639				Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.26	NGS	35	JNT

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021640			Unknown-1		4.35	NGS	200	JT
S16T021640			1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	25	JNT
S16T021640			Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	45	JNT
S16T021640			Decane, 2,4,6-trimethyl-	62108-27-4	5.10	NGS	15	JNT
S16T021640			Acetophenone	98-86-2	5.18	NGS	22	JNT
S16T021640			Undecane	1120-21-4	5.45	NGS	110	JNT
S16T021640			Nonanal	124-19-6	5.50	NGS	31	JNT
S16T021640			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	94	JNT
S16T021640			Benzothiazole	95-16-9	6.60	NGS	50	JNT
S16T021640			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	38	JNT
S16T021640			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	28	JNT
S16T021640			Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.26	NGS	30	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021641				Unknown-1		4.35	NGS	97	JT
S16T021641				Decane, 3,7-dimethyl-	17312-54-8	5.05	NGS	30	JNT
S16T021641				Acetophenone	98-86-2	5.18	NGS	11	JNT
S16T021641				Undecane	1120-21-4	5.45	NGS	69	JNT
S16T021641				Undecane, 2,6-dimethyl-	17301-23-4	5.49	NGS	15	JNT
S16T021641				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	76	JNT
S16T021641				Benzothiazole	95-16-9	6.60	NGS	52	JNT
S16T021641				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	27	JNT
S16T021641				Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.26	NGS	26	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-G1
Customer Sample ID: 16-06173-1-G1

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021642				Undecane	1120-21-4	5.44	NGS	5.5	JNT

NA = Not Analyzed, ND = Not Detected

T - Tentatively Identified Compound
Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

C.27

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-H1
Customer Sample ID: 16-06173-1-H1

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021643				Unknown-1		4.35	NGS	79	JT
S16T021643				Undecane	1120-21-4	5.44	NGS	21	JNT
S16T021643				Undecane, 2,6-dimethyl-	17301-23-4	5.49	NGS	11	JNT
S16T021643				Decamethlycyclopentasiloxane	541-02-6	5.71	NGS	38	JNT
S16T021643				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.89	NGS	7.1	JNT

C.28

NA = Not Analyzed, ND = Not Detected

T - Tentatively Identified Compound
Q - Qualitative
N - Named TIC
E - Outside Calibration Range
J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162142
SDG Number:
Customer Sample ID: 16-06173-1-H2
Customer Sample ID: 16-06173-1-H2

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021644				Unknown-1		4.35	NGS	85	JT
S16T021644				Acetophenone	98-86-2	5.18	NGS	5.5	JNT
S16T021644				Decane	124-18-5	5.45	NGS	27	JNT
S16T021644				Decamethlycyclopentasiloxane	541-02-6	5.71	NGS	91	JNT
S16T021644				Unknown-2		6.64	NGS	27	JT
S16T021644				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.89	NGS	9.7	JNT

C.29

NA = Not Analyzed, ND = Not Detected

T - Tentatively Identified Compound
Q - Qualitative

N - Named TIC

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021645			Unknown-1		4.35	NGS	230	JT
S16T021645			Unknown-2		4.83	NGS	47	JT
S16T021645			2,6-Dimethyldecane	13150-81-7	5.05	NGS	39	JNT
S16T021645			Decane, 2,4,6-trimethyl-	62108-27-4	5.10	NGS	10	JNT
S16T021645			Acetophenone	98-86-2	5.19	NGS	24	JNT
S16T021645			Undecane	1120-21-4	5.45	NGS	99	JNT
S16T021645			Nonanal	124-19-6	5.50	NGS	26	JNT
S16T021645			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	150	JNT
S16T021645			Benzothiazole	95-16-9	6.61	NGS	78	JNT
S16T021645			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	46	JNT
S16T021645			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	73	JNT
S16T021645			Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.26	NGS	33	JNT

NA = Not Analyzed, ND = Not Detected

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

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2														
S16T021620		3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021620		95-48-7	2-Methylphenol	NGS	93	<4.9	10	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021620		108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021620		92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021620		78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021620		84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021620		112-40-3	Dodecane	NGS	98	<0.60	63	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021620		544-76-3	Hexadecane-	NGS	95	<3.3	4.6	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021620		629-59-4	Tetradecane	NGS	95	<3.9	7.5	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021620		126-73-8	Tributyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	QU
S16T021620		629-50-5	Tridecane	NGS	90	<1.6	22	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021620		629-78-7	Heptadecane	NGS	94	<2.4	6.0	n/a	n/a	n/a	n/a	2.4	n/a	JQ
S16T021620		629-62-9	Pentadecane	NGS	96	<3.0	7.8	n/a	n/a	n/a	n/a	3.0	n/a	J

8/25/16

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T - Tentatively Identified Compound
U - Less Than Detection Limit
N - Named TIC
J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021621			3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021621			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021621			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021621			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021621			78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021621			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021621			112-40-3	Dodecane	NGS	98	<0.60	71	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021621			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S16T021621			629-59-4	Tetradecane	NGS	95	<3.9	5.8	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021621			126-73-8	Tributyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021621			629-50-5	Tridecane	NGS	90	<1.6	20	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021621			629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	U
S16T021621			629-62-9	Pentadecane	NGS	96	<3.0	4.7	n/a	n/a	n/a	n/a	3.0	n/a	J

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U - Less Than Detection Limit

N - Named TIC

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

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162141
SDG Number:
Customer Sample ID: 16-06172-1-B1
Customer Sample ID: 16-06172-1-B1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021622			3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021622			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021622			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021622			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021622			78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021622			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021622			112-40-3	Dodecane	NGS	98	<0.60	92	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021622			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S16T021622			629-59-4	Tetradecane	NGS	95	<3.9	6.2	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021622			126-73-8	Tributyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021622			629-50-5	Tridecane	NGS	90	<1.6	26	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021622			629-78-7	Heptadecane	NGS	94	<2.4	2.9	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021622			629-62-9	Pentadecane	NGS	96	<3.0	5.0	n/a	n/a	n/a	n/a	3.0	n/a	J

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U - Less Than Detection Limit

N - Named TIC

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

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021623			3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021623			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021623			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021623			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021623			78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021623			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021623			112-40-3	Dodecane	NGS	98	<0.60	0.70	n/a	n/a	n/a	n/a	0.55	n/a	J
S16T021623			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S16T021623			629-59-4	Tetradecane	NGS	95	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021623			126-73-8	Tributyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021623			629-50-5	Tridecane	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	U
S16T021623			629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	U
S16T021623			629-62-9	Pentadecane	NGS	96	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	U

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U - Less Than Detection Limit

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021624			3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021624			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021624			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021624			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021624			78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021624			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021624			112-40-3	Dodecane	NGS	98	<0.60	94	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021624			544-76-3	Hexadecane-	NGS	95	<3.3	5.1	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021624			629-59-4	Tetradecane	NGS	95	<3.9	8.7	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021624			126-73-8	Tributyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021624			629-50-5	Tridecane	NGS	90	<1.6	44	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021624			629-78-7	Heptadecane	NGS	94	<2.4	5.5	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021624			629-62-9	Pentadecane	NGS	96	<3.0	10	n/a	n/a	n/a	n/a	3.0	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021625			3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021625			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021625			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021625			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021625			78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021625			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021625			112-40-3	Dodecane	NGS	98	<0.60	25	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021625			544-76-3	Hexadecane-	NGS	95	<3.3	4.2	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021625			629-59-4	Tetradecane	NGS	95	<3.9	5.1	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021625			126-73-8	Tributyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021625			629-50-5	Tridecane	NGS	90	<1.6	7.0	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021625			629-78-7	Heptadecane	NGS	94	<2.4	4.8	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021625			629-62-9	Pentadecane	NGS	96	<3.0	6.5	n/a	n/a	n/a	n/a	3.0	n/a	J

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021626			3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021626			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021626			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021626			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021626			78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021626			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021626			112-40-3	Dodecane	NGS	98	<0.60	42	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021626			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S16T021626			629-59-4	Tetradecane	NGS	95	<3.9	4.1	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021626			126-73-8	Tributyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021626			629-50-5	Tridecane	NGS	90	<1.6	13	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021626			629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	U
S16T021626			629-62-9	Pentadecane	NGS	96	<3.0	4.3	n/a	n/a	n/a	n/a	3.0	n/a	J

E - Outside Calibration Range
Q - Qualitative

T - Tentatively Identified Compound
U - Less Than Detection Limit

N - Named TIC

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

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021627			3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	U
S16T021627			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	U
S16T021627			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021627			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	U
S16T021627			78-46-6	Dibutyl butylphosphonate	NGS	97	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	U
S16T021627			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	U
S16T021627			112-40-3	Dodecane	NGS	98	<0.60	68	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021627			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	U
S16T021627			629-59-4	Tetradecane	NGS	95	<3.9	7.2	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021627			126-73-8	Tributyl phosphate	NGS	93	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	U
S16T021627			629-50-5	Tridecane	NGS	90	<1.6	29	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021627			629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	U
S16T021627			629-62-9	Pentadecane	NGS	96	<3.0	6.8	n/a	n/a	n/a	n/a	3.0	n/a	J

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E - Outside Calibration Range
Q - Qualitative
T - Tentatively Identified Compound
U - Less Than Detection Limit
N - Named TIC
J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021628			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021628			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021628			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021628			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021628			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021628			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021628			112-40-3	Dodecane	NGS	97	<0.55	32	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021628			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021628			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021628			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021628			629-50-5	Tridecane	NGS	94	<1.6	8.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021628			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021628			629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021629			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021629			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021629			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021629			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021629			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021629			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021629			112-40-3	Dodecane	NGS	97	<0.55	33	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021629			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021629			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021629			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021629			629-50-5	Tridecane	NGS	94	<1.6	9.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021629			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021629			629-62-9	Pentadecane	NGS	100	<3.0	3.0	n/a	n/a	n/a	n/a	3.0	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021630			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021630			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021630			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021630			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021630			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021630			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021630			112-40-3	Dodecane	NGS	97	<0.55	43	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021630			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021630			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021630			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021630			629-50-5	Tridecane	NGS	94	<1.6	16	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021630			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021630			629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162141
SDG Number:
Customer Sample ID: 16-06172-1-H2
Customer Sample ID: 16-06172-1-H2

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021631			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021631			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021631			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021631			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021631			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021631			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021631			112-40-3	Dodecane	NGS	97	<0.55	33	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021631			544-76-3	Hexadecane-	NGS	94	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021631			629-59-4	Tetradecane	NGS	100	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021631			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021631			629-50-5	Tridecane	NGS	94	<1.6	9.5	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021631			629-78-7	Heptadecane	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021631			629-62-9	Pentadecane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021632			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021632			95-48-7	2-Methylphenol	NGS	92	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021632			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021632			92-52-4	Biphenyl	NGS	97	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021632			78-46-6	Dibutyl butylphosphonate	NGS	100	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021632			84-66-2	Diethylphthalate	NGS	90	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021632			112-40-3	Dodecane	NGS	97	<0.55	65	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021632			544-76-3	Hexadecane-	NGS	94	<3.3	3.4	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021632			629-59-4	Tetradecane	NGS	100	<3.9	5.1	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021632			126-73-8	Tributyl phosphate	NGS	99	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021632			629-50-5	Tridecane	NGS	94	<1.6	15	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021632			629-78-7	Heptadecane	NGS	91	<2.4	3.4	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021632			629-62-9	Pentadecane	NGS	100	<3.0	6.8	n/a	n/a	n/a	n/a	3.0	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021620			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	290	JNT
S16T021620			Phenol	108-95-2	4.45	NGS	34	JNT
S16T021620			1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	51	JNT
S16T021620			Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	87	JNT
S16T021620			Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	36	JNT
S16T021620			Acetophenone	98-86-2	5.19	NGS	39	JNT
S16T021620			Unknown-1		5.38	NGS	50	JT
S16T021620			Undecane	1120-21-4	5.45	NGS	160	JNT
S16T021620			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	130	JNT
S16T021620			Undecane, 3-methyl-	1002-43-3	6.05	NGS	7.8	JNT
S16T021620			Ethanol, 2-phenoxy-	122-99-6	6.56	NGS	66	JNT
S16T021620			Benzothiazole	95-16-9	6.61	NGS	50	JNT
S16T021620			Decane, 2,3,5,8-tetramethyl-	192823-15-7	6.90	NGS	52	JNT
S16T021620			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.97	NGS	13	JNT
S16T021620			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	58	JNT
S16T021620			Dodecane,4,6-dimethyl	61141-72-8	7.27	NGS	37	JNT
S16T021620			Propanoic acid, 2-methyl-, 1-(	74381-40-1	9.20	NGS	71	JNT

8/25/16

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021621			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	200	JNT
S16T021621			1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	26	JNT
S16T021621			Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	70	JNT
S16T021621			Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	25	JNT
S16T021621			Acetophenone	98-86-2	5.19	NGS	21	JNT
S16T021621			Undecane	1120-21-4	5.45	NGS	150	JNT
S16T021621			Hydroxylamine, O-decyl-	29812-79-1	5.50	NGS	26	JNT
S16T021621			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	120	JNT
S16T021621			Undecane, 3-methyl-	1002-43-3	6.05	NGS	11	JNT
S16T021621			Undecane, 2,6-dimethyl-	17301-23-4	6.40	NGS	5.4	JNT
S16T021621			Benzothiazole	95-16-9	6.61	NGS	75	JNT
S16T021621			Decane, 2,3,5,8-tetramethyl-	192823-15-7	6.90	NGS	60	JNT
S16T021621			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.97	NGS	14	JNT
S16T021621			Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	16	JNT
S16T021621			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	41	JNT
S16T021621			Dodecane,4,6-dimethyl	61141-72-8	7.26	NGS	45	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162141

SDG Number:

Customer Sample ID: 16-06172-1-B1

Customer Sample ID: 16-06172-1-B1

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021622				Propanoic acid, 2,2-dimethyl-	75-98-9	3.16	NGS	32	JNT
S16T021622				Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	230	JNT
S16T021622				Isooctanol	26952-21-6	4.84	NGS	51	JNT
S16T021622				1-Heptanol, 2,4-dimethyl-, (2S	18450-74-3	4.87	NGS	49	JNT
S16T021622				1-Heptanol, 6-methyl-	1653-40-3	4.90	NGS	37	JNT
S16T021622				Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	90	JNT
S16T021622				Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	28	JNT
S16T021622				Acetophenone	98-86-2	5.19	NGS	29	JNT
S16T021622				Hexyl octyl ether	17071-54-4	5.39	NGS	43	JNT
S16T021622				Undecane	1120-21-4	5.45	NGS	210	JNT
S16T021622				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	110	JNT
S16T021622				Undecane, 2,6-dimethyl-	17301-23-4	6.41	NGS	6.8	JNT
S16T021622				1,2-Benzisothiazole	272-16-2	6.62	NGS	82	JNT
S16T021622				Ethylene diacrylate	2274-11-5	6.68	NGS	32	JNT
S16T021622				Decane, 2,3,5,8-tetramethyl-	192823-15-7	6.91	NGS	53	JNT
S16T021622				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.97	NGS	13	JNT
S16T021622				Undecane, 3,7-dimethyl-	17301-29-0	7.02	NGS	14	JNT
S16T021622				Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	48	JNT
S16T021622				Dodecane,4,6-dimethyl	61141-72-8	7.27	NGS	46	JNT

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E - Outside Calibration Range
J - Estimated

U - Less Than Detection Limit

N - Named TIC

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021624			Propanoic acid, 2,2-dimethyl-	75-98-9	3.15	NGS	31	JNT
S16T021624			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	230	JNT
S16T021624			1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	33	JNT
S16T021624			Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	71	JNT
S16T021624			Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	25	JNT
S16T021624			Acetophenone	98-86-2	5.19	NGS	31	JNT
S16T021624			Hexyl octyl ether	17071-54-4	5.39	NGS	27	JNT
S16T021624			Undecane	1120-21-4	5.45	NGS	150	JNT
S16T021624			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	98	JNT
S16T021624			Undecane, 3-methyl-	1002-43-3	6.05	NGS	6.6	JNT
S16T021624			Benzothiazole	95-16-9	6.62	NGS	71	JNT
S16T021624			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	46	JNT
S16T021624			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.97	NGS	12	JNT
S16T021624			Undecane, 3,7-dimethyl-	17301-29-0	7.02	NGS	10	JNT
S16T021624			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	45	JNT
S16T021624			Dodecane,4,6-dimethyl	61141-72-8	7.27	NGS	38	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021625				Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	190	JNT
S16T021625				Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	50	JNT
S16T021625				Decane, 2,4,6-trimethyl-	62108-27-4	5.10	NGS	19	JNT
S16T021625				Acetophenone	98-86-2	5.18	NGS	27	JNT
S16T021625				Undecane	1120-21-4	5.45	NGS	94	JNT
S16T021625				Undecane, 2,6-dimethyl-	17301-23-4	5.49	NGS	16	JNT
S16T021625				Decamethlycyclopentasiloxane	541-02-6	5.71	NGS	100	JNT
S16T021625				Undecane, 3-methyl-	1002-43-3	6.05	NGS	5.0	JNT
S16T021625				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.90	NGS	29	JNT
S16T021625				Dodecane, 2,6,11-triemthyl-	31295-56-4	6.96	NGS	6.2	JNT
S16T021625				Dodecane,4,6-dimethyl	61141-72-8	7.26	NGS	16	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021626			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	180	JNT
S16T021626			1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	28	JNT
S16T021626			3,3-Dimethylhexane	563-16-6	4.88	NGS	37	JNT
S16T021626			Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	63	JNT
S16T021626			Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	20	JNT
S16T021626			Acetophenone	98-86-2	5.18	NGS	24	JNT
S16T021626			Undecane	1120-21-4	5.45	NGS	120	JNT
S16T021626			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	120	JNT
S16T021626			Undecane, 2-methyl-	7045-71-8	6.00	NGS	5.5	JNT
S16T021626			Undecane, 3-methyl-	1002-43-3	6.05	NGS	5.2	JNT
S16T021626			Benzothiazole	95-16-9	6.60	NGS	69	JNT
S16T021626			Decane, 2,3,5,8-tetramethyl-	192823-15-7	6.90	NGS	41	JNT
S16T021626			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.96	NGS	9.3	JNT
S16T021626			Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	9.8	JNT
S16T021626			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	45	JNT
S16T021626			Dodecane,4,6-dimethyl	61141-72-8	7.26	NGS	28	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021627			3-Methoxy-3-methylbutanol	56539-66-3	3.92	NGS	36	JNT
S16T021627			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	200	JNT
S16T021627			2,2,7,7-Tetramethyloctane	1071-31-4	4.49	NGS	65	JNT
S16T021627			Nonane, 2,2,3-trimethyl-	55499-04-2	4.77	NGS	28	JNT
S16T021627			1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	68	JNT
S16T021627			Octane, 2,3,6,7-tetramethyl-	52670-34-5	4.89	NGS	93	JNT
S16T021627			Octane, 3,5-dimethyl-	15869-93-9	5.06	NGS	85	JNT
S16T021627			Decane, 2,5,9-trimethyl-	62108-22-9	5.14	NGS	37	JNT
S16T021627			Acetophenone	98-86-2	5.19	NGS	11	JNT
S16T021627			2,6-Dimethyldecane	13150-81-7	5.25	NGS	59	JNT
S16T021627			Undecane	1120-21-4	5.45	NGS	120	JNT
S16T021627			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	83	JNT
S16T021627			Benzothiazole	95-16-9	6.61	NGS	40	JNT
S16T021627			Decane, 2,3,5,8-tetramethyl-	192823-15-7	6.90	NGS	29	JNT
S16T021627			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	26	JNT
S16T021627			Dodecane, 2,6,11-trimethyl-	31295-56-4	7.26	NGS	24	JNT
S16T021627			Undecane, 2-methyl-	7045-71-8	7.33	NGS	9.5	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021628			Unknown-1		4.35	NGS	110	JT
S16T021628			2,6-Dimethyldecane	13150-81-7	5.06	NGS	32	JNT
S16T021628			Acetophenone	98-86-2	5.18	NGS	16	JNT
S16T021628			Undecane	1120-21-4	5.44	NGS	73	JNT
S16T021628			Decamethlycyclopentasiloxane	541-02-6	5.71	NGS	67	JNT
S16T021628			Benzothiazole	95-16-9	6.60	NGS	41	JNT
S16T021628			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	22	JNT

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J - Estimated

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N - Named TIC

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021629			Unknown-1		4.35	NGS	130	JT
S16T021629			Decane, 3,7-dimethyl-	17312-54-8	5.05	NGS	35	JNT
S16T021629			Acetophenone	98-86-2	5.18	NGS	12	JNT
S16T021629			Undecane	1120-21-4	5.45	NGS	77	JNT
S16T021629			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	110	JNT
S16T021629			Benzothiazole	95-16-9	6.59	NGS	34	JNT
S16T021629			Methenamine	100-97-0	6.66	NGS	18	JNT
S16T021629			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	31	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021630			Unknown-1		4.35	NGS	220	JT
S16T021630			Phenol	108-95-2	4.42	NGS	30	JNT
S16T021630			1-Hexanol, 2-ethyl-	104-76-7	4.82	NGS	29	JNT
S16T021630			Acetophenone	98-86-2	5.18	NGS	18	JNT
S16T021630			Undecane	1120-21-4	5.45	NGS	100	JNT
S16T021630			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	88	JNT
S16T021630			Benzothiazole	95-16-9	6.60	NGS	45	JNT
S16T021630			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	25	JNT
S16T021630			2,2,4-Trimethyl-1,3-pentanedio	6846-50-0	9.18	NGS	26	JNT

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Q - Qualitative

E - Outside Calibration Range
J - Estimated

U - Less Than Detection Limit

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N - Named TIC

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162141
SDG Number:
Customer Sample ID: 16-06172-1-H2
Customer Sample ID: 16-06172-1-H2

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021631			Unknown-1		4.35	NGS	98	JT
S16T021631			Acetophenone	98-86-2	5.19	NGS	11	JNT
S16T021631			Undecane	1120-21-4	5.45	NGS	65	JNT
S16T021631			Undecane, 2,6-dimethyl-	17301-23-4	5.49	NGS	14	JNT
S16T021631			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	79	JNT
S16T021631			Benzothiazole	95-16-9	6.60	NGS	37	JNT
S16T021631			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	19	JNT

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E - Outside Calibration Range
J - Estimated
U - Less Than Detection Limit
N - Named TIC

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021632				2-Butoxyethanol	111-76-2	3.71	NGS	17	JNT
S16T021632				Unknown-1		4.35	NGS	370	JT
S16T021632				Phenol	108-95-2	4.43	NGS	31	JNT
S16T021632				Unknown-2		4.84	NGS	46	JT
S16T021632				Methyltris(trimethylsiloxy)sil	17928-28-8	5.00	NGS	27	JNT
S16T021632				Decane, 3,7-dimethyl-	17312-54-8	5.06	NGS	67	JNT
S16T021632				Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	23	JNT
S16T021632				Acetophenone	98-86-2	5.19	NGS	19	JNT
S16T021632				Undecane	1120-21-4	5.45	NGS	150	JNT
S16T021632				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	20	JNT
S16T021632				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	150	JNT
S16T021632				Benzothiazole	95-16-9	6.62	NGS	81	JNT
S16T021632				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	49	JNT
S16T021632				Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	71	JNT
S16T021632				Undecane, 3,7-dimethyl-	17301-29-0	7.27	NGS	35	JNT
S16T021632				2,2,4-Trimethyl-1,3-pentanedio	6846-50-0	9.18	NGS	28	JNT

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U - Less Than Detection Limit
N - Named TIC

C.3.2 VOC and VOCTIC

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021648			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021648			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021648			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021648			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021648			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021648			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021648			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021648			123-91-1	1,4-Dioxane	NGS	99	<2.0	3.8	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021648			71-36-3	1-Butanol	NGS	110	<4.3	310	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021648			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021648			71-23-8	1-Propanol	NGS	100	<8.9	110	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021648			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021648			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021648			78-93-3	2-Butanone	NGS	96	<3.1	270	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021648			110-43-0	2-Heptanone	NGS	98	<2.6	9.4	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021648			591-78-6	2-Hexanone	NGS	96	<2.5	16	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021648			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021648			78-94-4	3-Buten-2-one	NGS	93	<1.9	6.6	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021648			106-35-4	3-Heptanone	NGS	100	<2.7	55	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021648			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021648			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021648			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	
S16T021648			67-64-1	Acetone	NGS	86	<2.8	2.7E+03	n/a	n/a	n/a	n/a	2.8	n/a	EY
S16T021648			75-05-8	Acetonitrile	NGS	100	<1.6	280	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021648			98-86-2	Acetophenone	NGS	100	<6.2	10	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021648			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021648			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021648			107-05-1	Allyl Chloride	NGS	99	<2.5	22	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021648			71-43-2	Benzene	NGS	110	<1.5	8.4	n/a	n/a	n/a	n/a	1.5	n/a	J

NA = Not Analyzed, ND = Not Detected

N - Named TIC
Y - Comment

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Q - Qualitative
J - Estimated

E - Outside Calibration Range
T - Tentatively Identified Compound

B - Blank Contamination
L - LLS Outside Range

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021648			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021648			123-72-8	Butanal	NGS	100	<3.0	22	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021648			109-74-0	Butanenitrile	NGS	110	<2.1	38	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021648			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021648			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021648			75-00-3	Chloroethane	NGS	110	<1.6	2.1	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021648			67-66-3	Chloroform	NGS	100	<1.8	7.3	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021648			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021648			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021648			64-17-5	Ethanol	NGS	100	3.8	230	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021648			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021648			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021648			110-00-9	Furan	NGS	95	<1.6	5.0	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021648			110-54-3	Hexane	NGS	96	<1.3	38	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021648			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021648			126-98-7	Methacrylonitrile	NGS	110	<1.8	5.8	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021648			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021648			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021648			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021648			110-59-8	Pentanenitrile	NGS	110	<2.6	12	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021648			107-12-0	Propanenitrile	NGS	100	<1.8	33	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021648			110-86-1	Pyridine	NGS	100	<2.8	20	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021648			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021648			127-18-4	Tetrachloroethene	NGS	100	<1.8	44	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021648			108-88-3	Toluene	NGS	110	<2.2	9.8	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021648			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021648			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	450	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021648			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	
S16T021648			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021648			142-82-5	n-Heptane	NGS	110	<1.6	19	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021648			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021649			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021649			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021649			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021649			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021649			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021649			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021649			123-91-1	1,4-Dioxane	NGS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021649			71-36-3	1-Butanol	NGS	110	<4.3	7.2	n/a	n/a	n/a	n/a	4.3	n/a	J
S16T021649			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021649			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021649			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021649			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021649			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021649			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021649			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021649			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021649			78-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021649			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021649			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021649			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021649			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021649			67-64-1	Acetone	NGS	86	<2.8	20	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021649			75-05-8	Acetonitrile	NGS	100	<1.6	97	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021649			98-86-2	Acetophenone	NGS	100	<6.2	9.6	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021649			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021649			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021649			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021649			71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021649			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021649			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021649			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021649			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021649			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021649			75-00-3	Chloroethane	NGS	110	<1.6	2.1	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021649			67-66-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021649			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021649			64-17-5	Ethanol	NGS	100	3.8	17	n/a	n/a	n/a	n/a	3.7	n/a	BJ
S16T021649			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021649			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021649			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021649			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021649			126-98-7	Methacrylonitrile	NGS	110	<1.8	3.5	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021649			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021649			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021649			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021649			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021649			107-12-0	Propanenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021649			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021649			127-18-4	Tetrachloroethene	NGS	100	<1.8	130	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			108-88-3	Toluene	NGS	110	<2.2	3.3	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021649			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021649			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	5.7	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021649			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021649			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

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

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021650			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021650			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021650			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021650			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021650			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021650			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021650			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021650			123-91-1	1,4-Dioxane	NGS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021650			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021650			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021650			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021650			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021650			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021650			78-93-3	2-Butanone	NGS	96	<3.1	3.2	n/a	n/a	n/a	n/a	3.1	n/a	J
S16T021650			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021650			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021650			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021650			78-94-4	3-Buten-2-one	NGS	93	<1.9	2.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021650			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021650			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021650			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021650			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	
S16T021650			67-64-1	Acetone	NGS	86	<2.8	74	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021650			75-05-8	Acetonitrile	NGS	100	<1.6	300	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021650			98-86-2	Acetophenone	NGS	100	<6.2	14	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021650			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021650			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021650			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021650			71-43-2	Benzene	NGS	110	<1.5	1.7	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021650			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021650			123-72-8	Butanal	NGS	100	<3.0	3.2	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021650			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021650			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021650			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021650			75-00-3	Chloroethane	NGS	110	<1.6	2.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021650			67-66-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021650			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021650			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021650			64-17-5	Ethanol	NGS	100	3.8	81	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021650			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021650			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021650			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021650			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021650			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021650			126-98-7	Methacrylonitrile	NGS	110	<1.8	5.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021650			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021650			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021650			98-95-3	Nitrobenzene	NGS	94	<4.7	11	n/a	n/a	n/a	n/a	4.7	n/a	J
S16T021650			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021650			107-12-0	Propanenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021650			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021650			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021650			127-18-4	Tetrachloroethene	NGS	100	<1.8	100	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021650			108-88-3	Toluene	NGS	110	<2.2	3.2	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021650			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021650			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	92	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021650			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	
S16T021650			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021650			142-82-5	n-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021650			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021651			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	Q
S16T021651			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	Q
S16T021651			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021651			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021651			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021651			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021651			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	Q
S16T021651			123-91-1	1,4-Dioxane	NGS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021651			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021651			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	Q
S16T021651			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021651			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	Q
S16T021651			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021651			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021651			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021651			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	Q
S16T021651			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021651			78-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021651			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	Q
S16T021651			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	Q
S16T021651			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021651			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	
S16T021651			67-64-1	Acetone	NGS	86	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021651			75-05-8	Acetonitrile	NGS	100	<1.6	71	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021651			98-86-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	Q
S16T021651			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021651			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021651			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021651			71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021651			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	Q
S16T021651			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021651			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021651			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021651			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	Q
S16T021651			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021651			67-66-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021651			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021651			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	Q
S16T021651			64-17-5	Ethanol	NGS	100	3.8	7.0	n/a	n/a	n/a	n/a	3.7	n/a	BJ
S16T021651			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021651			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021651			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021651			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021651			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021651			126-98-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021651			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021651			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	Q
S16T021651			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	Q
S16T021651			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021651			107-12-0	Propanenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021651			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021651			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	Q
S16T021651			127-18-4	Tetrachloroethene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	Q
S16T021651			108-88-3	Toluene	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	Q
S16T021651			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021651			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021651			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	
S16T021651			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q

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Cartridge Evaluation
Data Summary of All Results

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

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

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021652			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021652			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021652			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021652			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021652			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021652			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021652			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021652			123-91-1	1,4-Dioxane	NGS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021652			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021652			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021652			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021652			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021652			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021652			78-93-3	2-Butanone	NGS	96	<3.1	3.2	n/a	n/a	n/a	n/a	3.1	n/a	J
S16T021652			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021652			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021652			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021652			78-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021652			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021652			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021652			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021652			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021652			67-64-1	Acetone	NGS	86	<2.8	380	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021652			75-05-8	Acetonitrile	NGS	100	<1.6	430	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021652			98-86-2	Acetophenone	NGS	100	<6.2	14	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021652			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021652			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021652			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021652			71-43-2	Benzene	NGS	110	<1.5	1.9	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021652			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021652			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021652			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021652			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021652			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021652			75-00-3	Chloroethane	NGS	110	<1.6	2.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021652			67-66-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021652			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021652			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021652			64-17-5	Ethanol	NGS	100	3.8	200	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021652			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021652			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021652			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021652			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021652			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021652			126-98-7	Methacrylonitrile	NGS	110	<1.8	8.0	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021652			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021652			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021652			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021652			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021652			107-12-0	Propanenitrile	NGS	100	<1.8	2.8	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021652			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021652			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021652			127-18-4	Tetrachloroethene	NGS	100	<1.8	78	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021652			108-88-3	Toluene	NGS	110	<2.2	3.0	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021652			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021652			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	330	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021652			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	
S16T021652			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021652			142-82-5	n-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021652			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021653			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021653			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021653			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021653			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021653			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021653			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021653			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021653			123-91-1	1,4-Dioxane	NGS	99	<2.0	2.5	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021653			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021653			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021653			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021653			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021653			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021653			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021653			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021653			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021653			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021653			78-94-4	3-Buten-2-one	NGS	93	<1.9	6.0	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021653			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021653			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021653			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021653			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	
S16T021653			67-64-1	Acetone	NGS	86	<2.8	700	n/a	n/a	n/a	n/a	2.8	n/a	E
S16T021653			75-05-8	Acetonitrile	NGS	100	<1.6	1.8E+03	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021653			98-86-2	Acetophenone	NGS	100	<6.2	9.6	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021653			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021653			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021653			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021653			71-43-2	Benzene	NGS	110	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021653			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021653			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021653			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021653			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021653			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021653			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021653			67-66-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021653			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021653			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021653			64-17-5	Ethanol	NGS	100	3.8	160	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021653			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021653			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021653			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021653			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021653			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021653			126-98-7	Methacrylonitrile	NGS	110	<1.8	4.5	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021653			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021653			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021653			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021653			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021653			107-12-0	Propanenitrile	NGS	100	<1.8	6.0	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021653			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021653			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021653			127-18-4	Tetrachloroethene	NGS	100	<1.8	78	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021653			108-88-3	Toluene	NGS	110	<2.2	2.3	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021653			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021653			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	220	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021653			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	
S16T021653			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021653			142-82-5	n-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021653			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021654			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021654			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021654			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021654			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021654			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021654			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021654			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021654			123-91-1	1,4-Dioxane	NGS	99	<2.0	5.6	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021654			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021654			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021654			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021654			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021654			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021654			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021654			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021654			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021654			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021654			78-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021654			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021654			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021654			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021654			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	
S16T021654			67-64-1	Acetone	NGS	86	<2.8	1.3E+03	n/a	n/a	n/a	n/a	2.8	n/a	E
S16T021654			75-05-8	Acetonitrile	NGS	100	<1.6	450	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021654			98-86-2	Acetophenone	NGS	100	<6.2	8.2	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021654			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021654			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021654			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021654			71-43-2	Benzene	NGS	110	<1.5	1.7	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021654			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021654			123-72-8	Butanal	NGS	100	<3.0	5.1	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021654			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021654			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021654			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021654			75-00-3	Chloroethane	NGS	110	<1.6	1.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021654			67-66-3	Chloroform	NGS	100	<1.8	1.8	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021654			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021654			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021654			64-17-5	Ethanol	NGS	100	3.8	240	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021654			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021654			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021654			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021654			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021654			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021654			126-98-7	Methacrylonitrile	NGS	110	<1.8	3.2	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021654			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021654			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021654			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021654			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021654			107-12-0	Propanenitrile	NGS	100	<1.8	15	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021654			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021654			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021654			127-18-4	Tetrachloroethene	NGS	100	<1.8	42	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021654			108-88-3	Toluene	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021654			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021654			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	670	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021654			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	
S16T021654			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021654			142-82-5	n-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021654			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021655			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021655			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021655			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021655			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021655			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021655			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021655			123-91-1	1,4-Dioxane	NGS	99	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021655			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021655			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021655			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021655			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021655			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021655			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021655			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021655			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021655			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021655			78-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021655			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021655			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021655			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021655			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021655			67-64-1	Acetone	NGS	86	<2.8	17	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021655			75-05-8	Acetonitrile	NGS	100	<1.6	19	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021655			98-86-2	Acetophenone	NGS	100	<6.2	8.2	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021655			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021655			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021655			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021655			71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021655			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021655			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021655			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021655			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021655			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021655			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021655			67-66-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021655			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021655			64-17-5	Ethanol	NGS	100	3.8	9.6	n/a	n/a	n/a	n/a	3.7	n/a	BJ
S16T021655			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021655			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021655			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021655			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021655			126-98-7	Methacrylonitrile	NGS	110	<1.8	2.1	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021655			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021655			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021655			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021655			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021655			107-12-0	Propanenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021655			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021655			127-18-4	Tetrachloroethene	NGS	100	<1.8	140	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021655			108-88-3	Toluene	NGS	110	<2.2	3.8	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021655			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021655			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021655			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	
S16T021655			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

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

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021656			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021656			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021656			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021656			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021656			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021656			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021656			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021656			123-91-1	1,4-Dioxane	NGS	99	<2.0	3.2	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021656			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021656			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021656			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021656			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021656			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021656			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021656			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021656			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021656			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021656			78-94-4	3-Buten-2-one	NGS	93	<1.9	13	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021656			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021656			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021656			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021656			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	
S16T021656			67-64-1	Acetone	NGS	86	<2.8	1.8E+03	n/a	n/a	n/a	n/a	2.8	n/a	E
S16T021656			75-05-8	Acetonitrile	NGS	100	<1.6	480	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021656			98-86-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021656			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021656			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021656			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021656			71-43-2	Benzene	NGS	110	<1.5	1.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021656			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021656			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021656			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021656			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021656			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021656			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021656			67-66-3	Chloroform	NGS	100	<1.8	4.1	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021656			110-82-7	Cyclohexane	NGS	99	<1.4	1.5	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021656			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021656			64-17-5	Ethanol	NGS	100	3.8	200	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021656			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021656			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021656			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021656			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021656			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021656			126-98-7	Methacrylonitrile	NGS	110	<1.8	2.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021656			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021656			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021656			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021656			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021656			107-12-0	Propanenitrile	NGS	100	<1.8	22	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021656			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021656			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021656			127-18-4	Tetrachloroethene	NGS	100	<1.8	31	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021656			108-88-3	Toluene	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021656			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021656			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	500	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021656			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021656			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021656			142-82-5	n-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021656			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021657			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021657			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021657			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021657			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021657			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021657			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021657			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021657			123-91-1	1,4-Dioxane	NGS	99	<2.0	6.0	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021657			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021657			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021657			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021657			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021657			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021657			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021657			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021657			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021657			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021657			78-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021657			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021657			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021657			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021657			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	
S16T021657			67-64-1	Acetone	NGS	86	<2.8	1.3E+03	n/a	n/a	n/a	n/a	2.8	n/a	E
S16T021657			75-05-8	Acetonitrile	NGS	100	<1.6	640	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021657			98-86-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021657			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021657			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021657			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021657			71-43-2	Benzene	NGS	110	<1.5	1.5	n/a	n/a	n/a	n/a	1.5	n/a	J

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Data Summary of All Results

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

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VAPOR-TDU VOA #2															
S16T021657			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021657			123-72-8	Butanal	NGS	100	<3.0	4.9	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021657			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021657			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021657			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021657			75-00-3	Chloroethane	NGS	110	<1.6	1.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021657			67-66-3	Chloroform	NGS	100	<1.8	4.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021657			110-82-7	Cyclohexane	NGS	99	<1.4	1.8	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021657			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021657			64-17-5	Ethanol	NGS	100	3.8	170	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021657			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021657			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021657			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021657			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021657			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021657			126-98-7	Methacrylonitrile	NGS	110	<1.8	2.2	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021657			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021657			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021657			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021657			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021657			107-12-0	Propanenitrile	NGS	100	<1.8	21	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021657			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021657			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021657			127-18-4	Tetrachloroethene	NGS	100	<1.8	14	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021657			108-88-3	Toluene	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021657			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021657			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	400	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021657			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	
S16T021657			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Customer Sample ID: 16-06172-2-G1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021657			142-82-5	n-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021657			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021658			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021658			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021658			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021658			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021658			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021658			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021658			123-91-1	1,4-Dioxane	NGS	99	<2.0	4.3	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021658			71-36-3	1-Butanol	NGS	110	<4.3	250	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021658			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021658			71-23-8	1-Propanol	NGS	100	<8.9	69	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021658			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021658			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021658			78-93-3	2-Butanone	NGS	96	<3.1	180	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021658			110-43-0	2-Heptanone	NGS	98	<2.6	5.6	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021658			591-78-6	2-Hexanone	NGS	96	<2.5	10	n/a	n/a	n/a	n/a	2.5	n/a	J
S16T021658			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021658			78-94-4	3-Buten-2-one	NGS	93	<1.9	7.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021658			106-35-4	3-Heptanone	NGS	100	<2.7	33	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021658			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021658			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021658			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021658			67-64-1	Acetone	NGS	86	<2.8	2.6E+03	n/a	n/a	n/a	n/a	2.8	n/a	EY
S16T021658			75-05-8	Acetonitrile	NGS	100	<1.6	780	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021658			98-86-2	Acetophenone	NGS	100	<6.2	6.3	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021658			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021658			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021658			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021658			71-43-2	Benzene	NGS	110	<1.5	6.5	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021658			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021658			123-72-8	Butanal	NGS	100	<3.0	17	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021658			109-74-0	Butanenitrile	NGS	110	<2.1	26	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021658			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021658			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021658			75-00-3	Chloroethane	NGS	110	<1.6	1.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021658			67-66-3	Chloroform	NGS	100	<1.8	4.7	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021658			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021658			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021658			64-17-5	Ethanol	NGS	100	3.8	210	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021658			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021658			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021658			110-54-3	Hexane	NGS	96	<1.3	26	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021658			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021658			126-98-7	Methacrylonitrile	NGS	110	<1.8	3.8	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021658			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021658			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021658			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021658			110-59-8	Pentanenitrile	NGS	110	<2.6	4.5	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021658			107-12-0	Propanenitrile	NGS	100	<1.8	30	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			110-86-1	Pyridine	NGS	100	<2.8	15	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021658			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021658			127-18-4	Tetrachloroethene	NGS	100	<1.8	18	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021658			108-88-3	Toluene	NGS	110	<2.2	4.0	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021658			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021658			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	430	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021658			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	
S16T021658			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021658			142-82-5	n-Heptane	NGS	110	<1.6	100	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021658			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021659			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021659			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021659			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021659			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021659			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021659			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021659			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021659			123-91-1	1,4-Dioxane	NGS	99	<2.0	2.1	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021659			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021659			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021659			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021659			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021659			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021659			78-93-3	2-Butanone	NGS	96	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021659			110-43-0	2-Heptanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021659			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021659			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021659			78-94-4	3-Buten-2-one	NGS	93	<1.9	14	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021659			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021659			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021659			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021659			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	
S16T021659			67-64-1	Acetone	NGS	86	<2.8	1.8E+03	n/a	n/a	n/a	n/a	2.8	n/a	E
S16T021659			75-05-8	Acetonitrile	NGS	100	<1.6	620	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021659			98-86-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021659			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021659			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021659			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021659			71-43-2	Benzene	NGS	110	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021659			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021659			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021659			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021659			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021659			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021659			75-00-3	Chloroethane	NGS	110	<1.6	1.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021659			67-66-3	Chloroform	NGS	100	<1.8	3.7	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021659			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021659			124-18-5	Decane	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021659			64-17-5	Ethanol	NGS	100	3.8	180	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021659			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021659			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021659			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021659			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021659			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021659			126-98-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021659			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021659			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021659			98-95-3	Nitrobenzene	NGS	94	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021659			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021659			107-12-0	Propanenitrile	NGS	100	<1.8	22	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021659			110-86-1	Pyridine	NGS	100	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021659			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021659			127-18-4	Tetrachloroethene	NGS	100	<1.8	12	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021659			108-88-3	Toluene	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021659			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021659			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	440	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021659			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	
S16T021659			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021659			142-82-5	n-Heptane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021659			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021660			79-34-5	1,1,2,2-Tetrachloroethane	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021660			79-00-5	1,1,2-Trichloroethane	NGS	100	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021660			75-34-3	1,1-Dichloroethane	NGS	99	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021660			75-35-4	1,1-Dichloroethene	NGS	93	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021660			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021660			542-75-6	1,3-Dichloropropene (Total)	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			106-46-7	1,4-Dichlorobenzene	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021660			123-91-1	1,4-Dioxane	NGS	99	<2.0	2.3	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021660			71-36-3	1-Butanol	NGS	110	<4.3	5.6	n/a	n/a	n/a	n/a	4.3	n/a	J
S16T021660			111-70-6	1-Heptanol	NGS	98	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021660			71-23-8	1-Propanol	NGS	100	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021660			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021660			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021660			78-93-3	2-Butanone	NGS	96	<3.1	3.4	n/a	n/a	n/a	n/a	3.1	n/a	J
S16T021660			110-43-0	2-Heptanone	NGS	98	<2.6	2.8	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021660			591-78-6	2-Hexanone	NGS	96	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021660			534-22-5	2-Methylfuran	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021660			78-94-4	3-Buten-2-one	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021660			106-35-4	3-Heptanone	NGS	100	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021660			106-68-3	3-Octanone	NGS	99	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021660			105-42-0	4-Methyl-2-hexanone	NGS	98	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021660			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	
S16T021660			67-64-1	Acetone	NGS	86	<2.8	37	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021660			75-05-8	Acetonitrile	NGS	100	<1.6	29	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021660			98-86-2	Acetophenone	NGS	100	<6.2	8.1	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021660			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021660			107-18-6	Allyl Alcohol	NGS	96	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021660			107-05-1	Allyl Chloride	NGS	99	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021660			71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021660			100-47-0	Benzonitrile	NGS	100	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021660			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021660			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021660			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021660			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021660			75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021660			67-66-3	Chloroform	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			110-82-7	Cyclohexane	NGS	99	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021660			124-18-5	Decane	NGS	100	<3.3	6.2	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021660			64-17-5	Ethanol	NGS	100	3.8	20	n/a	n/a	n/a	n/a	3.7	n/a	BJ
S16T021660			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			100-41-4	Ethylbenzene	NGS	110	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021660			110-00-9	Furan	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021660			110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021660			628-73-9	Hexanenitrile	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021660			126-98-7	Methacrylonitrile	NGS	110	<1.8	2.0	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021660			75-09-2	Methylene Chloride	NGS	100	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021660			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021660			98-95-3	Nitrobenzene	NGS	94	<4.7	5.6	n/a	n/a	n/a	n/a	4.7	n/a	J
S16T021660			110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021660			107-12-0	Propanenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			110-86-1	Pyridine	NGS	100	<2.8	13	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021660			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021660			127-18-4	Tetrachloroethene	NGS	100	<1.8	8.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021660			108-88-3	Toluene	NGS	110	<2.2	6.9	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021660			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021660			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	6.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021660			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021660			123-86-4	n-Butyl acetate	NGS	93	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021660			142-82-5	n-Heptane	NGS	110	<1.6	3.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021660			10061-02-6	trans-1,3-Dichloropropene	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021648			Acetic acid, anhydride with fo	2258-42-6	11.78	NGS	40	JNT
S16T021648			1-Propen-2-ol, formate	32978-00-0	14.09	NGS	30	JNT
S16T021648			Pentanal	110-62-3	14.32	NGS	40	JNT
S16T021648			Nitric oxide	10102-43-9	14.77	NGS	3.6E+03	JNT
S16T021648			Formamide	75-12-7	14.86	NGS	45	JNT
S16T021648			Hexanal	66-25-1	16.69	NGS	60	JNT
S16T021648			Cyclotetrasiloxane, octamethyl	556-67-2	20.19	NGS	260	JNT
S16T021648			Dodecane	112-40-3	22.78	NGS	160	JNT
S16T021648			Decane, 2,4,6-trimethyl-	62108-27-4	22.92	NGS	57	JNT
S16T021648			2,6-Dimethyldecane	13150-81-7	23.66	NGS	120	JNT
S16T021648			Octane, 4-ethyl-	15869-86-0	23.76	NGS	65	JNT
S16T021648			Unknown-1		24.07	NGS	260	JT
S16T021648			Undecane, 2,6-dimethyl-	17301-23-4	25.11	NGS	58	JNT
S16T021648			Carbamic acid, butylmethyl-, p	54644-61-0	25.68	NGS	47	JNT
S16T021648			1,2-Benzisothiazole	272-16-2	26.18	NGS	38	JNT
S16T021648			Undecane, 2-methyl-	7045-71-8	26.30	NGS	85	JNT
S16T021648			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.49	NGS	74	JNT
S16T021648			Decane, 2,6,8-trimethyl-	62108-26-3	26.88	NGS	49	JNT

8/19/16

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021649				Cyclotetrasiloxane, octamethyl	556-67-2	20.20	NGS	320	JNT
S16T021649				Dodecane	112-40-3	22.78	NGS	140	JNT
S16T021649				Decane, 2,4,6-trimethyl-	62108-27-4	22.92	NGS	55	JNT
S16T021649				2,6-Dimethyldecane	13150-81-7	23.66	NGS	89	JNT
S16T021649				Octane, 4-ethyl-	15869-86-0	23.76	NGS	90	JNT
S16T021649				Unknown-1		24.05	NGS	270	JT
S16T021649				Undecane, 2,6-dimethyl-	17301-23-4	25.10	NGS	63	JNT
S16T021649				1,2-Benzisothiazole	272-16-2	26.16	NGS	160	JNT
S16T021649				Undecane, 2-methyl-	7045-71-8	26.26	NGS	66	JNT
S16T021649				Decane, 2,6,8-trimethyl-	62108-26-3	26.83	NGS	31	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021650			Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	210	JNT
S16T021650			Dodecane	112-40-3	22.79	NGS	140	JNT
S16T021650			Decane, 2,4,6-trimethyl-	62108-27-4	22.93	NGS	48	JNT
S16T021650			2,6-Dimethyldecane	13150-81-7	23.66	NGS	99	JNT
S16T021650			Octane, 4-ethyl-	15869-86-0	23.76	NGS	120	JNT
S16T021650			Unknown-1		24.05	NGS	210	JT
S16T021650			Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	65	JNT
S16T021650			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.23	NGS	53	JNT
S16T021650			Unknown-2		25.83	NGS	48	JT
S16T021650			Methenamine	100-97-0	26.04	NGS	140	JNT
S16T021650			1,2-Benzisothiazole	272-16-2	26.15	NGS	130	JNT
S16T021650			Undecane, 2-methyl-	7045-71-8	26.25	NGS	74	JNT
S16T021650			Decane, 2,6,8-trimethyl-	62108-26-3	26.82	NGS	36	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021651			Unknown-1		24.05	NGS	35	JQT
S16T021651			Unknown-2		26.44	NGS	39	JQT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021652				Formamide	75-12-7	13.99	NGS	25	JNT
S16T021652				Cyclotetrasiloxane, octamethyl	556-67-2	20.20	NGS	230	JNT
S16T021652				Dodecane	112-40-3	22.78	NGS	130	JNT
S16T021652				Decane, 2,4,6-trimethyl-	62108-27-4	22.92	NGS	50	JNT
S16T021652				2,6-Dimethyldecane	13150-81-7	23.65	NGS	94	JNT
S16T021652				Octane, 4-ethyl-	15869-86-0	23.75	NGS	79	JNT
S16T021652				Unknown-1		24.05	NGS	290	JT
S16T021652				Undecane, 2,6-dimethyl-	17301-23-4	25.08	NGS	94	JNT
S16T021652				Unknown-2		25.83	NGS	94	JT
S16T021652				Methenamine	100-97-0	26.03	NGS	110	JNT
S16T021652				1,2-Benzisothiazole	272-16-2	26.14	NGS	150	JNT
S16T021652				Undecane, 2-methyl-	7045-71-8	26.24	NGS	66	JNT
S16T021652				1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.43	NGS	31	JNT
S16T021652				Hexadecane, 2,6,11,15-tetramet	504-44-9	26.80	NGS	34	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021653				Cyclotetrasiloxane, octamethyl	556-67-2	20.20	NGS	140	JNT
S16T021653				Dodecane	112-40-3	22.78	NGS	110	JNT
S16T021653				Decane, 2,4,6-trimethyl-	62108-27-4	22.92	NGS	38	JNT
S16T021653				2,6-Dimethyldecane	13150-81-7	23.65	NGS	79	JNT
S16T021653				Octane, 4-ethyl-	15869-86-0	23.75	NGS	51	JNT
S16T021653				Unknown-1		24.05	NGS	98	JT
S16T021653				1,2-Benzisothiazole	272-16-2	26.15	NGS	80	JNT

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L - LLS Outside Range

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021654				Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	110	JNT
S16T021654				Dodecane	112-40-3	22.79	NGS	74	JNT
S16T021654				Decane, 2,4,6-trimethyl-	62108-27-4	22.93	NGS	27	JNT
S16T021654				2,6-Dimethyldecane	13150-81-7	23.66	NGS	64	JNT
S16T021654				Octane, 4-ethyl-	15869-86-0	23.76	NGS	45	JNT
S16T021654				Unknown-1		24.06	NGS	170	JT
S16T021654				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	42	JNT
S16T021654				1,2-Benzisothiazole	272-16-2	26.16	NGS	89	JNT
S16T021654				Undecane, 2-methyl-	7045-71-8	26.25	NGS	37	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021655			Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	300	JNT
S16T021655			Dodecane	112-40-3	22.79	NGS	100	JNT
S16T021655			Decane, 2,4,6-trimethyl-	62108-27-4	22.93	NGS	35	JNT
S16T021655			2,6-Dimethyldecane	13150-81-7	23.66	NGS	63	JNT
S16T021655			Undecanal	112-44-7	23.78	NGS	56	JNT
S16T021655			Unknown-1		24.05	NGS	220	JT
S16T021655			Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	52	JNT
S16T021655			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.23	NGS	28	JNT
S16T021655			1-Octanol, 3,7-dimethyl-	106-21-8	25.83	NGS	27	JNT
S16T021655			1,2-Benzisothiazole	272-16-2	26.15	NGS	77	JNT
S16T021655			Undecane, 2-methyl-	7045-71-8	26.25	NGS	31	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021656				Formamide	75-12-7	14.87	NGS	47	JNT
S16T021656				Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	97	JNT
S16T021656				Dodecane	112-40-3	22.79	NGS	64	JNT
S16T021656				Decane, 2,4,6-trimethyl-	62108-27-4	22.93	NGS	24	JNT
S16T021656				2,6-Dimethyldecane	13150-81-7	23.66	NGS	55	JNT
S16T021656				Octane, 4-ethyl-	15869-86-0	23.76	NGS	39	JNT
S16T021656				Unknown-1		24.05	NGS	130	JT
S16T021656				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	38	JNT
S16T021656				1,2-Benzisothiazole	272-16-2	26.16	NGS	60	JNT
S16T021656				Undecane, 2-methyl-	7045-71-8	26.25	NGS	30	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021657			Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	120	JNT
S16T021657			Dodecane	112-40-3	22.79	NGS	98	JNT
S16T021657			Decane, 2,4,6-trimethyl-	62108-27-4	22.93	NGS	34	JNT
S16T021657			2,6-Dimethyldecane	13150-81-7	23.66	NGS	66	JNT
S16T021657			Octane, 4-ethyl-	15869-86-0	23.76	NGS	35	JNT
S16T021657			Unknown-1		24.05	NGS	130	JT
S16T021657			Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	26	JNT
S16T021657			Undecane, 2-methyl-	7045-71-8	26.25	NGS	18	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021658			Cyclotrisiloxane, hexamethyl-	541-05-9	16.89	NGS	26	JNT
S16T021658			Cyclotetrasiloxane, octamethyl	556-67-2	20.20	NGS	140	JNT
S16T021658			Dodecane	112-40-3	22.78	NGS	69	JNT
S16T021658			Decane, 2,4,6-trimethyl-	62108-27-4	22.92	NGS	24	JNT
S16T021658			2,6-Dimethyldecane	13150-81-7	23.66	NGS	47	JNT
S16T021658			Octane, 4-ethyl-	15869-86-0	23.75	NGS	29	JNT
S16T021658			Unknown-1		24.05	NGS	140	JT
S16T021658			Undecane, 2,6-dimethyl-	17301-23-4	25.08	NGS	41	JNT
S16T021658			1,2-Benzisothiazole	272-16-2	26.15	NGS	52	JNT
S16T021658			Undecane, 2-methyl-	7045-71-8	26.24	NGS	20	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021659				Formamide	75-12-7	14.87	NGS	61	JNT
S16T021659				Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	89	JNT
S16T021659				Dodecane	112-40-3	22.79	NGS	45	JNT
S16T021659				Decane, 2,4,6-trimethyl-	62108-27-4	22.93	NGS	17	JNT
S16T021659				2,6-Dimethyldecane	13150-81-7	23.66	NGS	38	JNT
S16T021659				Hydroxylamine, O-decyl-	29812-79-1	23.75	NGS	28	JNT
S16T021659				Unknown-1		24.05	NGS	90	JT
S16T021659				Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	38	JNT
S16T021659				1,2-Benzisothiazole	272-16-2	26.16	NGS	30	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021660			Hexanal	66-25-1	16.70	NGS	30	JNT
S16T021660			Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	390	JNT
S16T021660			Dodecane	112-40-3	22.78	NGS	110	JNT
S16T021660			Decane, 2,4,6-trimethyl-	62108-27-4	22.93	NGS	39	JNT
S16T021660			2,6-Dimethyldecane	13150-81-7	23.65	NGS	77	JNT
S16T021660			Octane, 4-ethyl-	15869-86-0	23.75	NGS	58	JNT
S16T021660			Unknown-1	--	24.05	NGS	350	JT
S16T021660			Undecane, 2,6-dimethyl-	17301-23-4	25.08	NGS	46	JNT
S16T021660			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.22	NGS	41	JNT
S16T021660			Unknown-2	--	25.83	NGS	42	JT
S16T021660			1,2-Benzisothiazole	272-16-2	26.14	NGS	130	JNT
S16T021660			Undecane, 2-methyl-	7045-71-8	26.24	NGS	61	JNT
S16T021660			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.43	NGS	44	JNT
S16T021660			Decane, 2,6,8-trimethyl-	62108-26-3	26.80	NGS	35	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021667			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021667			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021667			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021667			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021667			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021667			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021667			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LUY
S16T021667			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LUYa
S16T021667			71-23-8	1-Propanol	NGS	79	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	UY
S16T021667			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021667			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021667			78-93-3	2-Butanone	NGS	82	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			110-43-0	2-Heptanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			591-78-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021667			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021667			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021667			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021667			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			67-64-1	Acetone	NGS	78	4.6	93	n/a	n/a	n/a	n/a	4.3	n/a	BLY
S16T021667			75-05-8	Acetonitrile	NGS	85	<1.8	590	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021667			98-86-2	Acetophenone	NGS	90	<2.6	17	n/a	n/a	n/a	n/a	2.6	n/a	Y
S16T021667			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021667			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LUY
S16T021667			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021667			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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8/25/16

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021667			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			123-72-8	Butanal	NGS	94	<2.1	3.2	n/a	n/a	n/a	n/a	2.1	n/a	JY
S16T021667			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021667			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021667			67-66-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021667			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021667			64-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	UY
S16T021667			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021667			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			126-98-7	Methacrylonitrile	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			75-09-2	Methylene Chloride	NGS	84	6.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	LY
S16T021667			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021667			98-95-3	Nitrobenzene	NGS	91	<2.6	7.2	n/a	n/a	n/a	n/a	2.6	n/a	JY
S16T021667			110-59-8	Pentanenitrile	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021667			107-12-0	Propanenitrile	NGS	90	<1.4	2.8	n/a	n/a	n/a	n/a	1.4	n/a	JY
S16T021667			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021667			100-42-5	Styrene	NGS	93	<1.6	1.6	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021667			127-18-4	Tetrachloroethene	NGS	93	<1.6	63	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021667			108-88-3	Toluene	NGS	91	<1.5	2.3	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021667			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021667			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	170	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021667			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021667			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021667			142-82-5	n-Heptane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021667			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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

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

B - Blank Contamination
J - Estimated

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

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021668			79-34-5	1,1,2,2-Tetrachloroethane	NGS	95	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	Y
S16T021668			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021668			75-35-4	1,1-Dichloroethene	NGS	81	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	Y
S16T021668			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021668			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	QY
S16T021668			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	Y
S16T021668			71-36-3	1-Butanol	NGS	86	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021668			111-70-6	1-Heptanol	NGS	74	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LQY
S16T021668			71-23-8	1-Propanol	NGS	83	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	Y
S16T021668			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	Y
S16T021668			1708-29-8	2,5-Dihydrofuran	NGS	90	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	Y
S16T021668			78-93-3	2-Butanone	NGS	84	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Y
S16T021668			110-43-0	2-Heptanone	NGS	86	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			591-78-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021668			534-22-5	2-Methylfuran	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Y
S16T021668			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	Y
S16T021668			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	QY
S16T021668			105-42-0	4-Methyl-2-hexanone	NGS	89	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	Y
S16T021668			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Y
S16T021668			67-64-1	Acetone	NGS	71	5.6	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	BY
S16T021668			75-05-8	Acetonitrile	NGS	85	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	Y
S16T021668			98-86-2	Acetophenone	NGS	91	<2.6	7.7	n/a	n/a	n/a	n/a	2.6	n/a	JQY
S16T021668			107-13-1	Acrylonitrile	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	Y
S16T021668			107-18-6	Allyl Alcohol	NGS	82	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LY
S16T021668			107-05-1	Allyl Chloride	NGS	85	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	Y
S16T021668			71-43-2	Benzene	NGS	92	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021668			100-47-0	Benzonitrile	NGS	92	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	QY
S16T021668			123-72-8	Butanal	NGS	92	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	Y
S16T021668			109-74-0	Butanenitrile	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021668			56-23-5	Carbon tetrachloride	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			75-00-3	Chloroethane	NGS	85	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Y
S16T021668			67-66-3	Chloroform	NGS	95	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			110-82-7	Cyclohexane	NGS	93	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	Y
S16T021668			124-18-5	Decane	NGS	87	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	QY
S16T021668			64-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	Y
S16T021668			141-78-6	Ethyl acetate	NGS	81	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			110-00-9	Furan	NGS	81	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			110-54-3	Hexane	NGS	85	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	Y
S16T021668			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			126-98-7	Methacrylonitrile	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			75-09-2	Methylene Chloride	NGS	89	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	Y
S16T021668			91-20-3	Naphthalene	NGS	90	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	QY
S16T021668			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	QY
S16T021668			110-59-8	Pentanenitrile	NGS	87	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			107-12-0	Propanenitrile	NGS	87	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	Y
S16T021668			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	Y
S16T021668			100-42-5	Styrene	NGS	95	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			127-18-4	Tetrachloroethene	NGS	94	<1.6	26	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			108-88-3	Toluene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			79-01-6	Trichloroethene	NGS	91	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021668			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021668			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	Y
S16T021668			123-86-4	n-Butyl acetate	NGS	83	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	Y

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021668			142-82-5	n-Heptane	NGS	88	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	Y
S16T021668			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	Y

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021669			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021669			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021669			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021669			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021669			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021669			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021669			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021669			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LUY
S16T021669			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LUYa
S16T021669			71-23-8	1-Propanol	NGS	79	<3.0	4.2	n/a	n/a	n/a	n/a	3.0	n/a	JY
S16T021669			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021669			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021669			78-93-3	2-Butanone	NGS	82	<1.9	3.0	n/a	n/a	n/a	n/a	1.9	n/a	JY
S16T021669			110-43-0	2-Heptanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021669			591-78-6	2-Hexanone	NGS	84	<1.2	1.4	n/a	n/a	n/a	n/a	1.2	n/a	JY
S16T021669			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021669			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021669			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021669			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021669			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021669			67-64-1	Acetone	NGS	78	4.6	430	n/a	n/a	n/a	n/a	4.3	n/a	BELY
S16T021669			75-05-8	Acetonitrile	NGS	85	<1.8	800	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021669			98-86-2	Acetophenone	NGS	90	<2.6	25	n/a	n/a	n/a	n/a	2.6	n/a	Y
S16T021669			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021669			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LUY
S16T021669			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021669			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021669			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021669			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021669			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021669			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021669			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			75-00-3	Chloroethane	NGS	81	<1.9	2.0	n/a	n/a	n/a	n/a	1.9	n/a	JY
S16T021669			67-66-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021669			124-18-5	Decane	NGS	92	<2.8	2.8	n/a	n/a	n/a	n/a	2.8	n/a	JY
S16T021669			64-17-5	Ethanol	NGS	79	<7.4	130	n/a	n/a	n/a	n/a	7.4	n/a	Y
S16T021669			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021669			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021669			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			126-98-7	Methacrylonitrile	NGS	88	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021669			75-09-2	Methylene Chloride	NGS	84	6.7	4.2	n/a	n/a	n/a	n/a	2.7	n/a	BJLY
S16T021669			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021669			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021669			110-59-8	Pentanenitrile	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021669			107-12-0	Propanenitrile	NGS	90	<1.4	5.7	n/a	n/a	n/a	n/a	1.4	n/a	JY
S16T021669			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021669			100-42-5	Styrene	NGS	93	<1.6	1.7	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021669			127-18-4	Tetrachloroethene	NGS	93	<1.6	59	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021669			108-88-3	Toluene	NGS	91	<1.5	2.0	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021669			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021669			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	240	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021669			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021669			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021669			142-82-5	n-Heptane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021669			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021670			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021670			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021670			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021670			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021670			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021670			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021670			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021670			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LUY
S16T021670			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LUYa
S16T021670			71-23-8	1-Propanol	NGS	79	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	UY
S16T021670			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021670			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021670			78-93-3	2-Butanone	NGS	82	<1.9	2.1	n/a	n/a	n/a	n/a	1.9	n/a	JY
S16T021670			110-43-0	2-Heptanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021670			591-78-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021670			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021670			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021670			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021670			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021670			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021670			67-64-1	Acetone	NGS	78	4.6	190	n/a	n/a	n/a	n/a	4.3	n/a	BLY
S16T021670			75-05-8	Acetonitrile	NGS	85	<1.8	1.5E+04	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021670			98-86-2	Acetophenone	NGS	90	<2.6	26	n/a	n/a	n/a	n/a	2.6	n/a	Y
S16T021670			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021670			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LUY
S16T021670			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021670			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021670			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021670			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021670			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021670			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021670			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021670			67-66-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021670			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021670			64-17-5	Ethanol	NGS	79	<7.4	110	n/a	n/a	n/a	n/a	7.4	n/a	Y
S16T021670			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021670			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021670			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			126-98-7	Methacrylonitrile	NGS	88	<1.6	10	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021670			75-09-2	Methylene Chloride	NGS	84	6.7	7.9	n/a	n/a	n/a	n/a	2.7	n/a	BJLY
S16T021670			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021670			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021670			110-59-8	Pentanenitrile	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021670			107-12-0	Propanenitrile	NGS	90	<1.4	7.6	n/a	n/a	n/a	n/a	1.4	n/a	JY
S16T021670			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021670			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021670			127-18-4	Tetrachloroethene	NGS	93	<1.6	57	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021670			108-88-3	Toluene	NGS	91	<1.5	1.9	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021670			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021670			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	120	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021670			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021670			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

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

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021671			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021671			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021671			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021671			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	1.5	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021671			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021671			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021671			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LUY
S16T021671			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LUYa
S16T021671			71-23-8	1-Propanol	NGS	79	<3.0	4.9	n/a	n/a	n/a	n/a	3.0	n/a	JY
S16T021671			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021671			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021671			78-93-3	2-Butanone	NGS	82	<1.9	2.2	n/a	n/a	n/a	n/a	1.9	n/a	JY
S16T021671			110-43-0	2-Heptanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			591-78-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021671			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021671			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021671			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021671			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021671			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021671			67-64-1	Acetone	NGS	78	4.6	450	n/a	n/a	n/a	n/a	4.3	n/a	BELY
S16T021671			75-05-8	Acetonitrile	NGS	85	<1.8	530	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021671			98-86-2	Acetophenone	NGS	90	<2.6	12	n/a	n/a	n/a	n/a	2.6	n/a	Y
S16T021671			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021671			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LUY
S16T021671			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021671			71-43-2	Benzene	NGS	90	<1.2	1.4	n/a	n/a	n/a	n/a	1.2	n/a	JY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021671			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021671			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021671			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021671			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021671			67-66-3	Chloroform	NGS	93	<1.5	2.0	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021671			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021671			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021671			64-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	UY
S16T021671			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021671			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			126-98-7	Methacrylonitrile	NGS	88	<1.6	5.3	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021671			75-09-2	Methylene Chloride	NGS	84	6.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	LUY
S16T021671			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021671			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021671			110-59-8	Pentanenitrile	NGS	89	<1.6	4.3	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021671			107-12-0	Propanenitrile	NGS	90	<1.4	14	n/a	n/a	n/a	n/a	1.4	n/a	Y
S16T021671			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021671			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021671			127-18-4	Tetrachloroethene	NGS	93	<1.6	42	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021671			108-88-3	Toluene	NGS	91	<1.5	1.5	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021671			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021671			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	240	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021671			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021671			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021671			142-82-5	n-Heptane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021671			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	1.5	n/a	n/a	n/a	n/a	1.2	n/a	JY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021672			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021672			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021672			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021672			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021672			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021672			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021672			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LUY
S16T021672			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LUYa
S16T021672			71-23-8	1-Propanol	NGS	79	<3.0	3.6	n/a	n/a	n/a	n/a	3.0	n/a	JY
S16T021672			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021672			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021672			78-93-3	2-Butanone	NGS	82	<1.9	2.5	n/a	n/a	n/a	n/a	1.9	n/a	JY
S16T021672			110-43-0	2-Heptanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			591-78-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021672			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021672			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021672			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021672			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021672			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021672			67-64-1	Acetone	NGS	78	4.6	44	n/a	n/a	n/a	n/a	4.3	n/a	BLY
S16T021672			75-05-8	Acetonitrile	NGS	85	<1.8	250	n/a	n/a	n/a	n/a	1.8	n/a	Y
S16T021672			98-86-2	Acetophenone	NGS	90	<2.6	9.9	n/a	n/a	n/a	n/a	2.6	n/a	JY
S16T021672			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021672			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LUY
S16T021672			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021672			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021672			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021672			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021672			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021672			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021672			67-66-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021672			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021672			64-17-5	Ethanol	NGS	79	<7.4	20	n/a	n/a	n/a	n/a	7.4	n/a	JY
S16T021672			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021672			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			126-98-7	Methacrylonitrile	NGS	88	<1.6	6.0	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021672			75-09-2	Methylene Chloride	NGS	84	6.7	6.1	n/a	n/a	n/a	n/a	2.7	n/a	BJLY
S16T021672			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021672			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021672			110-59-8	Pentanenitrile	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021672			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021672			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021672			127-18-4	Tetrachloroethene	NGS	93	<1.6	54	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021672			108-88-3	Toluene	NGS	91	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021672			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021672			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	4.5	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021672			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021672			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021672			142-82-5	n-Heptane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021672			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021673			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021673			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	QUY
S16T021673			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	QUY
S16T021673			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	QUY
S16T021673			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021673			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021673			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	QUY
S16T021673			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LQUY
S16T021673			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LUYa
S16T021673			71-23-8	1-Propanol	NGS	79	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	QUY
S16T021673			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021673			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	QUY
S16T021673			78-93-3	2-Butanone	NGS	82	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	QY
S16T021673			110-43-0	2-Heptanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021673			591-78-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021673			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	QUY
S16T021673			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	QUY
S16T021673			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021673			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021673			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	QUY
S16T021673			67-64-1	Acetone	NGS	78	4.6	560	n/a	n/a	n/a	n/a	4.3	n/a	BELQY
S16T021673			75-05-8	Acetonitrile	NGS	85	<1.8	510	n/a	n/a	n/a	n/a	1.8	n/a	EQY
S16T021673			98-86-2	Acetophenone	NGS	90	<2.6	7.7	n/a	n/a	n/a	n/a	2.6	n/a	JY
S16T021673			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	QUY
S16T021673			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LQUY
S16T021673			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	QUY
S16T021673			71-43-2	Benzene	NGS	90	<1.2	1.5	n/a	n/a	n/a	n/a	1.2	n/a	JQY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021673			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021673			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	QUY
S16T021673			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	QUY
S16T021673			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	QUY
S16T021673			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	QUY
S16T021673			67-66-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	QUY
S16T021673			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	QUY
S16T021673			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021673			64-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	QUY
S16T021673			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	QUY
S16T021673			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	QUY
S16T021673			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	QUY
S16T021673			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			126-98-7	Methacrylonitrile	NGS	88	<1.6	2.3	n/a	n/a	n/a	n/a	1.6	n/a	JQY
S16T021673			75-09-2	Methylene Chloride	NGS	84	6.7	2.8	n/a	n/a	n/a	n/a	2.7	n/a	BJLQY
S16T021673			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021673			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021673			110-59-8	Pentanenitrile	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021673			107-12-0	Propanenitrile	NGS	90	<1.4	12	n/a	n/a	n/a	n/a	1.4	n/a	JQY
S16T021673			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	QUY
S16T021673			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021673			127-18-4	Tetrachloroethene	NGS	93	<1.6	23	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021673			108-88-3	Toluene	NGS	91	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021673			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	QUY
S16T021673			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	310	n/a	n/a	n/a	n/a	1.6	n/a	QY
S16T021673			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	QUY
S16T021673			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021673			142-82-5	n-Heptane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	QUY
S16T021673			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	QUY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021674			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021674			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021674			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021674			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021674			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021674			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021674			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LUY
S16T021674			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LUYa
S16T021674			71-23-8	1-Propanol	NGS	79	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	UY
S16T021674			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021674			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021674			78-93-3	2-Butanone	NGS	82	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			110-43-0	2-Heptanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			591-78-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021674			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021674			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021674			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021674			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			67-64-1	Acetone	NGS	78	4.6	950	n/a	n/a	n/a	n/a	4.3	n/a	BELY
S16T021674			75-05-8	Acetonitrile	NGS	85	<1.8	960	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021674			98-86-2	Acetophenone	NGS	90	<2.6	5.8	n/a	n/a	n/a	n/a	2.6	n/a	JY
S16T021674			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021674			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LUY
S16T021674			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021674			71-43-2	Benzene	NGS	90	<1.2	1.3	n/a	n/a	n/a	n/a	1.2	n/a	JY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021674			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021674			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021674			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021674			67-66-3	Chloroform	NGS	93	<1.5	2.3	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021674			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021674			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021674			64-17-5	Ethanol	NGS	79	<7.4	<7.4	n/a	n/a	n/a	n/a	7.4	n/a	UY
S16T021674			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021674			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			126-98-7	Methacrylonitrile	NGS	88	<1.6	2.9	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021674			75-09-2	Methylene Chloride	NGS	84	6.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	LUY
S16T021674			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021674			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021674			110-59-8	Pentanenitrile	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			107-12-0	Propanenitrile	NGS	90	<1.4	21	n/a	n/a	n/a	n/a	1.4	n/a	Y
S16T021674			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021674			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021674			127-18-4	Tetrachloroethene	NGS	93	<1.6	18	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021674			108-88-3	Toluene	NGS	91	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021674			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	310	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021674			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021674			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021674			142-82-5	n-Heptane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021674			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021675			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021675			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021675			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021675			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021675			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021675			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021675			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021675			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021675			71-36-3	1-Butanol	NGS	83	<8.9	220	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021675			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LYa
S16T021675			71-23-8	1-Propanol	NGS	79	<3.0	61	n/a	n/a	n/a	n/a	3.0	n/a	Y
S16T021675			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021675			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021675			78-93-3	2-Butanone	NGS	82	<1.9	98	n/a	n/a	n/a	n/a	1.9	n/a	Y
S16T021675			110-43-0	2-Heptanone	NGS	84	<1.6	9.4	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021675			591-78-6	2-Hexanone	NGS	84	<1.2	12	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021675			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021675			78-94-4	3-Buten-2-one	NGS	83	<1.7	6.6	n/a	n/a	n/a	n/a	1.7	n/a	JY
S16T021675			106-35-4	3-Heptanone	NGS	87	<1.5	49	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021675			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021675			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021675			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	2.1	n/a	n/a	n/a	n/a	1.9	n/a	JY
S16T021675			67-64-1	Acetone	NGS	78	4.6	850	n/a	n/a	n/a	n/a	4.3	n/a	BELY
S16T021675			75-05-8	Acetonitrile	NGS	85	<1.8	590	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021675			98-86-2	Acetophenone	NGS	90	<2.6	7.7	n/a	n/a	n/a	n/a	2.6	n/a	JY
S16T021675			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021675			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LUY
S16T021675			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021675			71-43-2	Benzene	NGS	90	<1.2	6.4	n/a	n/a	n/a	n/a	1.2	n/a	JY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021675			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021675			123-72-8	Butanal	NGS	94	<2.1	13	n/a	n/a	n/a	n/a	2.1	n/a	Y
S16T021675			109-74-0	Butanenitrile	NGS	86	<1.2	21	n/a	n/a	n/a	n/a	1.2	n/a	Y
S16T021675			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021675			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021675			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021675			67-66-3	Chloroform	NGS	93	<1.5	3.2	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021675			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021675			124-18-5	Decane	NGS	92	<2.8	2.9	n/a	n/a	n/a	n/a	2.8	n/a	JY
S16T021675			64-17-5	Ethanol	NGS	79	<7.4	120	n/a	n/a	n/a	n/a	7.4	n/a	Y
S16T021675			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021675			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021675			110-00-9	Furan	NGS	77	<1.6	2.1	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021675			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021675			628-73-9	Hexanenitrile	NGS	90	<1.5	1.7	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021675			126-98-7	Methacrylonitrile	NGS	88	<1.6	6.8	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021675			75-09-2	Methylene Chloride	NGS	84	6.7	6.0	n/a	n/a	n/a	n/a	2.7	n/a	BJLY
S16T021675			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021675			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021675			110-59-8	Pentanenitrile	NGS	89	<1.6	7.5	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021675			107-12-0	Propanenitrile	NGS	90	<1.4	31	n/a	n/a	n/a	n/a	1.4	n/a	Y
S16T021675			110-86-1	Pyridine	NGS	110	<3.8	5.3	n/a	n/a	n/a	n/a	3.8	n/a	JY
S16T021675			100-42-5	Styrene	NGS	93	<1.6	1.7	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021675			127-18-4	Tetrachloroethene	NGS	93	<1.6	23	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021675			108-88-3	Toluene	NGS	91	<1.5	4.1	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021675			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021675			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	220	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021675			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021675			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021675			142-82-5	n-Heptane	NGS	85	<1.4	10	n/a	n/a	n/a	n/a	1.4	n/a	JY
S16T021675			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021676			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021676			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021676			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021676			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021676			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021676			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021676			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021676			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021676			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LUY
S16T021676			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LUYa
S16T021676			71-23-8	1-Propanol	NGS	79	<3.0	3.8	n/a	n/a	n/a	n/a	3.0	n/a	JY
S16T021676			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021676			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021676			78-93-3	2-Butanone	NGS	82	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021676			110-43-0	2-Heptanone	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021676			591-78-6	2-Hexanone	NGS	84	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021676			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021676			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021676			106-35-4	3-Heptanone	NGS	87	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021676			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021676			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021676			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021676			67-64-1	Acetone	NGS	78	4.6	310	n/a	n/a	n/a	n/a	4.3	n/a	BLY
S16T021676			75-05-8	Acetonitrile	NGS	85	<1.8	1.1E+03	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021676			98-86-2	Acetophenone	NGS	90	<2.6	8.0	n/a	n/a	n/a	n/a	2.6	n/a	JY
S16T021676			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021676			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LUY
S16T021676			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021676			71-43-2	Benzene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021676			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021676			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021676			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021676			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021676			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021676			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021676			67-66-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021676			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021676			124-18-5	Decane	NGS	92	<2.8	3.0	n/a	n/a	n/a	n/a	2.8	n/a	JY
S16T021676			64-17-5	Ethanol	NGS	79	<7.4	150	n/a	n/a	n/a	n/a	7.4	n/a	Y
S16T021676			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021676			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021676			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021676			110-54-3	Hexane	NGS	80	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021676			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021676			126-98-7	Methacrylonitrile	NGS	88	<1.6	3.5	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021676			75-09-2	Methylene Chloride	NGS	84	6.7	4.2	n/a	n/a	n/a	n/a	2.7	n/a	BJLY
S16T021676			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021676			98-95-3	Nitrobenzene	NGS	91	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	UY
S16T021676			110-59-8	Pentanenitrile	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021676			107-12-0	Propanenitrile	NGS	90	<1.4	14	n/a	n/a	n/a	n/a	1.4	n/a	Y
S16T021676			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021676			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021676			127-18-4	Tetrachloroethene	NGS	93	<1.6	18	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021676			108-88-3	Toluene	NGS	91	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021676			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021676			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	260	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021676			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021676			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021676			142-82-5	n-Heptane	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021676			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021677			79-34-5	1,1,2,2-Tetrachloroethane	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021677			79-00-5	1,1,2-Trichloroethane	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			75-34-3	1,1-Dichloroethane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021677			75-35-4	1,1-Dichloroethene	NGS	78	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021677			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021677			106-46-7	1,4-Dichlorobenzene	NGS	92	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	UY
S16T021677			123-91-1	1,4-Dioxane	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021677			71-36-3	1-Butanol	NGS	83	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LUY
S16T021677			111-70-6	1-Heptanol	NGS	65	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	LUYa
S16T021677			71-23-8	1-Propanol	NGS	79	<3.0	9.1	n/a	n/a	n/a	n/a	3.0	n/a	JY
S16T021677			108-47-4	2,4-Dimethylpyridine	NGS	91	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	UY
S16T021677			1708-29-8	2,5-Dihydrofuran	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021677			78-93-3	2-Butanone	NGS	82	<1.9	2.7	n/a	n/a	n/a	n/a	1.9	n/a	JY
S16T021677			110-43-0	2-Heptanone	NGS	84	<1.6	6.2	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021677			591-78-6	2-Hexanone	NGS	84	<1.2	2.3	n/a	n/a	n/a	n/a	1.2	n/a	JY
S16T021677			534-22-5	2-Methylfuran	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021677			78-94-4	3-Buten-2-one	NGS	83	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021677			106-35-4	3-Heptanone	NGS	87	<1.5	29	n/a	n/a	n/a	n/a	1.5	n/a	Y
S16T021677			106-68-3	3-Octanone	NGS	88	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	UY
S16T021677			105-42-0	4-Methyl-2-hexanone	NGS	88	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021677			108-10-1	4-Methyl-2-Pentanone	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021677			67-64-1	Acetone	NGS	78	4.6	41	n/a	n/a	n/a	n/a	4.3	n/a	BLY
S16T021677			75-05-8	Acetonitrile	NGS	85	<1.8	150	n/a	n/a	n/a	n/a	1.8	n/a	Y
S16T021677			98-86-2	Acetophenone	NGS	90	<2.6	14	n/a	n/a	n/a	n/a	2.6	n/a	Y
S16T021677			107-13-1	Acrylonitrile	NGS	88	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	UY
S16T021677			107-18-6	Allyl Alcohol	NGS	75	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	LUY
S16T021677			107-05-1	Allyl Chloride	NGS	81	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	UY
S16T021677			71-43-2	Benzene	NGS	90	<1.2	1.9	n/a	n/a	n/a	n/a	1.2	n/a	JY

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021677			100-47-0	Benzonitrile	NGS	91	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021677			123-72-8	Butanal	NGS	94	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	UY
S16T021677			109-74-0	Butanenitrile	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	UY
S16T021677			56-23-5	Carbon tetrachloride	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			108-90-7	Chlorobenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			75-00-3	Chloroethane	NGS	81	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	UY
S16T021677			67-66-3	Chloroform	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			110-82-7	Cyclohexane	NGS	87	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	UY
S16T021677			124-18-5	Decane	NGS	92	<2.8	5.1	n/a	n/a	n/a	n/a	2.8	n/a	JY
S16T021677			64-17-5	Ethanol	NGS	79	<7.4	22	n/a	n/a	n/a	n/a	7.4	n/a	JY
S16T021677			141-78-6	Ethyl acetate	NGS	82	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			100-41-4	Ethylbenzene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			110-00-9	Furan	NGS	77	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			110-54-3	Hexane	NGS	80	<1.7	1.9	n/a	n/a	n/a	n/a	1.7	n/a	JY
S16T021677			628-73-9	Hexanenitrile	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			126-98-7	Methacrylonitrile	NGS	88	<1.6	3.7	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021677			75-09-2	Methylene Chloride	NGS	84	6.7	5.3	n/a	n/a	n/a	n/a	2.7	n/a	BJLY
S16T021677			91-20-3	Naphthalene	NGS	92	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	UY
S16T021677			98-95-3	Nitrobenzene	NGS	91	<2.6	3.8	n/a	n/a	n/a	n/a	2.6	n/a	JY
S16T021677			110-59-8	Pentanenitrile	NGS	89	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY
S16T021677			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	UY
S16T021677			100-42-5	Styrene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	UY
S16T021677			127-18-4	Tetrachloroethene	NGS	93	<1.6	14	n/a	n/a	n/a	n/a	1.6	n/a	Y
S16T021677			108-88-3	Toluene	NGS	91	<1.5	5.3	n/a	n/a	n/a	n/a	1.5	n/a	JY
S16T021677			79-01-6	Trichloroethene	NGS	90	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	UY
S16T021677			75-69-4	Trichlorofluoromethane	NGS	81	<1.6	5.7	n/a	n/a	n/a	n/a	1.6	n/a	JY
S16T021677			10061-01-5	cis-1,3-Dichloropropene	NGS	91	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	UY
S16T021677			123-86-4	n-Butyl acetate	NGS	84	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	UY

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Cartridge Evaluation
Data Summary of All Results

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

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

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-B1

Customer Sample ID: 16-06173-2-B1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021667			Methyl formate	107-31-3	4.81	NGS	46	JNTY
S16T021667			Acetic acid	64-19-7	10.13	NGS	14	JNTY
S16T021667			Formamide	75-12-7	14.28	NGS	110	JNTY
S16T021667			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	55	JNTY
S16T021667			Decane, 3,7-dimethyl-	17312-54-8	23.01	NGS	58	JNTY
S16T021667			2,6-Dimethyldecane	13150-81-7	23.14	NGS	25	JNTY
S16T021667			Undecane	1120-21-4	23.74	NGS	31	JNTY
S16T021667			Undecane, 4,7-dimethyl-	17301-32-5	23.85	NGS	58	JNTY
S16T021667			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	55	JNTY
S16T021667			Unknown-1		24.26	NGS	110	JTY
S16T021667			Dodecane	112-40-3	25.28	NGS	63	JNTY
S16T021667			1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS	51	JNTY
S16T021667			Unknown-2		26.01	NGS	88	JTY
S16T021667			Methenamine	100-97-0	26.20	NGS	320	JNTY
S16T021667			Benzothiazole	95-16-9	26.32	NGS	130	JNTY
S16T021667			Dodecane,4,6-dimethyl	61141-72-8	26.45	NGS	38	JNTY
S16T021667			Dodecane, 2,6,11-Trimethyl	31295-56-4	26.57	NGS	7.0	JNTY
S16T021667			Tridecane	629-50-5	26.59	NGS	6.5	JNTY
S16T021667			Tetradecane	629-59-4	27.03	NGS	19	JNTY
S16T021667		BLNK	Unknown-1	--	8.27	NGS	50	
S16T021667		BLNK	Unknown-2	--	24.30	NGS	27	
S16T021667		BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	
S16T021667		BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

8/25/16

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C.141

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021668			Cyclotetrasiloxane, octamethyl	556-67-2	20.49	NGS	40	JNTY
S16T021668			Decane, 2,4,6-trimethyl-	62108-27-4	23.01	NGS	21	JNTY
S16T021668			Undecane	1120-21-4	23.15	NGS	8.5	JNTY
S16T021668			Dodecane	112-40-3	23.85	NGS	16	JNTY
S16T021668			Undecanal	112-44-7	23.96	NGS	36	JNTY
S16T021668			Unknown-1		24.26	NGS	41	JTY
S16T021668			1,2-Benzisothiazole	272-16-2	26.34	NGS	60	JNTY
S16T021668		BLNK	Unknown-1		8.26	NGS	51	

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021669			Methyl formate	107-31-3	4.73	NGS	27	JNTY
S16T021669			Unknown-1		8.22	NGS	26	JTY
S16T021669			Formamide	75-12-7	14.03	NGS	33	JNTY
S16T021669			Propanoic acid, 2,2-dimethyl-	75-98-9	16.50	NGS	34	JNTY
S16T021669			Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	37	JNTY
S16T021669			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	180	JNTY
S16T021669			3-Ethyl-3-methylheptane	17302-01-1	23.01	NGS	130	JNTY
S16T021669			2,6-Dimethyldecane	13150-81-7	23.14	NGS	54	JNTY
S16T021669			Hexanoic acid, 2-ethyl-	149-57-5	23.70	NGS	110	JNTY
S16T021669			Undecane	1120-21-4	23.74	NGS	34	JNTY
S16T021669			Undecane, 4,7-dimethyl-	17301-32-5	23.85	NGS	120	JNTY
S16T021669			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	74	JNTY
S16T021669			Unknown-2		24.26	NGS	280	JTY
S16T021669			Dodecane	112-40-3	25.28	NGS	130	JNTY
S16T021669			1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS	32	JNTY
S16T021669			2-Propenoic acid, octyl ester	2499-59-4	26.01	NGS	47	JNTY
S16T021669			Methenamine	100-97-0	26.21	NGS	120	JNTY
S16T021669			Benzothiazole	95-16-9	26.33	NGS	220	JNTY
S16T021669			Dodecane,4,6-dimethyl	61141-72-8	26.45	NGS	100	JNTY
S16T021669			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.58	NGS	19	JNTY
S16T021669			Tridecane	629-50-5	26.60	NGS	38	JNTY
S16T021669			Unknown-3		26.66	NGS	48	JTY
S16T021669			Tetradecane	629-59-4	27.04	NGS	55	JNTY
S16T021669		BLNK	Unknown-1	--	8.27	NGS	50	
S16T021669		BLNK	Unknown-2	--	24.30	NGS	27	
S16T021669		BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	
S16T021669		BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

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Cartridge Evaluation
Data Summary of All Results

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

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021670			Methyl formate	107-31-3	4.73	NGS	47	JNTY
S16T021670			Unknown-1		8.22	NGS	25	BJTY
S16T021670			Formamide	75-12-7	14.04	NGS	42	JNTY
S16T021670			Propane, 2-methyl-1-nitro-	625-74-1	16.49	NGS	27	JNTY
S16T021670			Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	28	JNTY
S16T021670			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	140	JNTY
S16T021670			3-Ethyl-3-methylheptane	17302-01-1	23.01	NGS	120	JNTY
S16T021670			2,6-Dimethyldecane	13150-81-7	23.14	NGS	47	JNTY
S16T021670			Hexanoic acid, 2-ethyl-	149-57-5	23.70	NGS	100	JNTY
S16T021670			Undecane	1120-21-4	23.74	NGS	25	JNTY
S16T021670			Undecane, 4,7-dimethyl-	17301-32-5	23.85	NGS	120	JNTY
S16T021670			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	64	JNTY
S16T021670			2,3-Dimethyldecane	17312-44-6	24.06	NGS	31	JNTY
S16T021670			Unknown-2		24.26	NGS	250	BJTY
S16T021670			Dodecane	112-40-3	25.28	NGS	82	JNTY
S16T021670			1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS	27	JNTY
S16T021670			2-Propenoic acid, octyl ester	2499-59-4	26.02	NGS	38	JNTY
S16T021670			Methenamine	100-97-0	26.22	NGS	130	JNTY
S16T021670			Benzothiazole	95-16-9	26.34	NGS	210	JNTY
S16T021670			Dodecane,4,6-dimethyl	61141-72-8	26.46	NGS	120	JNTY
S16T021670			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.58	NGS	45	JNTY
S16T021670			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.66	NGS	66	JNTY
S16T021670			Unknown-3		26.83	NGS	25	JTY
S16T021670			Tetradecane	629-59-4	27.04	NGS	61	JNTY
S16T021670		BLNK	Unknown-1	--	8.27	NGS	50	
S16T021670		BLNK	Unknown-2	--	24.30	NGS	27	
S16T021670		BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021670		BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

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Y - Comment
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Q - Qualitative
E - Outside Calibration Range
B - Blank Contamination
J - Estimated
a - LCS Outside Range
T - Tentatively Identified Compound

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021671			Acetic acid	64-19-7	11.50	NGS	7.8	JNTY
S16T021671			Formamide	75-12-7	14.71	NGS	200	JNTY
S16T021671			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	69	JNTY
S16T021671			2,6-Dimethyldecane	13150-81-7	23.01	NGS	55	JNTY
S16T021671			Undecane	1120-21-4	23.74	NGS	21	JNTY
S16T021671			Undecane, 5,7-dimethyl-	17312-83-3	23.85	NGS	53	JNTY
S16T021671			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	32	JNTY
S16T021671			Unknown-1		24.26	NGS	150	JTY
S16T021671			Dodecane	112-40-3	25.28	NGS	58	JNTY
S16T021671			Methenamine	100-97-0	26.19	NGS	29	JNTY
S16T021671			Benzothiazole	95-16-9	26.30	NGS	130	JNTY
S16T021671			Dodecane,4,6-dimethyl	61141-72-8	26.43	NGS	45	JNTY
S16T021671			2-Hexyl-1-octanol	19780-79-1	26.58	NGS	32	JNTY
S16T021671			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.63	NGS	31	JNTY
S16T021671			Tetradecane	629-59-4	27.01	NGS	23	JNTY
S16T021671		BLNK	Unknown-1	--	8.27	NGS	50	
S16T021671		BLNK	Unknown-2	--	24.30	NGS	27	
S16T021671		BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	
S16T021671		BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

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

C.147

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162144

SDG Number:

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

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021672			Methyl formate	107-31-3	4.72	NGS	18	JNTY
S16T021672			Unknown-1		8.22	NGS	28	BJTY
S16T021672			Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	28	JNTY
S16T021672			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	150	JNTY
S16T021672			3-Ethyl-3-methylheptane	17302-01-1	23.01	NGS	78	JNTY
S16T021672			2,6-Dimethyldecane	13150-81-7	23.14	NGS	33	JNTY
S16T021672			Undecane	1120-21-4	23.74	NGS	19	JNTY
S16T021672			Undecane, 5,7-dimethyl-	17312-83-3	23.85	NGS	54	JNTY
S16T021672			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	50	JNTY
S16T021672			Unknown-2		24.26	NGS	180	JTY
S16T021672			Dodecane	112-40-3	25.28	NGS	47	JNTY
S16T021672			2-Propenoic acid, octyl ester	2499-59-4	25.41	NGS	29	JNTY
S16T021672			Unknown-3		26.02	NGS	31	JTY
S16T021672			Methenamine	100-97-0	26.21	NGS	79	JNTY
S16T021672			Benzothiazole	95-16-9	26.34	NGS	97	JNTY
S16T021672			Dodecane,4,6-dimethyl	61141-72-8	26.46	NGS	40	JNTY
S16T021672			Tetradecane	629-59-4	27.04	NGS	22	JNTY
S16T021672		BLNK	Unknown-1	--	8.27	NGS	50	
S16T021672		BLNK	Unknown-2	--	24.30	NGS	27	
S16T021672		BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	
S16T021672		BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

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J - Estimated
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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021673			Methyl formate	107-31-3	4.84	NGS	38	JNTY
S16T021673			Ethylene Glycol	107-21-1	14.36	NGS	29	JNTY
S16T021673			Formamide	75-12-7	14.55	NGS	510	JNTY
S16T021673			Decane, 3,7-dimethyl-	17312-54-8	23.00	NGS	25	JNTY
S16T021673			Undecane	1120-21-4	23.74	NGS	24	JNTY
S16T021673			2,6-Dimethyldecane	13150-81-7	23.85	NGS	30	JNTY
S16T021673			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	24	JNTY
S16T021673			Unknown-1		24.26	NGS	68	BJTY
S16T021673			Dodecane	112-40-3	25.28	NGS	47	JNTY
S16T021673			Methenamine	100-97-0	26.22	NGS	320	JNTY
S16T021673			Benzothiazole	95-16-9	26.33	NGS	71	JNTY
S16T021673			Dodecane,4,6-dimethyl	61141-72-8	26.46	NGS	16	JNTY
S16T021673			Tetradecane	629-59-4	27.04	NGS	9.7	JNTY
S16T021673		BLNK	Unknown-1	--	8.27	NGS	50	
S16T021673		BLNK	Unknown-2	--	24.30	NGS	27	
S16T021673		BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	
S16T021673		BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021674				Methyl formate	107-31-3	4.82	NGS	73	JNTY
S16T021674				Ethylene Glycol	107-21-1	14.32	NGS	15	JNTY
S16T021674				Formamide	75-12-7	14.46	NGS	86	JNTY
S16T021674				Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	100	JNTY
S16T021674				3-Ethyl-3-methylheptane	17302-01-1	23.01	NGS	100	JNTY
S16T021674				2,6-Dimethyldecane	13150-81-7	23.14	NGS	42	JNTY
S16T021674				Undecane	1120-21-4	23.74	NGS	21	JNTY
S16T021674				Undecane, 4,7-dimethyl-	17301-32-5	23.85	NGS	70	JNTY
S16T021674				Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	45	JNTY
S16T021674				Unknown-1		24.26	NGS	130	BJTY
S16T021674				Undecane, 3-methyl-	1002-43-3	24.90	NGS	8.0	JNTY
S16T021674				Dodecane	112-40-3	25.28	NGS	39	JNTY
S16T021674				Methenamine	100-97-0	26.22	NGS	47	JNTY
S16T021674				Benzothiazole	95-16-9	26.34	NGS	27	JNTY
S16T021674				Dodecane,4,6-dimethyl	61141-72-8	26.47	NGS	27	JNTY
S16T021674				Tetradecane	629-59-4	27.04	NGS	15	JNTY
S16T021674			BLNK	Unknown-1	--	8.27	NGS	50	
S16T021674			BLNK	Unknown-2	--	24.30	NGS	27	
S16T021674			BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	
S16T021674			BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021675				Methyl formate	107-31-3	4.71	NGS	37	JNTY
S16T021675				4-Methoxy-1-pentene	98386-09-5	7.15	NGS	28	JNTY
S16T021675				Unknown-1		8.32	NGS	60	BJTY
S16T021675				Tetrahydrofuran	109-99-9	11.96	NGS	5.8	JNTY
S16T021675				Ethylene Glycol	107-21-1	14.62	NGS	160	JNTY
S16T021675				Formamide	75-12-7	14.74	NGS	82	JNTY
S16T021675				Neopentane	463-82-1	15.75	NGS	33	JNTY
S16T021675				Acetonitrile, hydroxy-	107-16-4	16.31	NGS	31	JNTY
S16T021675				Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	130	JNTY
S16T021675				2,6-Dimethyldecane	13150-81-7	23.01	NGS	51	JNTY
S16T021675				Undecane	1120-21-4	23.74	NGS	22	JNTY
S16T021675				Undecane, 5,7-dimethyl-	17312-83-3	23.85	NGS	35	JNTY
S16T021675				Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	36	JNTY
S16T021675				Unknown-2		24.26	NGS	120	BJTY
S16T021675				Dodecane	112-40-3	25.28	NGS	42	JNTY
S16T021675				2-Propenoic acid, octyl ester	2499-59-4	26.01	NGS	29	JNTY
S16T021675				Benzothiazole	95-16-9	26.33	NGS	73	JNTY
S16T021675				Dodecane,4,6-dimethyl	61141-72-8	26.45	NGS	15	JNTY
S16T021675				Tridecane	629-50-5	26.60	NGS	13	JNTY
S16T021675				Tetradecane	629-59-4	27.04	NGS	6.5	JNTY
S16T021675			BLNK	Unknown-1	--	8.27	NGS	50	
S16T021675			BLNK	Unknown-2	--	24.30	NGS	27	
S16T021675			BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	
S16T021675			BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162144

SDG Number:

Customer Sample ID: 16-06173-2-H2

Customer Sample ID: 16-06173-2-H2

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021676			Methyl formate	107-31-3	4.72	NGS	53	JNTY
S16T021676			Unknown-2		8.32	NGS	74	BJTY
S16T021676			Formamide	75-12-7	14.32	NGS	110	JNTY
S16T021676			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	82	JNTY
S16T021676			3-Ethyl-3-methylheptane	17302-01-1	23.00	NGS	48	JNTY
S16T021676			Undecane	1120-21-4	23.74	NGS	21	JNTY
S16T021676			Decane, 3,7-dimethyl-	17312-54-8	23.85	NGS	38	JNTY
S16T021676			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	27	JNTY
S16T021676			Unknown-1		24.26	NGS	110	JTY
S16T021676			Dodecane	112-40-3	25.28	NGS	39	JNTY
S16T021676			2-Propenoic acid, octyl ester	2499-59-4	26.01	NGS	39	JNTY
S16T021676			Methenamine	100-97-0	26.20	NGS	260	JNTY
S16T021676			Benzothiazole	95-16-9	26.32	NGS	75	JNTY
S16T021676			Dodecane,4,6-dimethyl	61141-72-8	26.45	NGS	22	JNTY
S16T021676			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.60	NGS	24	JNTY
S16T021676			Tetradecane	629-59-4	27.03	NGS	11	JNTY
S16T021676		BLNK	Unknown-1	--	8.27	NGS	50	
S16T021676		BLNK	Unknown-2	--	24.30	NGS	27	
S16T021676		BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	
S16T021676		BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162144

SDG Number:

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

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021677			Unknown-1		8.22	NGS	51	JTY
S16T021677			Acetic acid	64-19-7	9.48	NGS	20	JNTY
S16T021677			Ethylene Glycol	107-21-1	14.10	NGS	1.1E+03	JNTY
S16T021677			Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	31	JNTY
S16T021677			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	210	JNTY
S16T021677			3-Ethyl-3-methylheptane	17302-01-1	23.01	NGS	98	JNTY
S16T021677			2,6-Dimethyldecane	13150-81-7	23.14	NGS	39	JNTY
S16T021677			Hexanoic acid, 2-ethyl-	149-57-5	23.70	NGS	55	JNTY
S16T021677			Undecane	1120-21-4	23.74	NGS	21	JNTY
S16T021677			Undecane, 4,7-dimethyl-	17301-32-5	23.85	NGS	74	JNTY
S16T021677			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	70	JNTY
S16T021677			Unknown-2		24.26	NGS	290	JTY
S16T021677			Dodecane	112-40-3	25.28	NGS	44	JNTY
S16T021677			1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS	43	JNTY
S16T021677			2-Propenoic acid, octyl ester	2499-59-4	26.01	NGS	50	JNTY
S16T021677			Methenamine	100-97-0	26.20	NGS	150	JNTY
S16T021677			Benzothiazole	95-16-9	26.32	NGS	150	JNTY
S16T021677			Dodecane,4,6-dimethyl	61141-72-8	26.45	NGS	50	JNTY
S16T021677			Silane, tetramethyl-	75-76-3	26.65	NGS	38	JNTY
S16T021677			Tetradecane	629-59-4	27.03	NGS	25	JNTY
S16T021677		BLNK	Unknown-1	--	8.27	NGS	50	
S16T021677		BLNK	Unknown-2	--	24.30	NGS	27	
S16T021677		BLNK	Mercaptoacetic acid, bis(trime	6398-62-5	25.10	NGS	30	
S16T021677		BLNK	1,1,1,3,5,5,7,7,7-Nonamethyl-3	38146-99-5	25.32	NGS	52	

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162139
SDG Number:
Customer Sample ID: 16-06172-3-A1
Customer Sample ID: 16-06172-3-A1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021587			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	0.48	n/a	n/a	n/a	n/a	0.18	n/a	J
S16T021587			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021587			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021587			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.44	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021587			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021587			3777-69-3	2-Pentylfuran	NGS	89	<0.34	0.44	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021587			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021587			110-00-9	Furan	NGS	73	<0.090	0.30	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021587			109-99-9	Tetrahydrofuran	NGS	91	<0.10	12	n/a	n/a	n/a	n/a	0.10	n/a	

8/24/16

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021588			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021588			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021588			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021588			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.34	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021588			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021588			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021588			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021588			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021588			109-99-9	Tetrahydrofuran	NGS	91	<0.10	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	U

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021589			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021589			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021589			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021589			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.36	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021589			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021589			3777-69-3	2-Pentylfuran	NGS	89	<0.34	0.39	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021589			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021589			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021589			109-99-9	Tetrahydrofuran	NGS	91	<0.10	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	U

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021590			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021590			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021590			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021590			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021590			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021590			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021590			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021590			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021590			109-99-9	Tetrahydrofuran	NGS	91	<0.10	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	U

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021591			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021591			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021591			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021591			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.29	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021591			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021591			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021591			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021591			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021591			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.12	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162139
SDG Number:
Customer Sample ID: 16-06172-3-D1
Customer Sample ID: 16-06172-3-D1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021592			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021592			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021592			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021592			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.35	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021592			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021592			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021592			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021592			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021592			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.31	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162139
SDG Number:
Customer Sample ID: 16-06172-3-E1
Customer Sample ID: 16-06172-3-E1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021593			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021593			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	0.26	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021593			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021593			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021593			534-22-5	2-Methylfuran	NGS	83	<0.23	0.27	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021593			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021593			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021593			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021593			109-99-9	Tetrahydrofuran	NGS	91	<0.10	1.0	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021594			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021594			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021594			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021594			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021594			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021594			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021594			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021594			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021594			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.16	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021595			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021595			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021595			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021595			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021595			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021595			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021595			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021595			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021595			109-99-9	Tetrahydrofuran	NGS	91	<0.10	2.4	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021596			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021596			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021596			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021596			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021596			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021596			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021596			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021596			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021596			109-99-9	Tetrahydrofuran	NGS	91	<0.10	3.0	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021597			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021597			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021597			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021597			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021597			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021597			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021597			4229-91-8	2-Propylfuran	NGS	87	<0.44	0.58	n/a	n/a	n/a	n/a	0.44	n/a	J
S16T021597			110-00-9	Furan	NGS	73	<0.090	0.38	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021597			109-99-9	Tetrahydrofuran	NGS	91	<0.10	18	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021598			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021598			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021598			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021598			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021598			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021598			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021598			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021598			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021598			109-99-9	Tetrahydrofuran	NGS	91	<0.10	3.5	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021599			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021599			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021599			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021599			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021599			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021599			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021599			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021599			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021599			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.15	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021603			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021603			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021603			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021603			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.35	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021603			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021603			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021603			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021603			110-00-9	Furan	NGS	73	<0.090	0.37	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021603			109-99-9	Tetrahydrofuran	NGS	91	<0.10	9.3	n/a	n/a	n/a	n/a	0.10	n/a	

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021607			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021607			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021607			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021607			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.28	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021607			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021607			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021607			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021607			110-00-9	Furan	NGS	73	<0.090	0.10	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021607			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.12	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021608			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021608			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021608			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021608			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.37	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021608			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021608			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021608			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021608			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021608			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.23	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021609			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021609			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021609			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021609			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021609			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021609			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021609			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021609			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021609			109-99-9	Tetrahydrofuran	NGS	91	<0.10	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	U

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM														
S16T021610		1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021610		1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021610		625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021610		3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.47	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021610		534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021610		3777-69-3	2-Pentylfuran	NGS	89	<0.34	0.35	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021610		4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021610		110-00-9	Furan	NGS	73	<0.090	0.090	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021610		109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.24	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021611			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021611			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	0.39	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021611			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021611			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.44	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021611			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021611			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021611			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021611			110-00-9	Furan	NGS	73	<0.090	0.10	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021611			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.24	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021612			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	0.27	n/a	n/a	n/a	n/a	0.18	n/a	J
S16T021612			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021612			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021612			3777-71-7	2-Heptylfuran	NGS	92	<0.27	0.29	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021612			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021612			3777-69-3	2-Pentylfuran	NGS	89	<0.34	0.57	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021612			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021612			110-00-9	Furan	NGS	73	<0.090	0.11	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021612			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.75	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021613			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021613			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021613			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021613			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021613			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021613			3777-69-3	2-Pentylfuran	NGS	89	<0.34	0.39	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021613			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021613			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021613			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.14	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162140
SDG Number:
Customer Sample ID: 16-06173-3-F1
Customer Sample ID: 16-06173-3-F1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021614			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021614			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021614			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021614			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021614			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021614			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021614			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021614			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021614			109-99-9	Tetrahydrofuran	NGS	91	<0.10	1.3	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021615			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021615			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021615			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021615			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021615			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021615			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021615			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021615			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021615			109-99-9	Tetrahydrofuran	NGS	91	<0.10	1.7	n/a	n/a	n/a	n/a	0.10	n/a	J

U - Less Than Detection Limit

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021616			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	0.22	n/a	n/a	n/a	n/a	0.18	n/a	J
S16T021616			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021616			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021616			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021616			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021616			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021616			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021616			110-00-9	Furan	NGS	73	<0.090	0.51	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021616			109-99-9	Tetrahydrofuran	NGS	91	<0.10	13	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021617			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021617			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021617			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021617			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021617			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021617			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021617			4229-91-8	2-Propylfuran	NGS	87	<0.44	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	U
S16T021617			110-00-9	Furan	NGS	73	<0.090	0.14	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021617			109-99-9	Tetrahydrofuran	NGS	91	<0.10	2.3	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021618			1191-99-7	2,3-Dihydrofuran	NGS	80	<0.18	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	U
S16T021618			1708-29-8	2,5-Dihydrofuran	NGS	90	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021618			625-86-5	2,5-Dimethylfuran	NGS	85	<0.43	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	U
S16T021618			3777-71-7	2-Heptylfuran	NGS	92	<0.27	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	U
S16T021618			534-22-5	2-Methylfuran	NGS	83	<0.23	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	U
S16T021618			3777-69-3	2-Pentylfuran	NGS	89	<0.34	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	U
S16T021618			4229-91-8	2-Propylfuran	NGS	87	<0.44	0.50	n/a	n/a	n/a	n/a	0.44	n/a	J
S16T021618			110-00-9	Furan	NGS	73	<0.090	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	U
S16T021618			109-99-9	Tetrahydrofuran	NGS	91	<0.10	0.24	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

U - Less Than Detection Limit

J - Estimated

C.3.4 Amines

ANALYTICAL REPORT

Report Date: August 02, 2016

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

Phone: (509) 373-1262

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20162152
Workorder: 34-1620981
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T022010** Collected: 07/22/2016
Lab ID: 1620981001 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	**0.13**	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: **S16T022011** Collected: 07/22/2016
Lab ID: 1620981002 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022012** Collected: 07/22/2016
Lab ID: 1620981003 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T022012** Collected: 07/22/2016
Lab ID: 1620981003 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Methylamine	<0.10	NA	NA	0.10

Sample ID: **S16T022013** Collected: 07/22/2016
Lab ID: 1620981004 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022014** Collected: 07/22/2016
Lab ID: 1620981005 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022015** Collected: 07/22/2016
Lab ID: 1620981006 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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

Analytical Results

Sample ID: **S16T022016** Collected: 07/22/2016
Lab ID: 1620981007 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022017** Collected: 07/22/2016
Lab ID: 1620981008 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022018** Collected: 07/22/2016
Lab ID: 1620981009 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022019** Collected: 07/22/2016
Lab ID: 1620981010 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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

Analytical Results

Sample ID: **S16T022020** Collected: 07/22/2016
Lab ID: 1620981011 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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	**0.36**	NA	NA	0.10

Sample ID: **S16T022021** Collected: 07/22/2016
Lab ID: 1620981012 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022022** Collected: 07/22/2016
Lab ID: 1620981013 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022023** Collected: 07/23/2016
Lab ID: 1620981014 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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

Analytical Results

Sample ID: **S16T022024** Collected: 07/23/2016
Lab ID: 1620981015 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022025** Collected: 07/23/2016
Lab ID: 1620981016 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022026** Collected: 07/23/2016
Lab ID: 1620981017 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022027** Collected: 07/23/2016
Lab ID: 1620981018 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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

Analytical Results

Sample ID: **S16T022028** Collected: 07/23/2016
Lab ID: 1620981019 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022029** Collected: 07/23/2016
Lab ID: 1620981020 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022030** Collected: 07/23/2016
Lab ID: 1620981021 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022031** Collected: 07/23/2016
Lab ID: 1620981022 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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

Analytical Results

Sample ID: **S16T022032** Collected: 07/23/2016
Lab ID: 1620981023 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022033** Collected: 07/23/2016
Lab ID: 1620981024 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022034** Collected: 07/23/2016
Lab ID: 1620981025 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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: **S16T022035** Collected: 07/23/2016
Lab ID: 1620981026 Received: 07/27/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 08/01/2016
Sampling Parameter: **Air Volume Not Provided**

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

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

Method	Analyst	Peer Review
Amines-VOA Aliphatic VAA-1	/S/ David Teynor 08/02/2016 15:18	/S/ Thomas Bosch 08/02/2016 16:09

Laboratory Contact Information

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General Lab Comments

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

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

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

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

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ACLASS (DoD ELAP)	ADE-1420	http://www.aclasscorp.com
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Florida (TNI)	E871067	http://www.dep.state.fl.us/labs/bars/sas/qa/
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing:			
CPSC	ACLASS (ISO 17025, CPSC)	ADE-1420	http://www.aclasscorp.com
Soil, Dust, Paint ,Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

ANALYTICAL REPORT

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

Definitions

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

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

Rand Potter, Project Manager, ALS Environmental

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620981

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** IH Aliphatic Amines
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12401 (HBN: 173887)
	Prepared By: NA	**Analyzed By:** David Teynor

Blank

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

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

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

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

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510815
Analyzed: 08/01/2016 00:00
Dilution: 1
Units: ug/sample

LCSD: 510816
Analyzed: 08/01/2016 00:00
Dilution: 1
Units: ug/sample

Analyte	Result	Target	%Rec	QC Limits		Result	%Rec	RPD	QC Limits	
Dimethylamine	1.38	2.00	69.0	60.4	134.6	1.47	73.5	6.32	0.0	20.0
Ethylamine	1.63	2.00	81.5	40.0	160.0	1.42	71.0	13.8	0.0	20.0
Methylamine	1.60	2.00	80.0	40.0	160.0	1.63	81.5	1.86	0.0	20.0

LCS: 510818
Analyzed: 08/01/2016 00:00
Dilution: 1
Units: ug/sample

LCSD: 510819
Analyzed: 08/01/2016 00:00
Dilution: 1
Units: ug/sample

Analyte	Result	Target	%Rec	QC Limits		Result	%Rec	RPD	QC Limits	
Dimethylamine	1.51	2.00	75.5	60.4	134.6	1.47	73.5	2.68	0.0	20.0
Ethylamine	1.76	2.00	88.0	40.0	160.0	1.58	79.0	10.8	0.0	20.0
Methylamine	1.61	2.00	80.5	40.0	160.0	1.66	83.0	3.06	0.0	20.0

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

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

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

1620981 3613-45

1620981

N/A

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162152
Page 1 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN T6-02 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013 Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T022010	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-A1	N/A
	S16T022011	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-A2	N/A
	S16T022012	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-B1	N/A
	S16T022013	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-BLANK	N/A
	S16T022014	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-C1	N/A
	S16T022015	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-D1	N/A
	S16T022016	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-E1	N/A
	S16T022017	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-EFF-BASE	N/A
	S16T022018	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-F1	N/A
	S16T022019	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-G1	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ⦿ No

SPECIAL INSTRUCTIONS
Send Results to Carl Howald IV & Greg Moore Carl_W_Howald@rl.gov and Gregory_S_Moore@rl.gov See SOW for email

CONTRACT 55502

RELEASE 9

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Webber / [signature]	7-21-16 0900	Scott Harder / [signature]	7-26-16 / 0900
SW Harder WRPS / [signature]	7-26-16 / 1400	FEDEX	
fedex		[signature] Tawnie Tassell	07-27-16 1049

Matrix*
S = Soil
SE = Sediment
SO = Solid
SL = Sludge
W = Water
O = Oil
A = Air
DS = Drum Solids
DL = Drum Liquids
T = Tissue
WI = Wipe
L = Liquid
V = Vegetation
VA = Vapor
X = Other

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process): DOT — Disposed By: CONSUMED — Date/Time: 08/01/16 12:00

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

A-6003-962 (03/05)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Assembler N/A		C.O.C. No. 20162152 Page 2 of 3
Collector JONES	Contact/Requestor CARL HOWALD IV	Telephone No. 373-6861 MSIN T6-02 FAX 372-1878
SAF No. N/A	Sample Origin CARTRIDGE EVALUATION	Purchase Order/Charge Code 202003/CB20
Project Title CARTRIDGE EVALUATION	Logbook/ Work Package No. N/A	Ice Chest No. WTS-013 Temp. ON ICE
Shipped To (Lab) ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296
Protocol N/A	Data Turnaround 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T022020	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-H1	N/A
	S16T022021	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-H2	N/A
	S16T022022	VA	7/22/16		XAD-7-NBD	AMINES 16-06172-4-IN-BASE	N/A
	S16T022023	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-A1	N/A
	S16T022024	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-A2	N/A
	S16T022025	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-B1	N/A
	S16T022026	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-BLANK	N/A
	S16T022027	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-C1	N/A
	S16T022028	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-D1	N/A
	S16T022029	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-E1	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ⦿ No

SPECIAL INSTRUCTIONS

Send Results to Carl Howald IV & Greg Moore
Carl_W_Howald@rl.gov and Gregory_S_Moore@rl.gov See SOW for email

CONTRACT 55502

RELEASE 9

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
SharonWalden / [signature]	7-26-16 0900	Scott Harder / [signature]	7-26-16 / 0900
SW Harder WRPS / [signature]	7-26-16 / 1400	FEDEX	
fedex		TammyVanTassell / TammyVanTassell	07-27-16 1030

Matrix*
S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; WI = Wipe; L = Liquid; V = Vegetation; VA = Vapor; X = Other

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time
	DJJ	CONSUMED	080116 12:00

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

A-6003-962 (03/05)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Assembler N/A		C.O.C. No. 20162152	Page 3 of 3
Collector JONES	Contact/Requestor CARL HOWALD IV	Telephone No. 373-6861	MSIN T6-02 FAX 372-1878
SAF No. N/A	Sample Origin CARTRIDGE EVALUATION	Purchase Order/Charge Code 202003/CB20	
Project Title CARTRIDGE EVALUATION	Logbook/ Work Package No. N/A	Ice Chest No. WTS-013	Temp. ON ICE
Shipped To (Lab) ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296	
Protocol N/A	Data Turnaround 10 DAYS	Parts and Return No. 41071	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T022030	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-EFF-BASE	N/A
	S16T022031	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-F1	N/A
	S16T022032	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-G1	N/A
	S16T022033	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-H1	N/A
	S16T022034	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-H2	N/A
	S16T022035	VA	7/23/16		XAD-7-NBD	AMINES 16-06173-4-IN-BASE	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS

Send Results to Carl Howald IV & Greg Moore Carl_W_Howald@rl.gov and Gregory_S_Moore@rl.gov see SOW for email

CONTRACT 55502

RELEASE 9

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holder / [signature]	7-26-16 0900	Scott Harder / [signature]	7-26-16/0900
SW Harder WRPS / [signature]	7-26-16/1400	FEDEX	
fedex		[signature] Tamika Fassell	07-27-16
			[illegible]

Matrix*

S = Soil		DL = Drum Liquids	
SE = Sediment		T = Tissue	
SO = Solid		WI = Wipe	
SL = Sludge		L = Liquid	
W = Water		V = Vegetation	
O = Oil		VA = Vapor	
A = Air		X = Other	
DS = Drum Solids			

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

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

A-6003-962 (03/05)

C.3.5 Acetonitrile

ANALYTICAL REPORT

Report Date: July 29, 2016

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

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162151

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

Analytical Results

Sample ID: S16T021945				Collected: 07/22/2016
Lab ID: 1620932001				Received: 07/27/2016
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/28/2016
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021946				Collected: 07/22/2016
Lab ID: 1620932002				Received: 07/27/2016
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/28/2016
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021947				Collected: 07/22/2016
Lab ID: 1620932003				Received: 07/27/2016
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/28/2016
		Sampling Parameter: Air Volume Not Provided		
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021948** Collected: 07/22/2016
Lab ID: 1620932004 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021949** Collected: 07/22/2016
Lab ID: 1620932005 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021950** Collected: 07/22/2016
Lab ID: 1620932006 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021951** Collected: 07/22/2016
Lab ID: 1620932007 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021952** Collected: 07/22/2016
Lab ID: 1620932008 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021953** Collected: 07/22/2016
Lab ID: 1620932009 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021954** Collected: 07/22/2016
Lab ID: 1620932010 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021955** Collected: 07/22/2016
Lab ID: 1620932011 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021956** Collected: 07/22/2016
Lab ID: 1620932012 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021957** Collected: 07/22/2016
Lab ID: 1620932013 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021958** Collected: 07/23/2016
Lab ID: 1620932014 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021959** Collected: 07/23/2016
Lab ID: 1620932015 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021960**				Collected: 07/23/2016
Lab ID: 1620932016				Received: 07/27/2016
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		**Analyzed:** 07/29/2016
		Sampling Parameter: Air Volume Not Provided		
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021961**				Collected: 07/23/2016
Lab ID: 1620932017				Received: 07/27/2016
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		**Analyzed:** 07/29/2016
		Sampling Parameter: Air Volume Not Provided		
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021962**				Collected: 07/23/2016
Lab ID: 1620932018				Received: 07/27/2016
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		**Analyzed:** 07/29/2016
		Sampling Parameter: Air Volume Not Provided		
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021963**				Collected: 07/23/2016
Lab ID: 1620932019				Received: 07/27/2016
Method: NIOSH 1606		Media: SKC 226-09, Charcoal Tube 400/200mg		**Analyzed:** 07/29/2016
		Sampling Parameter: Air Volume Not Provided		
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021964** Collected: 07/23/2016
Lab ID: 1620932020 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021965** Collected: 07/23/2016
Lab ID: 1620932021 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021966** Collected: 07/23/2016
Lab ID: 1620932022 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021967** Collected: 07/23/2016
Lab ID: 1620932023 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021968** Collected: 07/23/2016
Lab ID: 1620932024 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021969** Collected: 07/23/2016
Lab ID: 1620932025 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021970** Collected: 07/23/2016
Lab ID: 1620932026 Received: 07/27/2016

Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

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

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

Laboratory Contact Information

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

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

ANALYTICAL REPORT

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

General Lab Comments

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

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

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

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

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ACLASS (DoD ELAP)	ADE-1420	http://www.aclasscorp.com
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Florida (TNI)	E871067	http://www.dep.state.fl.us/labs/bars/sas/qa/
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing:			
CPSC	ACLASS (ISO 17025, CPSC)	ADE-1420	http://www.aclasscorp.com
Soil, Dust, Paint ,Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

Definitions

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

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

Rand Potter, Project Manager, ALS Environmental

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620932

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** IH GC-FID QC
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** IFID/7630 (HBN: 173706)
	Prepared By: NA	**Analyzed By:** Young Hee Yoon

Blank

MB: 510328
Analyzed: 07/28/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100

MB: 510331
Analyzed: 07/28/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510329
Analyzed: 07/28/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 510330
Analyzed: 07/28/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Acetonitrile	0.307	0.312	98.4	86.6	115.3	0.316	101	2.89	0.0	20.0

LCS: 510332
Analyzed: 07/28/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 510333
Analyzed: 07/28/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Acetonitrile	0.264	0.250	106	86.6	115.3	0.248	99.4	6.25	0.0	20.0

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

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

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

1620932

1620932

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162151
N/A		Page 1 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861	MSIN T6-02 FAX 372-1879
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20	
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013	Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021945	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-A1	N/A
	S16T021946	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-A2	N/A
	S16T021947	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-B1	N/A
	S16T021948	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-BLANK	N/A
	S16T021949	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-C1	N/A
	S16T021950	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-D1	N/A
	S16T021951	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-E1	N/A
	S16T021952	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-EFF-BASE	N/A
	S16T021953	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-F1	N/A
	S16T021954	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-G1	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS — Hold Time

Send Results to Carl Howald IV & Greg Moore
Carl_N_Howald@rl.gov and Gregory_S_Moore@rl.gov FoF email

RELEASE 9
Reference Contract # 55502

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holder	7-26-16 0900	Scott Harder	7-26-16/0900
SW Harder WRPS	7-26-16/1400	FEDEX	
		Paul Van Tassell Paul Van Tassell	07 27 16 10:19

Matrix*

S = Soil	DL = Drum Liquids		
SE = Sediment	T = Tissue		
SO = Solid	WI = Wipe		
SL = Sludge	L = Liquid		
W = Water	V = Vegetation		
O = Oil	VA = Vapor		
A = Air	X = Other		
DS = Drum Solids			

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process) — Disposed By — Date/Time: July 29, 2016 10:30 AM

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

A-6003-962 (03/05)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162151
N/A		Page 2 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861	MSIN T6-02 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20	
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013	Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021955	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-H1	N/A
	S16T021956	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-H2	N/A
	S16T021957	VA	7/22/16		CHARCOAL TUBE	Acetonitrile 16-06172-5-IN-BASE	N/A
	S16T021958	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-A1	N/A
	S16T021959	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-A2	N/A
	S16T021960	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-B1	N/A
	S16T021961	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-BLANK	N/A
	S16T021962	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-C1	N/A
	S16T021963	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-D1	N/A
	S16T021964	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-E1	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS — Hold Time

Send Results to Carl Howald IV & Greg Moore
Carl_W_Howald@rl.gov and Gregory_S_Moore@rl.gov for email

RELEASE 9
Reference Contract # 55502

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holdren	7-26-16 0900	Scott Harder	7-26-16 / 0900
SW Harder WRPS	7-26-16 / 1400	FEDEX	
fedex		Tami VanTassell	07-27-16 / 1015

Matrix*

S = Soil	DL = Drum Liquids		
SE = Sediment	T = Tissue		
SO = Solid	WI = Wipe		
SL = Sludge	L = Liquid		
W = Water	V = Vegetation		
O = Oil	VA = Vapor		
A = Air	X = Other		
DS = Drum Solids			

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process): Disposed By: [illegible] July 28, 2016 10:30 AM — Date/Time

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

A-6003-962 (03/05)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162151
N/A		Page 3 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN T6-02 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013 Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7748 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021965	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-EFF-BASE	N/A
	S16T021966	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-F1	N/A
	S16T021967	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-G1	N/A
	S16T021968	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-H1	N/A
	S16T021969	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-H2	N/A
	S16T021970	VA	7/23/16		CHARCOAL TUBE	Acetonitrile 16-06173-5-IN-BASE	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS: Send Results to Carl Howald IV & Greg Moore Carl_W_Howald@rl.gov and Gregory_S_Moore@rl.gov ToF email

RELEASE 9
Reference Contract # 55502

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon Lidder	7-26-16 0900	Scott Harder	7-26-16/0900
SW Harder WRPS	7-26-16/1400	FEDEX	
		Tami VanTassell	07-27-16

Matrix*: S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, O = Oil, A = Air, DS = Drum Solids, DL = Drum Liquids, T = Tissue, WI = Wipe, L = Liquid, V = Vegetation, VA = Vapor, X = Other

FINAL SAMPLE DISPOSITION: Disposal Method (e.g., Return to customer, per lab procedure, used in process) — Disposed By: Young Han Lee — Date/Time: July 29, 2016 10:30 Am

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

A-6003-962 (03/05)

C.3.6 Mercury

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

Document No.: 20162164 Rev. 0

Michael A. Purcell
WAI Hanford Laboratory

Date Published
August 24, 2016

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

NARRATIVE

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

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

DISCLAIMERS

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

PROCEDURES

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

ANALYTICAL SUMMARY

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

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

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

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

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

Attachment 1

DATA SUMMARY REPORT

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162164

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

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162164

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

Attachment 2

ANALYSIS DATE REPORT

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162164

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

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162164

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

Attachment 3

RECEIPT PAPERWORK

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST	ATS-LO-090-101 Rev DG-1

Date Samples Received: 7-25-16 Total Number of Samples: 312 Group #: 20162164-Hg

Sample Custodian: TERESA FRAZIER IH Technician: Jeff Skyming

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSR provided?		Yes	✓	
Verify GKI is complete			✓	☐ In Project File
Received from an alpha facility?		✓		☐ Contact PC for approval to release
Check that outer custody seal is intact, if present			✓	
Record cooler temperature in centigrade, as appropriate	4.0			☐ Check if no cooler and/or no ice
Samples are intact and in good condition	✓			If No, provide comments below
RSA/COC provided and complete containing the following information?				
• Client name and client sample number	✓			
• Date and time of sampling	✓			
• Sampling location or origin	✓			
• Container type, size, and number	✓			
• Preservatives (if used) noted on the COC/RSA and sample bottles	-		✓	
• Analysis request is clear	✓			
• Signature of persons relinquishing and receiving samples	✓			
• Date and/or time of sample custody exchange	✓			
Verify that sample numbers on containers match the COC and/or RSA	✓			
Samples stored properly (e.g., refrigeration)	✓			

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? Yes PC/SC Initials RLH Date 7-25-16

If No, comment on communication and resolution:

CWH 7/25/16

7-25-16 SW WRPS - Ship - 182
Run - 78
WHL - NH_3 - 26
Hg - 26

Number of IH Samples Received:

Acetonitrile 26

Aldehyde Screen:	26	Amines:	26	Ammonia:	26	Aromatic HC:		Asbestos:	
Beryllium:		Be-Bulk:		Be-Filter:		Be-Wipe		1,3-Butadiene:	52
Formaldehyde:		Furans:	26	Mercury:	26	Methanol:		Nitrosamines:	26
Nitrous Oxide:		Pyridines:	26	SVOA:	26	VOA:	26	Other-IH:	

A-6005-302 (REV 4)

20162164 Rev. 0

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/22/2016
CACN: 208367 202003	**COA:** CB20	**Survey No.:** 16-06172 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L CUST 7/25/16	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
	16-06172-3-EFF-BASE / TDU (Tenax)	Furans CM 7-23-16
	16-06172-3-F1 / TDU (Tenax)	Furans
	16-06172-3-G1 / TDU (Tenax)	Furans
	16-06172-3-H1 / TDU (Tenax)	Furans
	16-06172-3-H2 / TDU (Tenax)	Furans
	16-06172-3-IN-BASE / TDU (Tenax)	Furans
S16T022211	16-06172-6-A1 / Hydrar (SKC 226-17-1A) S16T022214 S16T022215	✓ Hg-Elemental
S16T022217	16-06172-6-A2 / Hydrar (SKC 226-17-1A) S16T022218 S16T022221	✓ Hg-Elemental

Special Instructions: N/A

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

	Signature	Printed Name	Date	Time
Relinquished By:	Dell Spaulding	Dell Spaulding	7-25-16	1100
Received By:	Teresa Forrester	TERESA FORRESTER	7-25-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

20162164 Rev. 0

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/22/2016
CACN: 202367 202003 est 7/25/16	**COA:** CB20	**Survey No.:** 16-06172 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
S16T022228	16-06172-6-B1 / Hydrar (SKC 226-17-1A) S16T022231 S16T022232	Hg-Elemental
S16T022234	16-06172-6-BLANK / Hydrar (SKC 226-17-1A) S16T022235 S16T022236	Hg-Elemental
S16T022238	16-06172-6-C1 / Hydrar (SKC 226-17-1A) S16T022241 S16T022242	Hg-Elemental
S16T022243	16-06172-6-D1 / Hydrar (SKC 226-17-1A) S16T022245 S16T022246	Hg-Elemental
S16T022247	16-06172-6-E1 / Hydrar (SKC 226-17-1A) S16T022250 S16T022251	Hg-Elemental
S16T022252	16-06172-6-EFF-BASE / Hydrar (SKC 226-17-1A) S16T022253 S16T022254	Hg-Elemental
S16T022255	16-06172-6-F1 / Hydrar (SKC 226-17-1A) S16T022256 S16T022257	Hg-Elemental
S16T022258	16-06172-6-G1 / Hydrar (SKC 226-17-1A) S16T022259 S16T022260	Hg-Elemental

Special Instructions: N/A

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Josh Wilhelm	2704 HV - H104	7/23/16	0700
Retrieved from Storage:	Dell Spalding	Dell Spalding		7-25-16	0715

	Signature	Printed Name	Date	Time
Relinquished By:	Dell Spalding	Dell Spalding	7-25-16	1100
Received By:	Teresa Forrester	TERESA FORRESTER	7-25-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

20162164 Rev. 0

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/22/2016
CACN: 202367 202003	**COA:** CB20	**Survey No.:** 16-06172 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker (CWH 7/25/16)	**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
S16T022261	16-06172-6-H1 / Hydrar (SKC 226-17-1A) · S16T022263 S16T022264	Hg-Elemental
S16T022267	16-06172-6-H2 / Hydrar (SKC 226-17-1A) · S16T022269 S16T022270	Hg-Elemental
S16T022273	16-06172-6-IN-BASE / Hydrar (SKC 226-17-1A) · S16T022274 S16T022275 (CWH 7-25-16)	Hg-Elemental
	16-06172-7-A1 / CISA (SKC 226-29)	NH3
	16-06172-7-A2 / CISA (SKC 226-29)	NH3
	16-06172-7-B1 / CISA (SKC 226-29)	NH3
	16-06172-7-BLANK / CISA (SKC 226-29)	NH3
	16-06172-7-C1 / CISA (SKC 226-29)	NH3

CM 7-23-16

Special Instructions: N/A

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

	Signature	Printed Name	Date	Time
Relinquished By:	Dell Spaulding	Dell Spaulding	7-25-16	1100
Received By:	Teresa Forrester	TERESA FORRESTER	7-25-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

20162164 Rev. 0

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/23/2016
CACN: ~~202367~~ 202003	**COA:** CB20	**Survey No.:** 16-06173 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L (JPJ 7/25/16)	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
	16-06173-3-EFF-BASE / TDU (Tenax)	Furans
	16-06173-3-F1 / TDU (Tenax)	Furans
	16-06173-3-G1 / TDU (Tenax)	Furans
	16-06173-3-H1 / TDU (Tenax)	Furans
	16-06173-3-H2 / TDU (Tenax)	Furans
	16-06173-3-IN-BASE / TDU (Tenax)	Furans
S16T022282	16-06173-6-A1 / Hydrar (SKC 226-17-1A) S16T022283 '16T022284	Hg-Elemental
S16T022285	16-06173-6-A2 / Hydrar (SKC 226-17-1A) S16T022286 '16T022287	Hg-Elemental

Special Instructions:

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

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

Additional Comments:

20162164 Rev. 0

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/23/2016
CACN: ~~202367~~ 202005	**COA:** CB20	**Survey No.:** 16-06173 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
S16T022489	16-06173-6-B1 / Hydrar (SKC 226-17-1A) S16T022289 S16T022290	Hg-Elemental
S16T022490 491	16-06173-6-BLANK / Hydrar (SKC 226-17-1A) S16T022292 S16T022293	Hg-Elemental
S16T022494	16-06173-6-C1 / Hydrar (SKC 226-17-1A) S16T022495 S16T022496	Hg-Elemental
S16T022497	16-06173-6-D1 / Hydrar (SKC 226-17-1A) S16T022498 S16T022499	Hg-Elemental
S16T022500	16-06173-6-E1 / Hydrar (SKC 226-17-1A) S16T022501 S16T022502	Hg-Elemental
S16T022503	16-06173-6-EFF-BASE / Hydrar (SKC 226-17-1A) S16T022504 S16T022505	Hg-Elemental
S16T022506	16-06173-6-F1 / Hydrar (SKC 226-17-1A) S16T022507 S16T022508	Hg-Elemental
S16T022520	16-06173-6-G1 / Hydrar (SKC 226-17-1A) S16T022524 S16T022525	Hg-Elemental

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Gerardo Saenz	2704 HU / H 104	7-23-16	2359
Retrieved from Storage:		~~BRETT GARNER~~ BRETT GARNER		7-25-16	0742

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

Additional Comments:

20162164 Rev. 0

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/23/2016
CACN: ~~202367~~ 202003	**COA:** CB20	**Survey No.:** 16-06173 - Respirator Cartridge Testing A Farm	
Contact Name: CWH 7/25/16 Johes, 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
S16T022528	16-06173-6-H1 / Hydrar (SKC 226-17-1A) S16T022529 S16T022530	Hg-Elemental
S16T022531	16-06173-6-H2 / Hydrar (SKC 226-17-1A) S16T022532 S16T022533	Hg-Elemental
S16T022535	16-06173-6-IN-BASE / Hydrar (SKC 226-17-1A) S16T022536 S16T022539	Hg-Elemental
	16-06173-7-A1 / CISA (SKC 226-29)	NH3
	16-06173-7-A2 / CISA (SKC 226-29)	NH3
	16-06173-7-B1 / CISA (SKC 226-29)	NH3
	16-06173-7-BLANK / CISA (SKC 226-29)	NH3
	16-06173-7-C1 / CISA (SKC 226-29)	NH3

Special Instructions:

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

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

Additional Comments:

C.3.7 Ammonia

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

Document No.: 20162135 Rev. 0

Michael A. Purcell
WAI Hanford Laboratory

Date Published
August 18, 2016

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509-373-3240

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

NARRATIVE

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

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

DISCLAIMERS

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

PROCEDURES

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

ANALYTICAL SUMMARY

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

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

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

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

Attachment 1

DATA SUMMARY REPORT

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162135

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

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162135

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

Attachment 2

ANALYSIS DATE REPORT

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162135

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

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162135

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

Attachment 3

RECEIPT PAPERWORK

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST	ATS-LO-090-101 Rev DG-1

Date Samples Received: 7-25-16 Total Number of Samples: 312 Group #: 20162135- NH3

Sample Custodian: TERESA FRAZIER IH Technician: [illegible signature]

Sample Custodian to Complete: [illegible signature]

Action	Yes	No	N/A	Comments
RSR provided?		[illegible]	✓	
Verify GKI is complete			✓	☐ In Project File
Received from an alpha facility?		✓		☐ Contact PC for approval to release
Check that outer custody seal is intact, if present			✓	
Record cooler temperature in centigrade, as appropriate	4.0			☐ Check if no cooler and/or no ice
Samples are intact and in good condition	✓			If No, provide comments below
RSA/COC provided and complete containing the following information?				
• Client name and client sample number	✓			
• Date and time of sampling	✓			
• Sampling location or origin	✓			
• Container type, size, and number	✓			
• Preservatives (if used) noted on the COC/RSA and sample bottles			✓	
• Analysis request is clear	✓			
• Signature of persons relinquishing and receiving samples	✓			
• Date and/or time of sample custody exchange	✓			
Verify that sample numbers on containers match the COC and/or RSA	✓			
Samples stored properly (e.g., refrigeration)	✓			

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? Yes PC/SC Initials [illegible] Date 7-25-16

If No, comment on communication and resolution: CWJ 7/25/16

~~[illegible]~~ WRPS - Ship - 182
Run - 78
WHL - NH_3 - 26
Hg - 26

Acetonitrile 26

Number of IH Samples Received:

Aldehyde Screen:	26	Amines:	26	Ammonia:	26	Aromatic HC:		Asbestos:			
Beryllium:		Be-Bulk:		Be-Filter:		Be-Wipe:		1,3-Butadiene:	52		
Formaldehyde:		Furans:	26	Mercury:	26	Methanol:		Nitrosamines:	26		
Nitrous Oxide:		Pyridines:	26	SVOA:	26	VOA:	26	Other-IH:			

A-6005-302 (REV 4)

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/22/2016
CACN: ~~202367~~ 202003	**COA:** CB20	**Survey No.:** 16-06172 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
	16-06172-6-H1 / Hydrar (SKC 226-17-1A)	Hg-Elemental CM 7-23-16
	16-06172-6-H2 / Hydrar (SKC 226-17-1A)	Hg-Elemental
	16-06172-6-IN-BASE / Hydrar (SKC 226-17-1A)	Hg-Elemental
S16T021581	16-06172-7-A1 / CISA (SKC 226-29) S16T021582 S16T021583	NH3
S16T021584	16-06172-7-A2 / CISA (SKC 226-29) S16T021585 S16T021586	NH3
S16T021619	16-06172-7-B1 / CISA (SKC 226-29) S16T021646 S16T021647	NH3
S16T021661	16-06172-7-BLANK / CISA (SKC 226-29) S16T021663 S16T021664	NH3
S16T021665	16-06172-7-C1 / CISA (SKC 226-29) S16T021678 S16T021679	NH3

Special Instructions: N/A

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Josh Wilhelm	2704 HV - H104	7/23/16	0700
Retrieved from Storage:	Dell Spaulding	Dell Spaulding		7-25-16	0720

	Signature	Printed Name	Date	Time
Relinquished By:	Dell Spaulding	Dell Spaulding	7-25-16	1100
Received By:	Teresa Forrester	TERESA FORRESTER	7-25-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/22/2016
CACN: 202767 202003	**COA:** CB20	**Survey No.:** 16-06172 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
S16T021684	16-06172-7-D1 / CISA (SKC 226-29) S16T021687 S16T021688	NH3
S16T021692	16-06172-7-E1 / CISA (SKC 226-29) S16T021693 S16T021694	NH3
S16T021698	16-06172-7-EFF-BASE / CISA (SKC 226-29) S16T021700 S16T021701	NH3
S16T021741	16-06172-7-F1 / CISA (SKC 226-29) S16T021742 S16T021743	NH3
S16T021750	16-06172-7-G1 / CISA (SKC 226-29) S16T021754 S16T021755	NH3
S16T021981	16-06172-7-H1 / CISA (SKC 226-29) S16T021984 S16T021985	NH3
S16T021986	16-06172-7-H2 / CISA (SKC 226-29) S16T021987 S16T021988	NH3
S16T021992	16-06172-7-IN-BASE / CISA (SKC 226-29) S16T021993 S16T021994	NH3

Special Instructions: N/A

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Josh Wilhelm	2704 HV - H104	7/23/16	0700
Retrieved from Storage:	Dell Spaulding	Dell Spaulding		7-25-16	0720

	Signature	Printed Name	Date	Time
Relinquished By:	Dell Spaulding	Dell Spaulding	7-25-16	1100
Received By:	Teresa Forrester	TERESA FORRESTER	7-25-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/23/2016
CACN: ~~202367~~ 202003 cash 7/25/16	**COA:** CB20	**Survey No.:** 16-06173 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
	16-06173-6-H1 / Hydrar (SKC 226-17-1A)	Hg-Elemental
	16-06173-6-H2 / Hydrar (SKC 226-17-1A)	Hg-Elemental
	16-06173-6-IN-BASE / Hydrar (SKC 226-17-1A)	Hg-Elemental
S16T022039	16-06173-7-A1 / CISA (SKC 226-29) S16T022040 S16T022041	NH3
S16T022046	16-06173-7-A2 / CISA (SKC 226-29) S16T022049 S16T022050	NH3
S16T022051	16-06173-7-B1 / CISA (SKC 226-29) S16T022054 S16T022056	NH3
S16T022087	16-06173-7-BLANK / CISA (SKC 226-29) S16T022089 S16T022090	NH3
S16T022091	16-06173-7-C1 / CISA (SKC 226-29) S16T022092 S16T022093	NH3

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Gerardo Sainz	2704 HV/H104	7-23-16	2359
Retrieved from Storage:		BRETT GARNER		7-25-16	0734

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

Additional Comments:

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/23/2016
CACN: ~~202367~~ 202003	**COA:** CB20	**Survey No.:** 16-06173 - Respirator Cartridge Testing A Farm	
Contact Name: Jones, Parker L CJH 7/25/16	**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
S16T022102	16-06173-7-D1 / CISA (SKC 226-29) S16T022105, S16T022106	NH3
S16T022107	16-06173-7-E1 / CISA (SKC 226-29) S16T022108, S16T022109	NH3
S16T022112	16-06173-7-EFF-BASE / CISA (SKC 226-29) S16T022113, S16T022114	NH3
S16T022143	16-06173-7-F1 / CISA (SKC 226-29) S16T022144, S16T022145	NH3
S16T022146	16-06173-7-G1 / CISA (SKC 226-29) S16T022147, S16T022148	NH3
S16T022149	16-06173-7-H1 / CISA (SKC 226-29) S16T022151, S16T022152	NH3
S16T022156	16-06173-7-H2 / CISA (SKC 226-29) S16T022159, S16T022160	NH3
S16T022161	16-06173-7-IN-BASE / CISA (SKC 226-29) S16T022162, S16T022163	NH3

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Gerardo Seane	2704 HV/H104	7-23-16	2359
Retrieved from Storage:		BRETT GARNER		7-25-16	0734

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

Additional Comments:

C.3.8 Aldehydes

ANALYTICAL REPORT

Report Date: August 03, 2016

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

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162150

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

Analytical Results

Sample ID: **S16T021901** Collected: 07/22/2016
Lab ID: 1620930001 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.39**	NA	NA	0.050
Acetaldehyde	**2.3**	NA	NA	0.050
Acetone	**13**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.98**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	**0.81**	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	**0.095**	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	**0.31**	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021902** Collected: 07/22/2016
Lab ID: 1620930002 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.10**	NA	NA	0.050
Acetaldehyde	**1.1**	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021902** Collected: 07/22/2016
Lab ID: 1620930002 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	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: **S16T021903** Collected: 07/22/2016
Lab ID: 1620930003 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.082**	NA	NA	0.050
Acetaldehyde	**1.3**	NA	NA	0.050
Acetone	**0.28**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021904** Collected: 07/22/2016
Lab ID: 1620930004 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	<0.050	NA	NA	0.050
Acetone	**0.59**	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: **S16T021905** Collected: 07/22/2016
Lab ID: 1620930005 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**1.2**	NA	NA	0.050
Acetone	**2.4**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.063**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021905** Collected: 07/22/2016
Lab ID: 1620930005 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021906** Collected: 07/22/2016
Lab ID: 1620930006 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.053**	NA	NA	0.050
Acetaldehyde	**1.3**	NA	NA	0.050
Acetone	**3.2**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.088**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021907** Collected: 07/22/2016
Lab ID: 1620930007 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**1.1**	NA	NA	0.050
Acetone	**6.2**	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021907** Collected: 07/22/2016
Lab ID: 1620930007 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.13**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021908** Collected: 07/22/2016
Lab ID: 1620930008 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.070**	NA	NA	0.050
Acetaldehyde	**0.082**	NA	NA	0.050
Acetone	**0.25**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021909** Collected: 07/22/2016
Lab ID: 1620930009 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**0.98**	NA	NA	0.050
Acetone	**8.9**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.17**	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: **S16T021910** Collected: 07/22/2016
Lab ID: 1620930010 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**1.2**	NA	NA	0.050
Acetone	**7.5**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.15**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050

Results Continued on Next Page

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

Analytical Results

Sample ID: **S16T021910** Collected: 07/22/2016
Lab ID: 1620930010 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021911** Collected: 07/22/2016
Lab ID: 1620930011 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.14**	NA	NA	0.050
Acetaldehyde	**2.1**	NA	NA	0.050
Acetone	**13**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**1.0**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	**0.79**	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: **S16T021912** Collected: 07/22/2016
Lab ID: 1620930012 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**1.2**	NA	NA	0.050
Acetone	**7.0**	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021912** Collected: 07/22/2016
Lab ID: 1620930012 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.16**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021913** Collected: 07/22/2016
Lab ID: 1620930013 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/28/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.25**	NA	NA	0.050
Acetaldehyde	**0.091**	NA	NA	0.050
Acetone	**0.29**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	**0.16**	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021914** Collected: 07/23/2016
Lab ID: 1620930014 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.44**	NA	NA	0.050
Acetaldehyde	**1.9**	NA	NA	0.050
Acetone	**4.8**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.81**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	**0.68**	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: **S16T021915** Collected: 07/23/2016
Lab ID: 1620930015 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.17**	NA	NA	0.050
Acetaldehyde	**1.1**	NA	NA	0.050
Acetone	**0.076**	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

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021915** Collected: 07/23/2016
Lab ID: 1620930015 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021916** Collected: 07/23/2016
Lab ID: 1620930016 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.089**	NA	NA	0.050
Acetaldehyde	**1.1**	NA	NA	0.050
Acetone	**2.0**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.079**	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: **S16T021917** Collected: 07/23/2016
Lab ID: 1620930017 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	<0.050	NA	NA	0.050
Acetone	**0.43**	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021917** Collected: 07/23/2016
Lab ID: 1620930017 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021918** Collected: 07/23/2016
Lab ID: 1620930018 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**0.96**	NA	NA	0.050
Acetone	**4.1**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021919** Collected: 07/23/2016
Lab ID: 1620930019 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**1.0**	NA	NA	0.050
Acetone	**4.9**	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: **S16T021920** Collected: 07/23/2016
Lab ID: 1620930020 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**1.2**	NA	NA	0.050
Acetone	**4.1**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.085**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021920** Collected: 07/23/2016
Lab ID: 1620930020 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021921** Collected: 07/23/2016
Lab ID: 1620930021 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**0.074**	NA	NA	0.050
Acetone	**0.33**	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: **S16T021922** Collected: 07/23/2016
Lab ID: 1620930022 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**1.1**	NA	NA	0.050
Acetone	**3.7**	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021922** Collected: 07/23/2016
Lab ID: 1620930022 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.083**	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: **S16T021923** Collected: 07/23/2016
Lab ID: 1620930023 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**1.1**	NA	NA	0.050
Acetone	**6.8**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.11**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021924** Collected: 07/23/2016
Lab ID: 1620930024 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.21**	NA	NA	0.050
Acetaldehyde	**2.0**	NA	NA	0.050
Acetone	**14**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.89**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	**0.72**	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021925** Collected: 07/23/2016
Lab ID: 1620930025 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**1.2**	NA	NA	0.050
Acetone	**8.7**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.13**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021925** Collected: 07/23/2016
Lab ID: 1620930025 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021926** Collected: 07/23/2016
Lab ID: 1620930026 Received: 07/27/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/29/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.31**	NA	NA	0.050
Acetaldehyde	**0.12**	NA	NA	0.050
Acetone	**0.45**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Comments

Quality Control: **EPA TO-11A - (HBN: 173721)**

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

Quality Control: **EPA TO-11A - (HBN: 173791)**

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

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

Method	Analyst	Peer Review
EPA TO-11A	/S/ David Teynor 08/02/2016 15:53	/S/ Christopher Winter 08/03/2016 10:00

ANALYTICAL REPORT

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

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

Method	Analyst	Peer Review
EPA TO-11A	/S/ David Teynor 08/02/2016 17:05	/S/ Lyle Edwards 08/03/2016 08:31

Laboratory Contact Information

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

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

General Lab Comments

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

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

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

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

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ACLASS (DoD ELAP)	ADE-1420	http://www.aclasscorp.com
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Florida (TNI)	E871067	http://www.dep.state.fl.us/labs/bars/sas/qa/
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing:			
CPSC	ACLASS (ISO 17025, CPSC)	ADE-1420	http://www.aclasscorp.com
Soil, Dust, Paint ,Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

ANALYTICAL REPORT

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

Definitions

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

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

Rand Potter, Project Manager, ALS Environmental

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620930

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** EPA TO-11A
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12388 (HBN: 173721)
	Prepared By: NA	**Analyzed By:** David Teynor

Blank

LMB: 510378
Analyzed: 07/28/2016 00:00
Units: ug/sample

Analyte	Result	MDL	RL
Formaldehyde	ND	NA	0.0500
Acetaldehyde	ND	NA	0.0500
Acetone	0.328	NA	0.0500
Acrolein	ND	NA	0.0500
Propionaldehyde	ND	NA	0.0500
Crotonaldehyde	ND	NA	0.0500
Butyraldehyde	ND	NA	0.0500
Benzaldehyde	ND	NA	0.0500
Isovaleraldehyde	ND	NA	0.0500
Valeraldehyde	ND	NA	0.0500
m-Tolualdehyde	ND	NA	0.0500
p-Tolualdehyde	ND	NA	0.0500
o-Tolualdehyde	ND	NA	0.0500
Hexanal	ND	NA	0.0500
2,5-Dimethylbenzaldehyde	ND	NA	0.0500

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510379
Analyzed: 07/28/2016 00:00
Dilution: 1
Units: ug/sample

LCSD: 510380
Analyzed: 07/28/2016 00:00
Dilution: 1
Units: ug/sample

Analyte	Result	Target	%Rec	QC Limits		Result	%Rec	RPD	QC Limits	
Formaldehyde	3.09	3.00	103	87.8	116.8	3.02	101	2.29	0.0	20.0
Acetaldehyde	3.06	3.00	102	94.7	110.5	3.03	101	0.985	0.0	20.0
Acetone	2.67	3.00	89.1	69.2	119.9	2.64	88.1	1.13	0.0	20.0
Acrolein	2.91	3.00	97.0	83.5	120.2	2.92	97.3	0.343	0.0	20.0
Propionaldehyde	3.16	3.00	105	92.2	117.2	3.15	105	0.317	0.0	20.0
Crotonaldehyde	3.05	3.00	102	93.1	114.8	3.02	101	0.988	0.0	20.0
Butyraldehyde	3.05	3.00	102	86.6	120.8	3.05	102	0.00	0.0	20.0
Benzaldehyde	3.06	3.00	102	96.0	112.3	3.07	102	0.326	0.0	20.0
Isovaleraldehyde	3.10	3.00	103	95.4	121.6	3.10	103	0.00	0.0	20.0
Valeraldehyde	3.06	3.00	102	85.3	120.4	3.06	102	0.00	0.0	20.0
m-Tolualdehyde	3.22	3.00	107	80.9	118.6	3.09	103	4.12	0.0	20.0
p-Tolualdehyde	2.76	3.00	92.0	83.5	122.2	2.83	94.3	2.50	0.0	20.0
o-Tolualdehyde	2.92	3.00	97.3	91.6	111.4	2.91	97.0	0.343	0.0	20.0
Hexanal	3.28	3.00	109	85.4	127.6	3.06	102	6.94	0.0	20.0
2,5-Dimethylbenzaldehyde	3.23	3.00	108	99.6	118.7	3.21	107	0.621	0.0	20.0

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620930

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** EPA TO-11A
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12388 (HBN: 173721)
	Prepared By: NA	**Analyzed By:** David Teynor

Comments

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	/S/ Christopher Winter
08/02/2016 15:53	08/03/2016 10:00

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◉ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620930

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** EPA TO-11A
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12393 (HBN: 173791)
	Prepared By: NA	**Analyzed By:** David Teynor

Blank

LMB: 510613
Analyzed: 07/29/2016 00:00
Units: ug/sample

Analyte	Result	MDL	RL
Formaldehyde	ND	NA	0.0500
Acetaldehyde	ND	NA	0.0500
Acetone	0.222	NA	0.0500
Acrolein	ND	NA	0.0500
Propionaldehyde	ND	NA	0.0500
Crotonaldehyde	ND	NA	0.0500
Butyraldehyde	ND	NA	0.0500
Benzaldehyde	ND	NA	0.0500
Isovaleraldehyde	ND	NA	0.0500
Valeraldehyde	ND	NA	0.0500
m-Tolualdehyde	ND	NA	0.0500
p-Tolualdehyde	ND	NA	0.0500
o-Tolualdehyde	ND	NA	0.0500
Hexanal	ND	NA	0.0500
2,5-Dimethylbenzaldehyde	ND	NA	0.0500

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510614
Analyzed: 07/29/2016 00:00
Dilution: 1
Units: ug/sample

LCSD: 510615
Analyzed: 07/29/2016 00:00
Dilution: 1
Units: ug/sample

Analyte	Result	Target	%Rec	QC Limits		Result	%Rec	RPD	QC Limits	
Formaldehyde	3.03	3.00	101	87.8	116.8	3.09	103	1.96	0.0	20.0
Acetaldehyde	3.05	3.00	102	94.7	110.5	3.07	102	0.654	0.0	20.0
Acetone	2.84	3.00	94.6	69.2	119.9	2.86	95.3	0.702	0.0	20.0
Acrolein	2.92	3.00	97.3	83.5	120.2	2.96	98.7	1.36	0.0	20.0
Propionaldehyde	3.14	3.00	105	92.2	117.2	3.19	106	1.58	0.0	20.0
Crotonaldehyde	2.99	3.00	99.7	93.1	114.8	3.00	100	0.334	0.0	20.0
Butyraldehyde	3.12	3.00	104	86.6	120.8	3.12	104	0.00	0.0	20.0
Benzaldehyde	3.06	3.00	102	96.0	112.3	3.12	104	1.94	0.0	20.0
Isovaleraldehyde	3.18	3.00	106	95.4	121.6	3.20	107	0.627	0.0	20.0
Valeraldehyde	3.12	3.00	104	85.3	120.4	3.09	103	0.966	0.0	20.0
m-Tolualdehyde	3.04	3.00	101	80.9	118.6	3.11	104	2.28	0.0	20.0
p-Tolualdehyde	2.88	3.00	96.0	83.5	122.2	2.88	96.0	0.00	0.0	20.0
o-Tolualdehyde	3.02	3.00	101	91.6	111.4	2.98	99.3	1.33	0.0	20.0
Hexanal	3.26	3.00	109	85.4	127.6	3.33	111	2.12	0.0	20.0
2,5-Dimethylbenzaldehyde	3.25	3.00	108	99.6	118.7	3.28	109	0.919	0.0	20.0

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620930

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** EPA TO-11A
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12393 (HBN: 173791)
	Prepared By: NA	**Analyzed By:** David Teynor

Comments

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	/S/ Lyle Edwards
08/02/2016 17:05	08/03/2016 08:31

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◉ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

1620930

1620930

A

N/. W

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162150

Page 1 of 3

Collector JONES	Contact/Requestor CARL HOWALD IV	Telephone No. 373-6861	MSIN T6-05 FAX 372-1878
SAF No. N/A	Sample Origin CARTRIDGE EVALUATION	Purchase Order/Charge Code 202003/CB20	
Project Title CARTRIDGE EVALUATION	Logbook/ Work Package No. N/A	Ice Chest No. WTS-013	Temp. ON ICE
Shipped To (Lab) ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296	
Protocol N/A	Data Turnaround 10 DAYS	Parts and Return No. 41071	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021901	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-A1	25C or low
	S16T021902	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-A2	25C or low
	S16T021903	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-B1	25C or low
	S16T021904	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-BLANK	25C or low
	S16T021905	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-C1	25C or low
	S16T021906	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-D1	25C or low
	S16T021907	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-E1	25C or low
	S16T021908	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-EFF-BASE	25C or low
	S16T021909	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-F1	25C or low
	S16T021910	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-G1	25C or low

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

EPA TO-11A

SPECIAL INSTRUCTIONS

Send Results to Carl Howald IV and Greg Moore
Carl_W_Howald@rl.gov and
Gregory_S_Moore@rl.gov see SOW for email

Release 9
Reference Contract # 55502
NIOSH 2016 MOD

Hold Time

Relinquished By (Print)	Sign	Date/Time	Received By (Print)	Sign	Date/Time
Sharon Uddla	[signature]	7-26-16 0900	Scott Harder	[signature]	7-26-16 / 0900
SW Harder WRPS	[signature]	7-26-16 / 1400	FEDEX		
[signature]			Paul Van Tassell	Paul Van Tassell	07-27-16 10:30

Matrix*

S = Soil	DL = Drum Liquids		
SE = Sediment	T = Tissue		
SO = Solid	WI = Wipe		
SL = Sludge	L = Liquid		
W = Water	V = Vegetation		
O = Oil	VA = Vapor		
A = Air	X = Other		
DS = Drum Solids			

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time
	DOT	CONSUMED	07/28/16 13:00

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

A-6003-962 (03/05)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162150
N/A		Page 2 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861	MSIN T6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20	
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013	Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.	7768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.	41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021911	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-H1	25C or low
	S16T021912	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-H2	25C or low
	S16T021913	VA	7/22/16		SILICA GEL	Aldehyde 16-06172-8-IN-BASE	25C or low
	S16T021914	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-A1	25C or low
	S16T021915	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-A2	25C or low
	S16T021916	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-B1	25C or low
	S16T021917	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-BLANK	25C or low
	S16T021918	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-C1	25C or low
	S16T021919	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-D1	25C or low
	S16T021920	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-E1	25C or low

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

EPA TO-11A

SPECIAL INSTRUCTIONS — Hold Time

Send Results to Carl Howald IV and Greg Moore
Carl_W_Howald@rl.gov and Gregory_S_Moore@rl.gov see SOW for email

Release 9
Reference Contract # 55502
NIOSH 2016 MOD

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
	Sharon L Holder		7-26-16 0900		Scott Harder		7-26-16/0900
Relinquished By	SW Harder WRPS		7-26-16/1400	Received By	FEDEX		Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time

Matrix*

S = Soil		DL = Drum Liquids	
SE = Sediment		T = Tissue	
SO = Solid		WI = Wipe	
SL = Sludge		L = Liquid	
W = Water		V = Vegetation	
O = Oil		VA = Vapor	
A = Air		X = Other	
DS = Drum Solids			

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time
	DOT	CONSUMED	07/28/16 13:00

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

A-6003-962 (03/05)

Assembler N/A	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C. No. 20162150 Page 3 of 3
Collector JONES	Contact/Requestor CARL HOWALD IV	Telephone No. 373-6861	MSIN T6-05 FAX 372-1878
SAF No. N/A	Sample Origin CARTRIDGE EVALUATION	Purchase Order/Charge Code 202003/CB20	
Project Title CARTRIDGE EVALUATION	Logbook/ Work Package No. N/A	Ice Chest No. WTS-013	Temp. ON ICE
Shipped To (Lab) ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296	
Protocol N/A	Data Turnaround 10 DAYS	Parts and Return No. 41071	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021921	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-EFF-BASE	25C or low
	S16T021922	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-F1	25C or low
	S16T021923	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-G1	25C or low
	S16T021924	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-H1	25C or low
	S16T021925	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-H2	25C or low
	S16T021926	VA	7/23/16		SILICA GEL	Aldehyde 16-06173-8-IN-BASE	25C or low

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ⦿ No

EPA TO-11A

SPECIAL INSTRUCTIONS

Send Results to Carl Howald IV and Greg Moore
Carl_W_Howald@rl.gov and
Gregory_S_Moore@rl.gov see SOW for email

Release 9
Reference Contract # 55502
NIOSH 2016 MOD

Hold Time

Relinquished By (Print)	Sign	Date/Time	Received By (Print)	Sign	Date/Time
Sharon Holden	[signature]	7-26-16 0900	Scott Harder	[signature]	7-26-16 / 0900
SW Harder WRPS	[signature]	7-26-16 / 1400	FEDEX		
	fedex		Tani Van Tassell	[signature]	07-27-16 10:05

Matrix*

S = Soil	SE = Sediment	SO = Solid	SL = Sludge
W = Water	O = Oil	A = Air	DS = Drum Solids
DL = Drum Liquids	T = Tissue	WI = Wipe	L = Liquid
V = Vegetation	VA = Vapor	X = Other	

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process): DJT — Disposed By: CONSUMED — Date/Time: 07/28/16 13:00

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

A-6003-962 (03/05)

C.3.9 1. 3-Butadiene

ANALYTICAL REPORT

Report Date: August 03, 2016

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

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162149

Workorder: 34-1620934
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021843				Collected: 07/22/2016
Lab ID: 1620934001				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021844				Collected: 07/22/2016
Lab ID: 1620934002				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021845				Collected: 07/22/2016
Lab ID: 1620934003				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	**0.0012**	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021846**				Collected: 07/22/2016
Lab ID: 1620934004				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**			**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021847**				Collected: 07/22/2016
Lab ID: 1620934005				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**			**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	**0.0010**	NA	NA	0.0010

Sample ID: **S16T021848**				Collected: 07/22/2016
Lab ID: 1620934006				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**			**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	**0.0012**	NA	NA	0.0010

Sample ID: **S16T021849**				Collected: 07/22/2016
Lab ID: 1620934007				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**			**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021850**				Collected: 07/22/2016
Lab ID: 1620934008				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**			**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021851				Collected: 07/22/2016
Lab ID: 1620934009				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021852				Collected: 07/22/2016
Lab ID: 1620934010				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021853				Collected: 07/22/2016
Lab ID: 1620934011				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021854				Collected: 07/22/2016
Lab ID: 1620934012				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021855				Collected: 07/22/2016
Lab ID: 1620934013				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021856				Collected: 07/22/2016
Lab ID: 1620934014				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021857				Collected: 07/22/2016
Lab ID: 1620934015				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021858				Collected: 07/22/2016
Lab ID: 1620934016				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021859				Collected: 07/22/2016
Lab ID: 1620934017				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021860				Collected: 07/22/2016
Lab ID: 1620934018				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021861				Collected: 07/22/2016
Lab ID: 1620934019				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021862				Collected: 07/22/2016
Lab ID: 1620934020				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021863				Collected: 07/22/2016
Lab ID: 1620934021				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021864				Collected: 07/22/2016
Lab ID: 1620934022				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021865				Collected: 07/22/2016
Lab ID: 1620934023				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021866				Collected: 07/22/2016
Lab ID: 1620934024				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021867				Collected: 07/22/2016
Lab ID: 1620934025				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021868				Collected: 07/22/2016
Lab ID: 1620934026				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021869				Collected: 07/23/2016
Lab ID: 1620934027				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021870				Collected: 07/23/2016
Lab ID: 1620934028				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021871**				Collected: 07/23/2016
Lab ID: 1620934029				Received: 07/27/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021872**				Collected: 07/23/2016
Lab ID: 1620934030				Received: 07/27/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021873**				Collected: 07/23/2016
Lab ID: 1620934031				Received: 07/27/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021874**				Collected: 07/23/2016
Lab ID: 1620934032				Received: 07/27/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021875**				Collected: 07/23/2016
Lab ID: 1620934033				Received: 07/27/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		**Analyzed:** 08/02/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021876** Collected: 07/23/2016
Lab ID: 1620934034 Received: 07/27/2016

Method: **NIOSH 1024** Media: SKC 226-37 Sorbent Tube Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021877** Collected: 07/23/2016
Lab ID: 1620934035 Received: 07/27/2016

Method: **NIOSH 1024** Media: SKC 226-37 Sorbent Tube Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021878** Collected: 07/23/2016
Lab ID: 1620934036 Received: 07/27/2016

Method: **NIOSH 1024** Media: SKC 226-37 Sorbent Tube Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021879** Collected: 07/23/2016
Lab ID: 1620934037 Received: 07/27/2016

Method: **NIOSH 1024** Media: SKC 226-37 Sorbent Tube Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021880** Collected: 07/23/2016
Lab ID: 1620934038 Received: 07/27/2016

Method: **NIOSH 1024** Media: SKC 226-37 Sorbent Tube Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021881				Collected: 07/23/2016
Lab ID: 1620934039				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021882				Collected: 07/23/2016
Lab ID: 1620934040				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021883				Collected: 07/23/2016
Lab ID: 1620934041				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021884				Collected: 07/23/2016
Lab ID: 1620934042				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021885				Collected: 07/23/2016
Lab ID: 1620934043				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620934
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021886				Collected: 07/23/2016
Lab ID: 1620934044				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021887				Collected: 07/23/2016
Lab ID: 1620934045				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021888				Collected: 07/23/2016
Lab ID: 1620934046				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021889				Collected: 07/23/2016
Lab ID: 1620934047				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021890				Collected: 07/23/2016
Lab ID: 1620934048				Received: 07/27/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 08/02/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021891** Collected: 07/23/2016
Lab ID: 1620934049 Received: 07/27/2016

Method: NIOSH 1024 Media: SKC 226-37 Sorbent Tube Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021892** Collected: 07/23/2016
Lab ID: 1620934050 Received: 07/27/2016

Method: NIOSH 1024 Media: SKC 226-37 Sorbent Tube Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021893** Collected: 07/23/2016
Lab ID: 1620934051 Received: 07/27/2016

Method: NIOSH 1024 Media: SKC 226-37 Sorbent Tube Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021894** Collected: 07/23/2016
Lab ID: 1620934052 Received: 07/27/2016

Method: NIOSH 1024 Media: SKC 226-37 Sorbent Tube Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

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

Method	Analyst	Peer Review
NIOSH 1024	/S/ Fred Rejali 08/03/2016 04:57	/S/ Thomas J. Masoian 08/03/2016 07:59

Laboratory Contact Information

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

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

ANALYTICAL REPORT

Workorder: **34-1620934**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

General Lab Comments

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

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

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

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

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ACLASS (DoD ELAP)	ADE-1420	http://www.aclasscorp.com
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Florida (TNI)	E871067	http://www.dep.state.fl.us/labs/bars/sas/qa/
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing:			
CPSC	ACLASS (ISO 17025, CPSC)	ADE-1420	http://www.aclasscorp.com
Soil, Dust, Paint ,Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

Definitions

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

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

Rand Potter, Project Manager, ALS Environmental

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620934

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** NIOSH 1024
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** IFID/7635 (HBN: 174019)
	Prepared By: NA	**Analyzed By:** Fred Rejali

Blank

MB: 511195
Analyzed: 08/02/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

MB: 511198
Analyzed: 08/02/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

MB: 511201
Analyzed: 08/02/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 511196
Analyzed: 08/02/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 511197
Analyzed: 08/02/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	LCS Result	Target	% Rec	QC Limits		LCSD Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0305	0.0308	99.2	78.0	117.6	0.0306	99.5	0.392	0.0	20.0

LCS: 511199
Analyzed: 08/02/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 511200
Analyzed: 08/02/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	LCS Result	Target	% Rec	QC Limits		LCSD Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0345	0.0342	101	78.0	117.6	0.0351	103	1.72	0.0	20.0

LCS: 511202
Analyzed: 08/02/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 511203
Analyzed: 08/02/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	LCS Result	Target	% Rec	QC Limits		LCSD Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0347	0.0342	101	78.0	117.6	0.0346	101	0.289	0.0	20.0

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620934

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** NIOSH 1024
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** IFID/7635 (HBN: 174019)
	Prepared By: NA	**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	/S/ Thomas J. Masoian
08/03/2016 04:57	08/03/2016 07:59

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

1620934

Asset N/A · W

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162149 — 1620934

Page 1 of 6

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN T6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013 Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021843	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A1	CHILL -4C
	S16T021844	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-A2	CHILL -4C
	S16T021845	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-B1	CHILL -4C
	S16T021846	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-BLANK	CHILL -4C
	S16T021847	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-C1	CHILL -4C
	S16T021848	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-D1	CHILL -4C
	S16T021849	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-E1	CHILL -4C
	S16T021850	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-F1	CHILL -4C
	S16T021851	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-G1	CHILL -4C
	S16T021852	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-H1	CHILL -4C

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ⦿ No

SPECIAL INSTRUCTIONS

Send Results to Carl W Howald IV,
Carl_W_Howald@rl.gov, and Greg Moore,
Gregory_S_Moore@rl.gov see SOW for email

Reference Contract # 55502
RELEASE 9
NIOSH 1024 CHILL BELOW -4 C

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L. Holden / [signature]	7-26-16 0900	Scott Harder / [signature]	7-26-16/0900
SW Harder WRPS / [signature]	7-26-16/1406	FEDEX	
[signature]		Tami VanAssell / Tami VanAssell	07-27-16
			09:29

Matrix*

S = Soil		DL = Drum Liquids	
SE = Sediment		T = Tissue	
SO = Solid		WI = Wipe	
SL = Sludge		L = Liquid	
W = Water		V = Vegetation	
O = Oil		VA = Vapor	
A = Air		X = Other	
DS = Drum Solids			

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process): used in process (circled) — Disposed By: Fred Rejali [signature] 08/02/16 — Date/Time: 2300

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

A-6003-962 (03/05)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162149
Page 2 of 6

Assembler: N/A		
Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No 373-6861 MSIN T6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013 Temp. on ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021853	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-A-H2	CHILL -4C
	S16T021854	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-A1	CHILL -4C
	S16T021855	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-A2	CHILL -4C
	S16T021856	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-B1	CHILL -4C
	S16T021857	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-BLANK	CHILL -4C
	S16T021858	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-C1	CHILL -4C
	S16T021859	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-D1	CHILL -4C
	S16T021860	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-E1	CHILL -4C
	S16T021861	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-F1	CHILL -4C
	S16T021862	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-G1	CHILL -4C

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ⦿ No

SPECIAL INSTRUCTIONS
Send Results to Carl W Howald IV, Carl_W_Howald@rl.gov, and Greg Moore, Gregory_S_Moore@rl.gov see SOW for email
Reference Contract # 55502
RELEASE 9
NIOSH 1024 CHILL BELOW -4 C

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holden / [signature]	7-26-16 0900	Scott Harder / [signature]	7-26-16 / 0900
SW Harder WRPS / [signature]	7-26-16 / 1400	FEDEX	
[signature] fedex		[signature] Terri VanTassell	07-27-16
			10:08

Matrix*
S = Soil
SE = Sediment
SO = Solid
SL = Sludge
W = Water
O = Oil
A = Air
DS = Drum Solids
DL = Drum Liquids
T = Tissue
WI = Wipe
L = Liquid
V = Vegetation
VA = Vapor
X = Other

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By: Fred Rejali	Date/Time: 08/02/16 2300

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

A-6003-962 (03/05)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162149
N/A		Page 3 of 6

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN T6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013 Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021863	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-H1	CHILL -4C
	S16T021864	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-B-H2	CHILL -4C
	S16T021865	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-EFF-A-BASE	CHILL -4C
	S16T021866	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-EFF-B-BASE	CHILL -4C
	S16T021867	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-IN-A-BASE	CHILL -4C
	S16T021868	VA	7/22/16		CHARCOAL TUBE	1,3-Butadiene 16-06172-9-IN-B-BASE	CHILL -4C
	S16T021869	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-A1	CHILL -4C
	S16T021870	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-A2	CHILL -4C
	S16T021871	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-B1	CHILL -4C
	S16T021872	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-BLANK	CHILL -4C

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS — Hold Time

Send Results to Carl W Howald IV,
Carl_W_Howald@rl.gov, and Greg Moore,
Gregory_S_Moore@rl.gov see SOW for email

Reference Contract # 55502
RELEASE 9
NIOSH 1024 CHILL BELOW -4 C

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon Holder	7-26-16/0930	Scott Harder	7-26-16/0900
SW Harder WRPS	7-26-16/1400	FEDEX	
fedex		Tami VanTassell	07-27-16

Matrix*

S = Soil		DL = Drum Liquids	
SE = Sediment		T = Tissue	
SO = Solid		WI = Wipe	
SL = Sludge		L = Liquid	
W = Water		V = Vegetation	
O = Oil		VA = Vapor	
A = Air		X = Other	
DS = Drum Solids			

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process): Disposed By: Fred Rajali Date/Time: 08102/16 2300

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

A-6003-962 (03/05)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162149
Page 4 of 6

Assembler: N/A

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN T6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013 Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021873	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-C1	CHILL -4C
	S16T021874	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-D1	CHILL -4C
	S16T021875	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-E1	CHILL -4C
	S16T021876	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-F1	CHILL -4C
	S16T021877	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-G1	CHILL -4C
	S16T021878	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-H1	CHILL -4C
	S16T021879	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-A-H2	CHILL -4C
	S16T021880	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-A1	CHILL -4C
	S16T021881	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-A2	CHILL -4C
	S16T021882	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-B1	CHILL -4C

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ⦿ No

SPECIAL INSTRUCTIONS
Send Results to Carl W Howald IV, Carl_W_Howald@rl.gov, and Greg Moore, Gregory_S_Moore@rl.gov see SOW for email
Reference Contract # 55502
RELEASE 9
NIOSH 1024 CHILL BELOW -4 C

Hold Time

Relinquished By (Print)	Sign	Date/Time	Received By (Print)	Sign	Date/Time
Sharon Wolber	[signature]	7-26-16 0900	Scott Harder	[signature]	7-26-16 / 0900
SW Harder WRPS	[signature]	7-26-16 / 1400	FEDEX		
[signature]			Tami Van Tassell	Tami Van Tassell	07-27-16 0929

Matrix*
S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; WI = Wipe; L = Liquid; V = Vegetation; VA = Vapor; X = Other

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process): used in process (circled) — Disposed By: Fred Rejah — Date/Time: 08/02/16 2300

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

A-6003-962 (03/05)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162149
N/A		Page 5 of 6

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN R6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013 Temp. OW ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021883	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-BLANK	CHILL -4C
	S16T021884	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-C1	CHILL -4C
	S16T021885	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-D1	CHILL -4C
	S16T021886	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-E1	CHILL -4C
	S16T021887	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-F1	CHILL -4C
	S16T021888	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-G1	CHILL -4C
	S16T021889	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-H1	CHILL -4C
	S16T021890	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-B-H2	CHILL -4C
	S16T021891	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-EFF-A-BASE	CHILL -4C
	S16T021892	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-EFF-B-BASE	CHILL -4C

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS — Hold Time

Send Results to Carl W Howald IV,
Carl_W_Howald@rl.gov, and Greg Moore,
Gregory_S_Moore@rl.gov see SOW for email

Reference Contract # 55502
RELEASE 9
NIOSH 1024 CHILL BELOW -4 C

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
Shevon Hadden			7-26-16 0900	Scott Harder			7-26-16/0900
Relinquished By	SW Harder WRPS		7-26-16/1400	Received By	FEDEX		Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time

Matrix*

S = Soil		DL = Drum Liquids	
SE = Sediment		T = Tissue	
SO = Solid		WI = Wipe	
SL = Sludge		L = Liquid	
W = Water		V = Vegetation	
O = Oil		VA = Vapor	
A = Air		X = Other	
DS = Drum Solids			

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time
		Fred Rajah	08/02/16 2300

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

A-6003-962 (03/05)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162149
Page 6 of 6

Assembler: N/A

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861; MSIN T6-05; FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013; Temp. on ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021893	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-IN-A-BASE	CHILL -4C
	S16T021894	VA	7/23/16		CHARCOAL TUBE	1,3-Butadiene 16-06173-9-IN-B-BASE	CHILL -4C

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS
Send Results to Carl W Howald IV,
Carl_W_Howald@rl.gov, and Greg Moore,
Gregory_S_Moore@rl.gov see SOW for email

Reference Contract # 55502
RELEASE 9
NIOSH 1024 CHILL BELOW -4 C

Hold Time

Relinquished By (Print)	Sign	Date/Time	Received By (Print)	Sign	Date/Time
Sharon L Holda Jr	[signature]	7-26-16 0900	Scott Harder	[signature]	7-26-16/0906
SW Harder WRPS	[signature]	7-26-16/1400	FEDEX		
	fedex		Tami Van Tassel		07-27-16 [illegible]

Matrix*
S = Soil
SE = Sediment
SO = Solid
SL = Sludge
W = Water
O = Oil
A = Air
DS = Drum Solids
DL = Drum Liquids
T = Tissue
WI = Wipe
L = Liquid
V = Vegetation
VA = Vapor
X = Other

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process): used in process — Disposed By: Fred Rejnh — Date/Time: 08/02/16 2300

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

A-6003-962 (03/05)

C.3.10 Pyridines

ANALYTICAL REPORT

Report Date: August 03, 2016

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

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162147
Workorder: 34-1620929
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021785** Collected: 07/22/2016
Lab ID: 1620929001 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021786** Collected: 07/22/2016
Lab ID: 1620929002 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021787** Collected: 07/22/2016
Lab ID: 1620929003 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **34-1620929**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021788** Collected: 07/22/2016
Lab ID: 1620929004 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021789** Collected: 07/22/2016
Lab ID: 1620929005 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021790** Collected: 07/22/2016
Lab ID: 1620929006 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021791** Collected: 07/22/2016
Lab ID: 1620929007 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **34-1620929**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021792** Collected: 07/22/2016
Lab ID: 1620929008 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021793** Collected: 07/22/2016
Lab ID: 1620929009 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021794** Collected: 07/22/2016
Lab ID: 1620929010 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021795** Collected: 07/22/2016
Lab ID: 1620929011 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **34-1620929**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021796** Collected: 07/22/2016
Lab ID: 1620929012 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021797** Collected: 07/22/2016
Lab ID: 1620929013 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021798** Collected: 07/23/2016
Lab ID: 1620929014 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021799** Collected: 07/23/2016
Lab ID: 1620929015 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **34-1620929**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021800** Collected: 07/23/2016
Lab ID: 1620929016 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021801** Collected: 07/23/2016
Lab ID: 1620929017 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/02/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021802** Collected: 07/23/2016
Lab ID: 1620929018 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/03/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021803** Collected: 07/23/2016
Lab ID: 1620929019 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/03/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **34-1620929**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021804** Collected: 07/23/2016
Lab ID: 1620929020 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/03/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021805** Collected: 07/23/2016
Lab ID: 1620929021 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/03/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021806** Collected: 07/23/2016
Lab ID: 1620929022 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/03/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021807** Collected: 07/23/2016
Lab ID: 1620929023 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/03/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **34-1620929**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021808** Collected: 07/23/2016
Lab ID: 1620929024 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/03/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021809** Collected: 07/23/2016
Lab ID: 1620929025 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/03/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021810** Collected: 07/23/2016
Lab ID: 1620929026 Received: 07/27/2016

Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 08/03/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Comments

Quality Control: **NIOSH 1613 Mod. - (HBN: 173960)**

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

LCSD 511002 fails RPD for 2,4-dimethylpyridine but passes percent recovery.

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

Method	Analyst	Peer Review
NIOSH 1613 Mod.	/S/ Steven Yourstone 08/03/2016 10:04	/S/ Thomas J. Masoian 08/03/2016 12:45

ANALYTICAL REPORT

Workorder: 34-1620929
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Laboratory Contact Information

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

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

General Lab Comments

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

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

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

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

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ACLASS (DoD ELAP)	ADE-1420	http://www.aclasscorp.com
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Florida (TNI)	E871067	http://www.dep.state.fl.us/labs/bars/sas/qa/
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing:			
CPSC	ACLASS (ISO 17025, CPSC)	ADE-1420	http://www.aclasscorp.com
Soil, Dust, Paint ,Air	AIHA-LAP, LLC (ISO 17025, AIHA-LAP, LLC ELLAP and NLLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

Definitions

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

ANALYTICAL REPORT

Workorder: **34-1620929**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

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

Rand Potter, Project Manager, ALS Environmental

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620929

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** NIOSH 1613 Mod.
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ISVO/3081 (HBN: 173960)
	Prepared By: NA	**Analyzed By:** Steven Yourstone

Blank

LMB: 510997
Analyzed: 08/02/2016 12:20
Units: ug/sample

Analyte	Result	MDL	RL
Pyridine	ND	NA	0.500
2,4-Dimethylpyridine	ND	NA	0.500

LMB: 511000
Analyzed: 08/03/2016 02:41
Units: ug/sample

Analyte	Result	MDL	RL
Pyridine	ND	NA	0.500
2,4-Dimethylpyridine	ND	NA	0.500

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510998
Analyzed: 08/02/2016 12:40
Dilution: 1
Units: ug/sample

LCSD: 510999
Analyzed: 08/02/2016 12:59
Dilution: 1
Units: ug/sample

Analyte	LCS Result	Target	LCS %Rec	QC Limits		LCSD Result	LCSD %Rec	RPD	QC Limits	
Pyridine	1.54	2.00	77.1	61.8	141.1	1.90	95.0	20.8	0.0	22.1
2,4-Dimethylpyridine	1.20	2.00	59.8	51.7	130.6	1.47	73.3	20.4	0.0	22.2

LCS: 511001
Analyzed: 08/03/2016 03:00
Dilution: 1
Units: ug/sample

LCSD: 511002
Analyzed: 08/03/2016 03:20
Dilution: 1
Units: ug/sample

Analyte	LCS Result	Target	LCS %Rec	QC Limits		LCSD Result	LCSD %Rec	RPD	QC Limits	
Pyridine	1.85	2.00	92.5	61.8	141.1	2.14	107	14.8	0.0	22.1
2,4-Dimethylpyridine	1.14	2.00	57.1	51.7	130.6	1.51	75.7	* 28.0	0.0	22.2

Comments

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

LCSD 511002 fails RPD for 2,4-dimethylpyridine but passes percent recovery.

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

Analyst	Peer Review
/S/ Steven Yourstone	/S/ Thomas J. Masoian
08/03/2016 10:04	08/03/2016 12:45

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
◆ - Result is above the calibration range

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

1620929

Ass N/A

1620929

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162147

Page 1 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN T6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013 Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 2768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021785	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-A1	N/A
	S16T021786	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-A2	N/A
	S16T021787	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-B1	N/A
	S16T021788	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-BLANK	N/A
	S16T021789	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-C1	N/A
	S16T021790	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-D1	N/A
	S16T021791	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-E1	N/A
	S16T021792	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-EFF-BASE	N/A
	S16T021793	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-F1	N/A
	S16T021794	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-G1	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ⦿ No

SPECIAL INSTRUCTIONS

Send Results to Carl Howald IV and Greg Moore
Carl_W_Howald@rl.gov and
Gregory_S_Moore@rl.gov see SOW for email

RELEASE 9
Reference Contract # 55502

Hold Time

Relinquished By (Print)	Sign	Date/Time	Received By (Print)	Sign	Date/Time
Sharon L Holden	[signature]	7-26-16 0900	Scott Harder	[signature]	7-26-16/0900
SW Harder WRPS	[signature]	7-26-16 /1400	FEDEX		
fedex			Tami VanTassel	Tami VanTassel	07-27-16 1039

Matrix*

S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, O = Oil, A = Air, DS = Drum Solids, DL = Drum Liquids, T = Tissue, WI = Wipe, L = Liquid, V = Vegetation, VA = Vapor, X = Other

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time
		[signature]	8/2/16 1033

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

A-6003-962 (03/05)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162147
N/A		Page 2 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN T6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. WTS-013 Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7768 4438 5296
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41071

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021795	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-H1	N/A
	S16T021796	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-H2	N/A
	S16T021797	VA	7/22/16		CHARCOAL TUBE	Pyridines 16-06172-10-IN-BASE	N/A
	S16T021798	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-A1	N/A
	S16T021799	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-A2	N/A
	S16T021800	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-B1	N/A
	S16T021801	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-BLANK	N/A
	S16T021802	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-C1	N/A
	S16T021803	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-D1	N/A
	S16T021804	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-E1	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS: Send Results to Carl Howald IV and Greg Moore Carl_W_Howald@rl.gov and Gregory_S_Moore@rl.gov see SOW for email

RELEASE 9
Reference Contract # 55502

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon Waldon	7-26-16 0900	SCOTT Harder	7-26-16 0900
SW Harder WRPS	7-26-16 1400	FEDEX	
fedex		Tami VanTassell	07-27-16

Matrix*

S = Soil		DL = Drum Liquids	
SE = Sediment		T = Tissue	
SO = Solid		WI = Wipe	
SL = Sludge		L = Liquid	
W = Water		V = Vegetation	
O = Oil		VA = Vapor	
A = Air		X = Other	
DS = Drum Solids			

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure) (used in process)	Disposed By	Date/Time
			8/2/16 1035

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

A-6003-962 (03/05)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162147

Page 3 of 3

Assembler: N/A	Contact/Requestor: CARL HOWALD IV	Telephone No: 373-6861	MSIN: 76-05 FAX: 372-1878
Collector: JONES	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/Ce20	
SAF No.: N/A	Logbook/ Work Package No.: N/A	Ice Chest No.: 445-013	Temp.: on ice
Project Title: CARTRIDGE EVALUATION	Method of Shipment	Bill of Lading/Air Bill No.: 7748 4438 5296	
Shipped To (Lab): ALS	Data Turnaround: 10 DAYS	Parts and Return No.: 41071	
Protocol: N/A			

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021805	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-EFF-BASE	N/A
	S16T021806	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-F1	N/A
	S16T021807	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-G1	N/A
	S16T021808	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-H1	N/A
	S16T021809	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-H2	N/A
	S16T021810	VA	7/23/16		CHARCOAL TUBE	Pyridines 16-06173-10-IN-BASE	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS

Send Results to Carl Howald IV and Greg Moore
Carl_W_Howald@ri.gov and
Gregory_S_Moore@ri.gov See SOW for email

RELEASE 9
Reference Contract # 55502

Hold Time

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
	Drew Holder	Drew Holder	7-24-16 0900	Scott Harder	Scott Harder		7-26-16/0900
Relinquished By	SW Harder WRPS		Date/Time	Received By	FEDEX		Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time

Matrix*: S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, O = Oil, A = Air, DS = Drum Solids, DL = Drum Liquids, T = Tissue, WI = Wipe, L = Liquid, V = Vegetation, VA = Vapor, X = Other

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure)	Disposed By	Date/Time
	Used in process		8/2/16 1035

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

A-6003-962 (03/05)

C.3.11 Nitrosamines

RJ LEE GROUP

RJ Lee*Group*, Inc. | Columbia Basin Analytical Laboratories
2710 North 20th Avenue, Pasco WA 99301
Tel: (509) 545-4989 | Fax: (509) 544-6010

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 20162148

Enclosed is the final report for group 20162148 number analyzed for Nitrosamines using NIOSH 2522-Modified. This group number 20162148 has been assigned a Columbia Basin Analytical Laboratories login order number of W607075. This report consists of a summary report of the samples, a laboratory report of each nitrosamine, a single quality control report for the analysis batch, and a copy of the chain of custody.

General Set Comments

Columbia Basin Analytical Laboratories received 26 samples on 07/26/16 to be tested for Nitrosamines. The samples were analyzed in accordance with NIOSH 2522-Modified for N-Nitrosodimethylamine, N-Nitrosomethylethylamine, N-Nitrosodiethylamine, N-Nitrosodi-n-propylamine, N-Nitrosodi-n-butylamine, N-Nitrosopiperidine, N-Nitrosopyrrolidine,and N-Nitrosomorpholine. All results have been corrected for desorption efficiency and measurable levels in the blanks.

Positive Results

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

16-06172-11-A1	W607075-01	N-Nitrosodimethylamine	0.416	µg/tube	
16-06172-11-A1	W607075-01	N-Nitrosodi-n-butylamine	0.024	µg/tube	
16-06172-11-A1	W607075-01	N-Nitrosodi-n-propylamine	0.052	µg/tube	
16-06172-11-A1	W607075-01	N-Nitrosopyrrolidine	0.024	µg/tube	
16-06172-11-A1	W607075-01	N-Nitrosodimethylamine	0.043	µg/tube	
16-06172-11-H1	W607075-11	N-Nitrosodiethylamine	0.050	µg/tube	
16-06172-11-H1	W607075-11	N-Nitrosodimethylamine	0.359	µg/tube	
16-06172-11-H1	W607075-11	N-Nitrosodi-n-butylamine	0.031	µg/tube	
16-06172-11-H1	W607075-11	N-Nitrosopiperidine	0.039	µg/tube	
16-06173-11-A1	W607075-14	N-Nitrosodiethylamine	0.069	µg/tube	C
16-06173-11-A1	W607075-14	N-Nitrosodimethylamine	0.088	µg/tube	
16-06173-11-A1	W607075-14	N-Nitrosomorpholine	0.046	µg/tube	
16-06173-11-A1	W607075-14	N-Nitrosopiperidine	0.046	µg/tube	
16-06173-11-H1	W607075-24	N-Nitrosodiethylamine	0.047	µg/tube	
16-06173-11-H1	W607075-24	N-Nitrosodimethylamine	0.372	µg/tube	
16-06173-11-H1	W607075-24	N-Nitrosomorpholine	0.052	µg/tube	
16-06173-11-H1	W607075-24	N-Nitrosopiperidine	0.042	µg/tube	

RJ LEE GROUP

16-06173-11-H1	W607075-24	N-Nitrosodimethylamine	0.017	µg/tube
16-06173-11-H1	W607075-24	N-Nitrosodi-n-propylamine	0.023	µg/tube

Recovery Failures in the ICV, CCV's, LCS, RL and MRL

There were no recovery failures in the: ICV, CCV, LCS, LCSD, There were recovery failures in the MRL.

RSD Failures in the LCS and LCSD's

There were no RSD failures between the laboratory control samples.

Measurable Blank Values

There were no measurable analytes in the blank samples.

Calibration Curves

The calibration curves for the Nitrosamines had an R-value that was 0.997 or better, over a range of 5.0 ng/mL to 200 ng/mL.

General Lab Comments

The results provided in this report relate only to the items tested. Samples were received in acceptable conditions unless otherwise noted in the comments above. Samples have not been field blank corrected unless otherwise noted in the general set comments above. This test report shall not be reproduced, except in full, without written approval of Columbia Basin Analytical Laboratories.

I certify that this analytical report is in compliance with the Hanford SOW, both technically and for completeness. Release of the data contained in this hard copy report has been authorized by the Laboratory Director or a designee as verified by the following signature.

08/17/16

Scientist II DeNomy Dage

This report has been reviewed and approved by the following individual:

08/18/16

Scientist I Fernanda Pincheira

If you have any questions, please feel free to contact DeNomy Dage at ddage@rjlg.com or at 509-545-4989.

RJ LEE GROUP

Carl Howald IV
Washington River Protection Solutions, LLC
P.O. Box 850 MSIN H6-16
Richland, WA 99352
Client Project:
Cartridge Evaluation

Laboratory Report

NIOSH 2522
Air/Emissions on GC/TEA Analyzer
Summary Table

RJ Lee Group No.: W607075
Samples Received: 07/26/16
Report Date: 08/18/16
COC No.: 20162148
Extraction Date: 8/5/2016

Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
Client Sample ID	RJLG ID						
16-06172-11-A1 | S16T021811	| W607075-01	07/22/16	08/05/16	N-Nitrosodimethylamine	0.416	0.014	
		07/22/16	08/08/16	N-Nitrosodimethylamine	0.043	0.016	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/08/16	N-Nitrosomethylethylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/08/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	0.052	0.021	
		07/22/16	08/08/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	0.024	0.022	
		07/22/16	08/08/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/22/16	08/08/16	N-Nitrosopiperidine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/08/16	N-Nitrosopyrrolidine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	0.024	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
		07/22/16	08/08/16	N-Nitrosomorpholine	<0.020	0.020	
16-06172-11-A2 | S16T021812	| W607075-02	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	

Report Qualifiers:
A = Target Analyte media breakthrough suspect, see analytical report
D = Analyte analyzed in a dilution
E = Report concentration was above the instrument calibration range
J = Analyte detected below quantitation limits, concentration is estimated
P = Library spectrum match, rsd >80% 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
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L = Sample condition at receipt out of compliance with method defined conditions
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RJ LEE GROUP

Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
Client Sample ID	RJLG ID						
16-06172-11-B1 | S16T021813	| W607075-03	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-BLANK | S16T021814	| W607075-04	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-C1 | S16T021815	| W607075-05	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-D1 | S16T021816	| W607075-06	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	

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Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
Client Sample ID	RJLG ID						
16-06172-11-E1 | S16T021817	| W607075-07	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-EFF-BASE | S16T021818	| W607075-08	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-F1 | S16T021819	| W607075-09	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-G1 | S16T021820	| W607075-10	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	

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Client Sample ID	RJLG ID						
16-06172-11-H1 | S16T021821	| W607075-11	07/22/16	08/08/16	N-Nitrosodimethylamine	<0.016	0.016	
		07/22/16	08/05/16	N-Nitrosodimethylamine	0.359	0.014	
		07/22/16	08/08/16	N-Nitrosomethylethylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	0.050	0.022	
		07/22/16	08/08/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/22/16	08/08/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/08/16	N-Nitrosodi-n-butylamine	0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	0.031	0.022	
		07/22/16	08/08/16	N-Nitrosopiperidine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosopiperidine	0.039	0.022	
		07/22/16	08/08/16	N-Nitrosopyrrolidine	<0.020	0.020	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
		07/22/16	08/08/16	N-Nitrosomorpholine	<0.020	0.020	
16-06172-11-H2 | S16T021822	| W607075-12	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06172-11-IN-BASE | S16T021823	| W607075-13	07/22/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/22/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/22/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/22/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	

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Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
Client Sample ID	RJLG ID						
16-06173-11-A1 | S16T021824	| W607075-14	07/23/16	08/05/16	N-Nitrosodimethylamine	0.088	0.014	
		07/23/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosodiethylamine	0.069	0.022	C
		07/23/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosopiperidine	0.046	0.022	
		07/23/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosomorpholine	0.046	0.022	
16-06173-11-A2 | S16T021825	| W607075-15	07/23/16	08/05/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/05/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/05/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/05/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-B1 | S16T021826	| W607075-16	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-BLANK | S16T021827	| W607075-17	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	

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RJ LEE GROUP

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Client Sample ID	RJLG ID						
16-06173-11-C1 | S16T021829	| W607075-18	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-D1 | S16T021830	| W607075-19	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-E1 | S16T021831	| W607075-20	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.014	0.014	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.022	0.022	
16-06173-11-EFF-BASE | S16T021832	| W607075-21	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	

Report Qualifiers:
A = Target Analyte media breakthrough suspect, see analytical report
D = Analyte analyzed in a dilution
E = Report concentration was above the instrument calibration range
J = Analyte detected below quantitation limits, concentration is estimated
P = Library spectrum match, rsd >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 times for preparation or analysis exceeded
L = Sample condition at receipt out of compliance with method defined conditions
Q = Result out of method specific acceptance QC criteria
S = Spike Recovery outside accepted recovery limits
Z = Not ELAP accredited analyte
ND = Not Detected
C = Confirmation analysis unavailable

RJ LEE GROUP

Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
Client Sample ID	RJLG ID						
16-06173-11-F1 | S16T021833	| W607075-22	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	
16-06173-11-G1 | S16T021834	| W607075-23	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	
16-06173-11-H1 | S16T021835	| W607075-24	07/23/16	08/08/16	N-Nitrosodimethylamine	0.017	0.016	
		07/23/16	08/06/16	N-Nitrosodimethylamine	0.372	0.025	
		07/23/16	08/08/16	N-Nitrosomethylethylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/08/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/23/16	08/06/16	N-Nitrosodiethylamine	0.047	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/08/16	N-Nitrosodi-n-propylamine	0.023	0.021	
		07/23/16	08/08/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/08/16	N-Nitrosopiperidine	<0.020	0.020	
		07/23/16	08/06/16	N-Nitrosopiperidine	0.042	0.022	
		07/23/16	08/08/16	N-Nitrosopyrrolidine	<0.020	0.020	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	0.052	0.021	
		07/23/16	08/08/16	N-Nitrosomorpholine	<0.020	0.020	

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RJ LEE GROUP

Sample Identification Client Sample ID	RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-06173-11-H2 | S16T021836	| W607075-25	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	
16-06173-11-IN-BASE | S16T021837	| W607075-26	07/23/16	08/06/16	N-Nitrosodimethylamine	<0.025	0.025	
		07/23/16	08/06/16	N-Nitrosomethylethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/23/16	08/06/16	N-Nitrosopiperidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/23/16	08/06/16	N-Nitrosomorpholine	<0.021	0.021	

Report Qualifiers:
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D = Analyte analyzed in a dilution
E = Report concentration was above the instrument calibration range
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RJ LEE GROUP

Carl Howald IV

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

Client Project:
Cartridge Evaluation

Quality Control

NIOSH 2522

RJ Lee Group No.: W607075
Samples Received: 07/26/16
Report Date: 08/18/16
COC No.: 20162148
Extraction Date: 8/5/2016

Analyte	CAS No.	Sample ID	Analyzed Date	Expected µg/tube	Result µg/tube	DE	DE Corrected	REC %	RSD %	Qualifier
N-Nitrosodiethylamine	55-18-5	LCS1	08/05/16	0.200	0.188	0.93	0.203	101	1.14	
N-Nitrosodiethylamine	55-18-5	LCS1	08/06/16	0.200	0.184	0.92	0.200	99.8	0.343	
N-Nitrosodiethylamine	55-18-5	LCS1	08/08/16	0.200	0.193	0.98	0.196	97.9	1.95	
N-Nitrosodimethylamine	62-75-9	LCS1	08/05/16	0.200	0.182	0.89	0.206	103	2.53	
N-Nitrosodimethylamine	62-75-9	LCS1	08/06/16	0.200	0.166	0.80	0.206	103	2.79	
N-Nitrosodimethylamine	62-75-9	LCS1	08/08/16	0.200	0.184	0.94	0.195	97.4	3.45	
N-Nitrosodi-n-butylamine	924-16-3	LCS1	08/05/16	0.200	0.182	0.91	0.200	99.6	1.73	
N-Nitrosodi-n-butylamine	924-16-3	LCS1	08/06/16	0.200	0.195	0.97	0.201	100	0.547	
N-Nitrosodi-n-butylamine	924-16-3	LCS1	08/08/16	0.200	0.191	0.96	0.200	99.7	1.20	
N-Nitrosodi-n-propylamine	621-64-7	LCS1	08/05/16	0.200	0.187	0.94	0.199	98.9	2.54	
N-Nitrosodi-n-propylamine	621-64-7	LCS1	08/06/16	0.200	0.195	0.97	0.201	100	0.120	
N-Nitrosodi-n-propylamine	621-64-7	LCS1	08/08/16	0.200	0.193	0.97	0.200	100	0.667	
N-Nitrosomethylethylamine	10595-95-6	LCS1	08/05/16	0.200	0.182	0.91	0.200	100	1.06	
N-Nitrosomethylethylamine	10595-95-6	LCS1	08/06/16	0.200	0.177	0.89	0.198	98.8	1.21	
N-Nitrosomethylethylamine	10595-95-6	LCS1	08/08/16	0.200	0.192	0.97	0.197	98.5	1.92	
N-Nitrosomorpholine	59-89-2	LCS1	08/05/16	0.200	0.186	0.93	0.200	100	0.891	
N-Nitrosomorpholine	59-89-2	LCS1	08/06/16	0.200	0.189	0.95	0.198	99.0	0.927	
N-Nitrosomorpholine	59-89-2	LCS1	08/08/16	0.200	0.195	0.99	0.198	99.0	2.53	
N-Nitrosopiperidine	100-75-4	LCS1	08/05/16	0.200	0.183	0.91	0.201	99.9	0.890	
N-Nitrosopiperidine	100-75-4	LCS1	08/06/16	0.200	0.179	0.91	0.197	98.4	1.53	
N-Nitrosopiperidine	100-75-4	LCS1	08/08/16	0.200	0.195	0.98	0.199	99.1	1.56	
N-Nitrosopyrrolidine	930-55-2	LCS1	08/05/16	0.200	0.182	0.92	0.198	99.3	2.11	
N-Nitrosopyrrolidine	930-55-2	LCS1	08/06/16	0.200	0.185	0.91	0.202	101	1.29	
N-Nitrosopyrrolidine	930-55-2	LCS1	08/08/16	0.200	0.193	0.98	0.198	98.9	1.05	
N-Nitrosodiethylamine	55-18-5	LCS2	08/05/16	0.200	0.185	0.93	0.199	99.7	1.14	
N-Nitrosodiethylamine	55-18-5	LCS2	08/06/16	0.200	0.184	0.92	0.200	99.8	0.343	
N-Nitrosodiethylamine	55-18-5	LCS2	08/08/16	0.200	0.201	0.98	0.204	102	1.95	
N-Nitrosodimethylamine	62-75-9	LCS2	08/05/16	0.200	0.177	0.89	0.200	99.7	2.53	
N-Nitrosodimethylamine	62-75-9	LCS2	08/06/16	0.200	0.160	0.80	0.199	99.0	2.79	
N-Nitrosodimethylamine	62-75-9	LCS2	08/08/16	0.200	0.196	0.94	0.208	104	3.45	
N-Nitrosodi-n-butylamine	924-16-3	LCS2	08/05/16	0.200	0.186	0.91	0.204	102	1.73	
N-Nitrosodi-n-butylamine	924-16-3	LCS2	08/06/16	0.200	0.193	0.97	0.199	99.4	0.547	
N-Nitrosodi-n-butylamine	924-16-3	LCS2	08/08/16	0.200	0.194	0.96	0.203	101	1.20	
N-Nitrosodi-n-propylamine	621-64-7	LCS2	08/05/16	0.200	0.194	0.94	0.206	103	2.54	
N-Nitrosodi-n-propylamine	621-64-7	LCS2	08/06/16	0.200	0.195	0.97	0.201	100	0.120	

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Analyte	CAS No.	Sample ID	Analyzed Date	Expected µg/tube	Result µg/tube	DE	DE Corrected	REC %	RSD %	Qualifier
N-Nitrosodi-n-propylamine	621-64-7	LCS2	08/08/16	0.200	0.195	0.97	0.202	101	0.667	
N-Nitrosomethylethylamine	10595-95-6	LCS2	08/05/16	0.200	0.184	0.91	0.202	101	1.06	
N-Nitrosomethylethylamine	10595-95-6	LCS2	08/06/16	0.200	0.179	0.89	0.201	99.9	1.21	
N-Nitrosomethylethylamine	10595-95-6	LCS2	08/08/16	0.200	0.199	0.97	0.204	102	1.92	
N-Nitrosomorpholine	59-89-2	LCS2	08/05/16	0.200	0.187	0.93	0.201	101	0.891	
N-Nitrosomorpholine	59-89-2	LCS2	08/06/16	0.200	0.191	0.95	0.201	100	0.927	
N-Nitrosomorpholine	59-89-2	LCS2	08/08/16	0.200	0.203	0.99	0.206	103	2.53	
N-Nitrosopiperidine	100-75-4	LCS2	08/05/16	0.200	0.184	0.91	0.202	101	0.890	
N-Nitrosopiperidine	100-75-4	LCS2	08/06/16	0.200	0.184	0.91	0.203	101	1.53	
N-Nitrosopiperidine	100-75-4	LCS2	08/08/16	0.200	0.200	0.98	0.204	102	1.56	
N-Nitrosopyrrolidine	930-55-2	LCS2	08/05/16	0.200	0.188	0.92	0.205	102	2.11	
N-Nitrosopyrrolidine	930-55-2	LCS2	08/06/16	0.200	0.184	0.91	0.201	100	1.29	
N-Nitrosopyrrolidine	930-55-2	LCS2	08/08/16	0.200	0.197	0.98	0.202	101	1.05	
N-Nitrosodiethylamine	55-18-5	LCS3	08/05/16	0.200	0.184	0.93	0.198	99.1	1.14	
N-Nitrosodiethylamine	55-18-5	LCS3	08/06/16	0.200	0.185	0.92	0.201	100	0.343	
N-Nitrosodiethylamine	55-18-5	LCS3	08/08/16	0.200	0.198	0.98	0.201	100	1.95	
N-Nitrosodimethylamine	62-75-9	LCS3	08/05/16	0.200	0.173	0.89	0.195	97.6	2.53	
N-Nitrosodimethylamine	62-75-9	LCS3	08/06/16	0.200	0.158	0.80	0.196	97.8	2.79	
N-Nitrosodimethylamine	62-75-9	LCS3	08/08/16	0.200	0.186	0.94	0.198	98.7	3.45	
N-Nitrosodi-n-butylamine	924-16-3	LCS3	08/05/16	0.200	0.180	0.91	0.198	98.5	1.73	
N-Nitrosodi-n-butylamine	924-16-3	LCS3	08/06/16	0.200	0.195	0.97	0.201	100	0.547	
N-Nitrosodi-n-butylamine	924-16-3	LCS3	08/08/16	0.200	0.190	0.96	0.198	99.0	1.20	
N-Nitrosodi-n-propylamine	621-64-7	LCS3	08/05/16	0.200	0.185	0.94	0.196	98.2	2.54	
N-Nitrosodi-n-propylamine	621-64-7	LCS3	08/06/16	0.200	0.194	0.97	0.200	99.9	0.120	
N-Nitrosodi-n-propylamine	621-64-7	LCS3	08/08/16	0.200	0.192	0.97	0.199	99.3	0.667	
N-Nitrosomethylethylamine	10595-95-6	LCS3	08/05/16	0.200	0.180	0.91	0.198	98.9	1.06	
N-Nitrosomethylethylamine	10595-95-6	LCS3	08/06/16	0.200	0.181	0.89	0.203	101	1.21	
N-Nitrosomethylethylamine	10595-95-6	LCS3	08/08/16	0.200	0.194	0.97	0.199	99.3	1.92	
N-Nitrosomorpholine	59-89-2	LCS3	08/05/16	0.200	0.184	0.93	0.198	99.0	0.891	
N-Nitrosomorpholine	59-89-2	LCS3	08/06/16	0.200	0.192	0.95	0.202	101	0.927	
N-Nitrosomorpholine	59-89-2	LCS3	08/08/16	0.200	0.194	0.99	0.197	98.2	2.53	
N-Nitrosopiperidine	100-75-4	LCS3	08/05/16	0.200	0.181	0.91	0.198	99.1	0.890	
N-Nitrosopiperidine	100-75-4	LCS3	08/06/16	0.200	0.182	0.91	0.201	100	1.53	
N-Nitrosopiperidine	100-75-4	LCS3	08/08/16	0.200	0.194	0.98	0.198	99.1	1.56	
N-Nitrosopyrrolidine	930-55-2	LCS3	08/05/16	0.200	0.181	0.92	0.197	98.3	2.11	
N-Nitrosopyrrolidine	930-55-2	LCS3	08/06/16	0.200	0.180	0.91	0.197	98.5	1.29	
N-Nitrosopyrrolidine	930-55-2	LCS3	08/08/16	0.200	0.196	0.98	0.201	100	1.05	
N-Nitrosodiethylamine	55-18-5	MB	08/05/16		0.00	0.93	0.00			
N-Nitrosodiethylamine	55-18-5	MB	08/06/16		0.00	0.92	0.00			
N-Nitrosodiethylamine	55-18-5	MB	08/08/16		0.00	0.98	0.00			
N-Nitrosodimethylamine	62-75-9	MB	08/05/16		0.00	0.89	0.00			
N-Nitrosodimethylamine	62-75-9	MB	08/06/16		0.00	0.80	0.00			

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Analyte	CAS No.	Sample ID	Analyzed Date	Expected µg/tube	Result µg/tube	DE	DE Corrected	REC %	RSD %	Qualifier
N-Nitrosodimethylamine	62-75-9	MB	08/08/16		0.00	0.94	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	08/05/16		0.00	0.91	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	08/06/16		0.00	0.97	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	08/08/16		0.00	0.96	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	08/05/16		0.00	0.94	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	08/06/16		0.00	0.97	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	08/08/16		0.00	0.97	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	08/05/16		0.00	0.91	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	08/06/16		0.00	0.89	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	08/08/16		0.00	0.97	0.00			
N-Nitrosomorpholine	59-89-2	MB	08/05/16		0.00	0.93	0.00			
N-Nitrosomorpholine	59-89-2	MB	08/06/16		0.00	0.95	0.00			
N-Nitrosomorpholine	59-89-2	MB	08/08/16		0.00	0.99	0.00			
N-Nitrosopiperidine	100-75-4	MB	08/05/16		0.00	0.91	0.00			
N-Nitrosopiperidine	100-75-4	MB	08/06/16		0.00	0.91	0.00			
N-Nitrosopiperidine	100-75-4	MB	08/08/16		0.00	0.98	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	08/05/16		0.00	0.92	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	08/06/16		0.00	0.91	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	08/08/16		0.00	0.98	0.00			
N-Nitrosodiethylamine	55-18-5	MRL	08/05/16	0.020	0.021	0.93	0.023	114		
N-Nitrosodiethylamine	55-18-5	MRL	08/06/16	0.020	0.024	0.92	0.026	129		
N-Nitrosodiethylamine	55-18-5	MRL	08/08/16	0.020	0.026	0.98	0.026	130		
N-Nitrosodimethylamine	62-75-9	MRL	08/05/16	0.020	0.023	0.89	0.026	130		
N-Nitrosodimethylamine	62-75-9	MRL	08/06/16	0.020	0.019	0.80	0.024	120		
N-Nitrosodimethylamine	62-75-9	MRL	08/08/16	0.020	0.025	0.94	0.027	134		
N-Nitrosodi-n-butylamine	924-16-3	MRL	08/05/16	0.020	0.025	0.91	0.028	141		
N-Nitrosodi-n-butylamine	924-16-3	MRL	08/06/16	0.020	0.026	0.97	0.027	135		
N-Nitrosodi-n-butylamine	924-16-3	MRL	08/08/16	0.020	0.025	0.96	0.026	129		
N-Nitrosodi-n-propylamine	621-64-7	MRL	08/05/16	0.020	0.023	0.94	0.024	121		
N-Nitrosodi-n-propylamine	621-64-7	MRL	08/06/16	0.020	0.026	0.97	0.027	137		
N-Nitrosodi-n-propylamine	621-64-7	MRL	08/08/16	0.020	0.025	0.97	0.026	129		
N-Nitrosomethylethylamine	10595-95-6	MRL	08/05/16	0.020	0.023	0.91	0.025	126		
N-Nitrosomethylethylamine	10595-95-6	MRL	08/06/16	0.020	0.023	0.89	0.026	128		
N-Nitrosomethylethylamine	10595-95-6	MRL	08/08/16	0.020	0.025	0.97	0.026	131		
N-Nitrosomorpholine	59-89-2	MRL	08/05/16	0.020	0.024	0.93	0.026	128		
N-Nitrosomorpholine	59-89-2	MRL	08/06/16	0.020	0.026	0.95	0.027	136		
N-Nitrosomorpholine	59-89-2	MRL	08/08/16	0.020	0.024	0.99	0.024	119		
N-Nitrosopiperidine	100-75-4	MRL	08/05/16	0.020	0.022	0.91	0.024	118		
N-Nitrosopiperidine	100-75-4	MRL	08/06/16	0.020	0.023	0.91	0.025	126		
N-Nitrosopiperidine	100-75-4	MRL	08/08/16	0.020	0.026	0.98	0.027	133		
N-Nitrosopyrrolidine	930-55-2	MRL	08/05/16	0.020	0.025	0.92	0.027	137		
N-Nitrosopyrrolidine	930-55-2	MRL	08/06/16	0.020	0.026	0.91	0.028	138		

RJ LEE GROUP

Analyte	CAS No.	Sample ID	Analyzed Date	Expected µg/tube	Result µg/tube	DE	DE Corrected	REC %	RSD %	Qualifier
N-Nitrosopyrrolidine	930-55-2	MRL	08/08/16	0.020	0.023	0.98	0.024	118		

Report Qualifiers:

A = Target Analyte media breakthrough suspect, see analytical report
B = Analyte detected in the associated blank
D = Analyte analyzed in a dilution
d = Data that exceeds the RSD criteria set by the SOP
E = Report concentration was above the instrument calibration range
H = Holding times for preparation or analysis exceeded
I = Analyte detected below quantitation limits, concentration is estimated
L = Sample condition at receipt out of compliance with method defined conditions
P = Library spectrum match, rsd >80% w RT match
Q = Result out of method specific acceptance QC criteria
R = RPD (relative percent difference) outside accepted recovery limits
S = Spike Recovery outside accepted recovery limits
U = Analyte analyzed for but not detected
Z = Not ELAP accredited analyte
N/A = Not Applicable
ND = Not Detected

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W607075

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No.
N/A		20162148
		Page 1 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN T6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No. Temp.
Shipped To (Lab): CBAL	Method of Shipment	Bill of Lading/Air Bill No.
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021811	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-A1 ✓	N/A
	S16T021812	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-A2 ✓	N/A
	S16T021813	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-B1 ✓	N/A
	S16T021814	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-BLANK ✓	N/A
	S16T021815	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-C1 ✓	N/A
	S16T021816	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-D1 ✓	N/A
	S16T021817	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-E1 ✓	N/A
	S16T021818	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-EFF-BASE ✓	N/A
	S16T021819	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-F1 ✓	N/A
	S16T021820	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-G1 ✓	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS Hold Time

Send Results to Carl Howald IV & Greg Moore
Robert_W_Sosa@rl.gov and Greg_S_Moore@rl.gov
see SOW for email

CONTRACT 55503

RELEASE 5

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holder	7-26-16 0900	R E Rogers	7-26-16 0900
R E Rogers	7-26-16 1150	T. RICE RJ LEE GROUP	7/26/16 11:50

Matrix*

S = Soil		DL = Drum Liquids	
SE = Sediment		T = Tissue	
SO = Solid		WI = Wipe	
SL = Sludge		L = Liquid	
W = Water		V = Vegetation	
O = Oil		VA = Vapor	
A = Air		X = Other	
DS = Drum Solids			

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time
	Consumed		08/15/16 12:27

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

A-6003-962 (03/05)

W607075

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162148
N/A		Page 2 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No.: 373-6861	MSIN: T6-05 FAX: 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20	
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No.	Temp.
Shipped To (Lab): CBAL	Method of Shipment	Bill of Lading/Air Bill No.	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021821	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-H1 ✓	N/A
	S16T021822	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-H2 ✓	N/A
	S16T021823	VA	7/22/16		Thermosorb-N	Nitrosamines 16-06172-11-IN-BASE ✓	N/A
	S16T021824	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-A1 ✓	N/A
	S16T021825	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-A2 ✓	N/A
	S16T021826	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-B1 ✓	N/A
	S16T021827	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-BLANK ✓	N/A
	S16T021829	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-C1 ✓	N/A
	S16T021830	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-D1 ✓	N/A
	S16T021831	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-E1 ✓	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS — Hold Time

Send Results to Carl Howald IV & Greg Moore
Robert_W_Sosa@rl.gov and Greg_S_Moore@rl.gov
see SOW for email

CONTRACT 55503

RELEASE 5

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holder	7-26-16 0900	RE Rogers	7-26-16 0900
RE Rogers	7-26-16 1150	T. RICE RJ LEE GROUP	7/26/16 1150

Matrix*

S = Soil		DL = Drum Liquids	
SE = Sediment		T = Tissue	
SO = Solid		WI = Wipe	
SL = Sludge		L = Liquid	
W = Water		V = Vegetation	
O = Oil		VA = Vapor	
A = Air		X = Other	
DS = Drum Solids			

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time
	CONSUMED		08/15/16 12:27

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

A-6003-962 (03/05)

W607075

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No.
N/A		20162148
		Page 3 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861	MSIN T6-05 FAX 372-1878
SAF No.: N/A	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20	
Project Title: CARTRIDGE EVALUATION	Logbook/ Work Package No.: N/A	Ice Chest No.	Temp.
Shipped To (Lab): CBAL	Method of Shipment	Bill of Lading/Air Bill No.	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021832	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-EFF-BASE ✓	N/A
	S16T021833	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-F1 ✓	N/A
	S16T021834	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-G1 ✓	N/A
	S16T021835	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-H1 ✓	N/A
	S16T021836	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-H2 ✓	N/A
	S16T021837	VA	7/23/16		Thermosorb-N	Nitrosamines 16-06173-11-IN-BASE ✓	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ○ Yes ◉ No

SPECIAL INSTRUCTIONS

Send Results to Carl Howald IV & Greg Moore
Robert_W_Sosa@rl.gov and Greg_S_Moore@rl.gov
see SOW for email

CONTRACT 55503

RELEASE 5

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holdren	7-26-16 0900	R E Rogers	7-26-16 0830
R E Rogers	7-26-16 1150	T. RICE RJ LEE GROUP	7/26/16 1150

Matrix*

S = Soil		DL = Drum Liquids	
SE = Sediment		T = Tissue	
SO = Solid		WI = Wipe	
SL = Sludge		L = Liquid	
W = Water		V = Vegetation	
O = Oil		VA = Vapor	
A = Air		X = Other	
DS = Drum Solids			

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time
	Consumed		08/15/16 12:27

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

A-6003-962 (03/05)

Appendix D

Data Reduction Steps

Appendix D

Data Reduction Steps

1. Only chemicals in the current Chemicals Of Potential Concern (COPC) list were included in the calculated data. Nitrous oxide and methanol were not measured in the study. Any other missing COPCs were analyzed as "Tentatively Identified Compounds."
2. The COPCs are ranked in the order of their COPC number. Within the data section for each COPC, data are ranked in the order of survey (1 and 2). Within every survey, data are ranked in the order of inlet and outlet and following the time sequence.
3. Except for mercury, COPC concentrations were converted into parts per million using their molecular weights and corresponding flow rates after volume correction[17] as shown in the following equation:

$$C = 24.45 \frac{r}{M\,V}$$

   where C is the concentration of COPC in ppmv; r is the analytical result with units of μg/sample (if the analytical result unit is expressed in mg/sample, the value of C needs to be multiplied by 1000; if the analytical result unit is in ng/sample the value of C needs to be divided by 1000); V is the collected volume in 2 hours expressed in liters; M is the molecular weight of COPC with unit of g/mol. When the ratio between concentration and the corresponding OEL is larger than 10%, the fraction is shown in red.
4. The reported volume measurements in Appendix C were made via DryCal devices placed downstream of each sample media tube. This allowed for precise volume measurements through each of the tubes. However, to perform the concentration conversion to ppm, the "actual" volumetric values required conversion to standard temperature and pressure conditions.

   Ideal gas behavior was assumed for these volume corrections and standard temperatures and pressures were assumed to be 298 K ($T_{standard}$) and 760 Torr ($P_{standard}$), respectively. For temperatures, the reported upstream temperatures for each time period were used ($T_{upstream}$, in Kelvin), and the temperature correction factor (i.e. the factor multiplied by each reported volume) was simply $T_{standard}/T_{upstream}$.

   For the pressure corrections, additional pressure drop information was gathered so that the pressure at the point of the DryCal device could be calculated. Each time step had reported upstream pressures ($P_{upstream}$, or upstream of the respirator cartridges). Therefore, pressure drop measurements across the respirator cartridge and each sample media tube were performed offline to gather the additional information necessary for the correction.

   The average reported pressure drop reading for the respirator cartridge ($P_{cartridge}$) tested was 3.2 inches of water column (WC). The pressure drop measurements across the individual sample tubes are shown in the table below (all in inches of WC).

   The average pressure drops were then used in a pressure correction factor for the reported volumes. Note that all pressure values were first converted to units of Torr. For measurements made at the inlet of the respirator cartridge the pressure correction factor is $(P_{upstream} - P_{tube}) \div P_{standard}$.

[17] Based on the standard temperature and pressure condition of P = 101325 Pa, R = 8.314 J/(mol.K), and T = 298.15 K.

For measurements made at the outlet of the respirator cartridge the pressure correction factor is $(P_{upstream} - P_{cartridge} - P_{tube}) \div P_{standard}$.

Tube Location	First Measure (inches of WC, tube on cartridge inlet side)	Second Measure (inches of WC, tube on cartridge outlet side)	Average of Both Measurements (P_{tube}, inches of WC)
A	5.0	12.4	8.7
B	6.9	7.2	7.1
C	2.3	2.5	2.4
D	0.8	0.8	0.8
E	1.9	2.1	2.0
F	3.8	6.8	5.3
G	1.6	1.7	1.7
H	7.7	6.5	7.1
I	5.2	4.0	4.6
J	15.9	16.3	16.1
K	10.1	9.7	9.9

An example of calculating the correction factors is as follows. For a given time period assume that the reported upstream pressure ($P_{upstream}$) was 734 Torr and the corresponding temperature ($T_{upstream}$) was 85.9F (or 302.9K). Here, for tube location 'A' and upstream of the respirator cartridge, the corresponding temperature correction factor would be 0.984 and the pressure correction factor for the respirator cartridge outlet is 0.944. When multiplied, these two factors equal 0.929 which would be the overall correction to the reported volume measurement.

5. The analytical detection limit (DL)—or reporting limit in some cases—for every COPC was obtained from the raw analytical data. Here, the average flow rate was used to calculate the approximate analytical detection limit as the percentage of the OEL for each COPC. Because the flow rates vary, the calculated concentrations were different for each point, even though some of the results are less than the DL in the original reading. The last column in the tables below indicate if the original readings were less than the DL or not.
    1. For ammonia and mercury, only the results obtained from using method of total vapor of ammonia and mercury were used.
    2. For furan, results from furan tube instead of Carbotrap 300 TDU were used. For acetonitrile, results from the Carbotrap 300 TDU tube were used.
    3. For N-Nitrosdiemethylamine (NDMA) and other nitrosamines, data values above analytical DLs for the same time and position were added together because the original sample was diluted into three samples for measurement. This same rule applies to 1, 3-Butadiene. The results in the plots and tables reflect the results.

The following tables show the calculated concentrations for each of the COPC measurements conducted in this study. Red highlighted values reflect measurements that were above 10% of the respective OEL values. COPCs with these highlights are plotted and shown in Section 5.0. Orange highlighted values reflect measurements in the 2 to 10% (of OEL) range. COPCs with these highlights (only) are plotted and shown in Appendix E.

The position numbers that start with 6172 are for the SCOTT 7422-SD1 model of cartridge and the position numbers that start with 6173 are for the SCOTT 7422-SC1 model of cartridge.

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
1	Ammonia	2	6172-A1	121	2.50E+01	484%		2.55%
1	Ammonia	16	6172-H1	121	2.50E+01	484%		2.55%
1	Ammonia	2	6172-A2	0.62	2.50E+01	2.48%	YES	2.55%
1	Ammonia	4	6172-B1	7.6	2.50E+01	30.3%		2.55%
1	Ammonia	6	6172-C1	63	2.50E+01	253%		2.55%
1	Ammonia	8	6172-D1	11	2.50E+01	43.7%		2.55%
1	Ammonia	10	6172-E1	72	2.50E+01	289%		2.55%
1	Ammonia	12	6172-F1	87	2.50E+01	348%		2.55%
1	Ammonia	14	6172-G1	18	2.50E+01	72.4%		2.55%
1	Ammonia	16	6172-H2	0.61	2.50E+01	2.44%	YES	2.55%
1	Ammonia	2	6173-A1	111	2.50E+01	442%		2.55%
1	Ammonia	16	6173-H1	48	2.50E+01	192%		2.55%
1	Ammonia	2	6173-A2	0.62	2.50E+01	2.50%	YES	2.55%
1	Ammonia	4	6173-B1	0.64	2.50E+01	2.55%	YES	2.55%
1	Ammonia	6	6173-C1	0.64	2.50E+01	2.54%	YES	2.55%
1	Ammonia	8	6173-D1	2.0	2.50E+01	7.89%		2.55%
1	Ammonia	10	6173-E1	3.4	2.50E+01	13.4%		2.55%
1	Ammonia	12	6173-F1	0.64	2.50E+01	2.55%	YES	2.55%
1	Ammonia	14	6173-G1	78	2.50E+01	314%		2.55%
1	Ammonia	16	6173-H2	5.1	2.50E+01	20.3%		2.55%
3	Mercury	2	6172-A1	0.0009	3.00E-03	31.5%		7.38%
3	Mercury	16	6172-H1	0.0009	3.00E-03	29.6%		7.38%
3	Mercury	2	6172-A2	0.0002	3.00E-03	7.11%	YES	7.38%
3	Mercury	4	6172-B1	0.0002	3.00E-03	7.27%	YES	7.38%
3	Mercury	6	6172-C1	0.0002	3.00E-03	6.83%	YES	7.38%
3	Mercury	8	6172-D1	0.0002	3.00E-03	7.31%	YES	7.38%
3	Mercury	10	6172-E1	0.0002	3.00E-03	7.14%	YES	7.38%
3	Mercury	12	6172-F1	0.0002	3.00E-03	7.03%	YES	7.38%
3	Mercury	14	6172-G1	0.0002	3.00E-03	7.02%	YES	7.38%
3	Mercury	16	6172-H2	0.0002	3.00E-03	7.00%	YES	7.38%
3	Mercury	2	6173-A1	0.0010	3.00E-03	32.0%		7.38%
3	Mercury	16	6173-H1	0.001	3.00E-03	33.8%		7.38%
3	Mercury	2	6173-A2	0.0002	3.00E-03	7.11%	YES	7.38%
3	Mercury	4	6173-B1	0.0002	3.00E-03	7.22%	YES	7.38%
3	Mercury	6	6173-C1	0.0002	3.00E-03	7.26%	YES	7.38%
3	Mercury	8	6173-D1	0.0002	3.00E-03	7.38%	YES	7.38%
3	Mercury	10	6173-E1	0.0002	3.00E-03	7.26%	YES	7.38%
3	Mercury	12	6173-F1	0.0002	3.00E-03	7.23%	YES	7.38%
3	Mercury	14	6173-G1	0.0002	3.00E-03	7.15%	YES	7.38%
3	Mercury	16	6173-H2	0.0002	3.00E-03	6.98%	YES	7.38%
4	1,3-Butadiene	2	6172-A1	0.019	1.00E+00	1.95%	YES	2.44%
4	1,3-Butadiene	16	6172-H1	0.020	1.00E+00	1.97%	YES	2.44%
4	1,3-Butadiene	2	6172-A2	0.020	1.00E+00	1.98%	YES	2.44%
4	1,3-Butadiene	4	6172-B1	0.024	1.00E+00	2.44%		2.44%
4	1,3-Butadiene	6	6172-C1	0.019	1.00E+00	1.94%		2.44%
4	1,3-Butadiene	8	6172-D1	0.024	1.00E+00	2.38%		2.44%
4	1,3-Butadiene	10	6172-E1	0.020	1.00E+00	1.97%	YES	2.44%
4	1,3-Butadiene	12	6172-F1	0.020	1.00E+00	1.99%	YES	2.44%
4	1,3-Butadiene	14	6172-G1	0.020	1.00E+00	1.96%	YES	2.44%
4	1,3-Butadiene	16	6172-H2	0.019	1.00E+00	1.94%	YES	2.44%
4	1,3-Butadiene	2	6173-A1	0.020	1.00E+00	1.98%	YES	2.64%
4	1,3-Butadiene	16	6173-H1	0.020	1.00E+00	1.97%	YES	2.64%
4	1,3-Butadiene	2	6173-A2	0.026	1.00E+00	2.64%	YES	2.64%
4	1,3-Butadiene	4	6173-B1	0.020	1.00E+00	2.01%	YES	2.64%
4	1,3-Butadiene	6	6173-C1	0.020	1.00E+00	2.00%	YES	2.64%
4	1,3-Butadiene	8	6173-D1	0.020	1.00E+00	2.01%	YES	2.64%
4	1,3-Butadiene	10	6173-E1	0.020	1.00E+00	2.03%	YES	2.64%
4	1,3-Butadiene	12	6173-F1	0.020	1.00E+00	2.00%	YES	2.64%
4	1,3-Butadiene	14	6173-G1	0.020	1.00E+00	2.00%	YES	2.64%
4	1,3-Butadiene	16	6173-H2	0.020	1.00E+00	1.98%	YES	2.64%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
5	Benzene	2	6172-A1	0.0007	5.00E-01	0.133%		0.03%
5	Benzene	16	6172-H1	0.0006	5.00E-01	0.122%		0.03%
5	Benzene	2	6172-A2	0.0001	5.00E-01	0.026%	YES	0.03%
5	Benzene	4	6172-B1	0.0002	5.00E-01	0.030%		0.03%
5	Benzene	6	6172-C1	0.0002	5.00E-01	0.031%		0.03%
5	Benzene	8	6172-D1	0.0002	5.00E-01	0.031%		0.03%
5	Benzene	10	6172-E1	0.0001	5.00E-01	0.028%		0.03%
5	Benzene	12	6172-F1	0.0001	5.00E-01	0.026%		0.03%
5	Benzene	14	6172-G1	0.0001	5.00E-01	0.025%		0.03%
5	Benzene	16	6172-H2	0.0001	5.00E-01	0.030%		0.03%
5	Benzene	2	6173-A1		5.00E-01			0.03%
5	Benzene	16	6173-H1	0.0005	5.00E-01	0.108%		0.03%
5	Benzene	2	6173-A2		5.00E-01			0.03%
5	Benzene	4	6173-B1	0.0001	5.00E-01	0.021%	YES	0.03%
5	Benzene	6	6173-C1	0.0001	5.00E-01	0.021%	YES	0.03%
5	Benzene	8	6173-D1	0.0001	5.00E-01	0.021%	YES	0.03%
5	Benzene	10	6173-E1	0.0001	5.00E-01	0.024%		0.03%
5	Benzene	12	6173-F1	0.0001	5.00E-01	0.025%		0.03%
5	Benzene	14	6173-G1	0.0001	5.00E-01	0.022%		0.03%
5	Benzene	16	6173-H2	0.0001	5.00E-01	0.020%	YES	0.03%
6	Biphenyl	2	6172-A1	0.0002	2.00E-01	0.087%	YES	0.29%
6	Biphenyl	16	6172-H1	0.0002	2.00E-01	0.085%	YES	0.29%
6	Biphenyl	2	6172-A2	0.0002	2.00E-01	0.080%	YES	0.29%
6	Biphenyl	4	6172-B1	0.0002	2.00E-01	0.084%	YES	0.29%
6	Biphenyl	6	6172-C1	0.0002	2.00E-01	0.081%	YES	0.29%
6	Biphenyl	8	6172-D1	0.0002	2.00E-01	0.083%	YES	0.29%
6	Biphenyl	10	6172-E1	0.0002	2.00E-01	0.086%	YES	0.29%
6	Biphenyl	12	6172-F1	0.0002	2.00E-01	0.084%	YES	0.29%
6	Biphenyl	14	6172-G1	0.0002	2.00E-01	0.085%	YES	0.29%
6	Biphenyl	16	6172-H2	0.0002	2.00E-01	0.083%	YES	0.29%
6	Biphenyl	2	6173-A1	0.0003	2.00E-01	0.151%	YES	0.29%
6	Biphenyl	16	6173-H1	0.0006	2.00E-01	0.287%	YES	0.29%
6	Biphenyl	2	6173-A2	0.0002	2.00E-01	0.092%	YES	0.29%
6	Biphenyl	4	6173-B1	0.0002	2.00E-01	0.091%	YES	0.29%
6	Biphenyl	6	6173-C1	0.0002	2.00E-01	0.087%	YES	0.29%
6	Biphenyl	8	6173-D1	0.0002	2.00E-01	0.090%	YES	0.29%
6	Biphenyl	10	6173-E1	0.0002	2.00E-01	0.088%	YES	0.29%
6	Biphenyl	12	6173-F1	0.0002	2.00E-01	0.086%	YES	0.29%
6	Biphenyl	14	6173-G1		2.00E-01			0.29%
6	Biphenyl	16	6173-H2	0.0004	2.00E-01	0.179%	YES	0.29%
7	1-Butanol	2	6172-A1	0.026	2.00E+01	0.129%		0.004%
7	1-Butanol	16	6172-H1	0.025	2.00E+01	0.123%		0.004%
7	1-Butanol	2	6172-A2	0.0007	2.00E+01	0.003%		0.004%
7	1-Butanol	4	6172-B1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	6	6172-C1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	8	6172-D1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	10	6172-E1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	12	6172-F1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	14	6172-G1	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	16	6172-H2	0.0004	2.00E+01	0.002%	YES	0.004%
7	1-Butanol	2	6173-A1		2.00E+01			0.004%
7	1-Butanol	16	6173-H1	0.020	2.00E+01	0.098%		0.004%
7	1-Butanol	2	6173-A2		2.00E+01			0.004%
7	1-Butanol	4	6173-B1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	6	6173-C1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	8	6173-D1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	10	6173-E1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	12	6173-F1	0.0008	2.00E+01	0.004%	YES	0.004%
7	1-Butanol	14	6173-G1	0.0008	2.00E+01	0.004%	YES	0.004%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
7	1-Butanol	16	6173-H2	0.0008	2.00E+01	0.004%	YES	0.004%
9	2-Hexanone	2	6172-A1	0.0010	5.00E+00	0.020%		0.016%
9	2-Hexanone	16	6172-H1	0.0007	5.00E+00	0.015%	YES	0.016%
9	2-Hexanone	2	6172-A2	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	4	6172-B1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	6	6172-C1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	8	6172-D1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	10	6172-E1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	12	6172-F1	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	14	6172-G1	0.0002	5.00E+00	0.003%		0.016%
9	2-Hexanone	16	6172-H2	0.0002	5.00E+00	0.003%	YES	0.016%
9	2-Hexanone	2	6173-A1		5.00E+00			0.016%
9	2-Hexanone	16	6173-H1	0.0008	5.00E+00	0.016%	YES	0.016%
9	2-Hexanone	2	6173-A2		5.00E+00			0.016%
9	2-Hexanone	4	6173-B1	0.0001	5.00E+00	0.002%		0.016%
9	2-Hexanone	6	6173-C1	0.0001	5.00E+00	0.002%	YES	0.016%
9	2-Hexanone	8	6173-D1	0.0001	5.00E+00	0.002%	YES	0.016%
9	2-Hexanone	10	6173-E1	0.0001	5.00E+00	0.002%	YES	0.016%
9	2-Hexanone	12	6173-F1	0.0001	5.00E+00	0.002%	YES	0.016%
9	2-Hexanone	14	6173-G1	0.0001	5.00E+00	0.002%		0.016%
9	2-Hexanone	16	6173-H2	0.0001	5.00E+00	0.002%	YES	0.016%
11	4-Methyl-2-hexanone	2	6172-A1	0.0001	5.00E-01	0.028%	YES	0.033%
11	4-Methyl-2-hexanone	16	6172-H1	0.0002	5.00E-01	0.033%	YES	0.033%
11	4-Methyl-2-hexanone	2	6172-A2	0.0002	5.00E-01	0.031%	YES	0.033%
11	4-Methyl-2-hexanone	4	6172-B1	0.0002	5.00E-01	0.032%	YES	0.033%
11	4-Methyl-2-hexanone	6	6172-C1	0.0001	5.00E-01	0.029%	YES	0.033%
11	4-Methyl-2-hexanone	8	6172-D1	0.0002	5.00E-01	0.030%	YES	0.033%
11	4-Methyl-2-hexanone	10	6172-E1	0.0001	5.00E-01	0.030%	YES	0.033%
11	4-Methyl-2-hexanone	12	6172-F1	0.0001	5.00E-01	0.029%	YES	0.033%
11	4-Methyl-2-hexanone	14	6172-G1	0.0001	5.00E-01	0.029%	YES	0.033%
11	4-Methyl-2-hexanone	16	6172-H2	0.0001	5.00E-01	0.029%	YES	0.033%
11	4-Methyl-2-hexanone	2	6173-A1		5.00E-01			0.033%
11	4-Methyl-2-hexanone	16	6173-H1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	2	6173-A2		5.00E-01			0.033%
11	4-Methyl-2-hexanone	4	6173-B1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	6	6173-C1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	8	6173-D1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	10	6173-E1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	12	6173-F1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	14	6173-G1	0.0001	5.00E-01	0.015%	YES	0.033%
11	4-Methyl-2-hexanone	16	6173-H2	0.0001	5.00E-01	0.015%	YES	0.033%
13	3-Buten-2-one	2	6172-A1	0.0006	2.00E-01	0.291%		0.093%
13	3-Buten-2-one	16	6172-H1	0.0008	2.00E-01	0.380%		0.093%
13	3-Buten-2-one	2	6172-A2	0.0002	2.00E-01	0.093%	YES	0.093%
13	3-Buten-2-one	4	6172-B1	0.0002	2.00E-01	0.114%		0.093%
13	3-Buten-2-one	6	6172-C1	0.0002	2.00E-01	0.087%	YES	0.093%
13	3-Buten-2-one	8	6172-D1	0.0006	2.00E-01	0.285%		0.093%
13	3-Buten-2-one	10	6172-E1	0.0002	2.00E-01	0.088%	YES	0.093%
13	3-Buten-2-one	12	6172-F1	0.0012	2.00E-01	0.594%		0.093%
13	3-Buten-2-one	14	6172-G1	0.0002	2.00E-01	0.087%	YES	0.093%
13	3-Buten-2-one	16	6172-H2	0.0013	2.00E-01	0.644%		0.093%
13	3-Buten-2-one	2	6173-A1		2.00E-01			0.093%
13	3-Buten-2-one	16	6173-H1	0.0006	2.00E-01	0.311%		0.093%
13	3-Buten-2-one	2	6173-A2		2.00E-01			0.093%
13	3-Buten-2-one	4	6173-B1	0.0002	2.00E-01	0.082%	YES	0.093%
13	3-Buten-2-one	6	6173-C1	0.0002	2.00E-01	0.082%	YES	0.093%
13	3-Buten-2-one	8	6173-D1	0.0002	2.00E-01	0.082%	YES	0.093%
13	3-Buten-2-one	10	6173-E1	0.0002	2.00E-01	0.081%	YES	0.093%
13	3-Buten-2-one	12	6173-F1	0.0002	2.00E-01	0.080%	YES	0.093%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
13	3-Buten-2-one	14	6173-G1	0.0002	2.00E-01	0.079%	YES	0.093%
13	3-Buten-2-one	16	6173-H2	0.0002	2.00E-01	0.079%	YES	0.093%
14	Formaldehyde	2	6172-A1	0.014	3.00E-01	4.60%		0.607%
14	Formaldehyde	16	6172-H1	0.005	3.00E-01	1.67%		0.607%
14	Formaldehyde	2	6172-A2	0.004	3.00E-01	1.22%		0.607%
14	Formaldehyde	4	6172-B1	0.003	3.00E-01	0.983%		0.607%
14	Formaldehyde	6	6172-C1	0.002	3.00E-01	0.567%	YES	0.607%
14	Formaldehyde	8	6172-D1	0.002	3.00E-01	0.623%		0.607%
14	Formaldehyde	10	6172-E1	0.002	3.00E-01	0.597%	YES	0.607%
14	Formaldehyde	12	6172-F1	0.002	3.00E-01	0.600%	YES	0.607%
14	Formaldehyde	14	6172-G1	0.002	3.00E-01	0.597%	YES	0.607%
14	Formaldehyde	16	6172-H2	0.002	3.00E-01	0.587%	YES	0.607%
14	Formaldehyde	2	6173-A1	0.016	3.00E-01	5.22%		0.607%
14	Formaldehyde	16	6173-H1	0.008	3.00E-01	2.51%		0.607%
14	Formaldehyde	2	6173-A2	0.006	3.00E-01	2.08%		0.607%
14	Formaldehyde	4	6173-B1	0.003	3.00E-01	1.08%		0.607%
14	Formaldehyde	6	6173-C1	0.002	3.00E-01	0.607%	YES	0.607%
14	Formaldehyde	8	6173-D1	0.002	3.00E-01	0.603%	YES	0.607%
14	Formaldehyde	10	6173-E1	0.002	3.00E-01	0.507%	YES	0.607%
14	Formaldehyde	12	6173-F1	0.002	3.00E-01	0.603%	YES	0.607%
14	Formaldehyde	14	6173-G1	0.002	3.00E-01	0.607%	YES	0.607%
14	Formaldehyde	16	6173-H2	0.002	3.00E-01	0.593%	YES	0.607%
15	Acetaldehyde	2	6172-A1	0.056	2.50E+01	0.222%		0.005%
15	Acetaldehyde	16	6172-H1	0.051	2.50E+01	0.205%		0.005%
15	Acetaldehyde	2	6172-A2	0.027	2.50E+01	0.109%		0.005%
15	Acetaldehyde	4	6172-B1	0.032	2.50E+01	0.128%		0.005%
15	Acetaldehyde	6	6172-C1	0.028	2.50E+01	0.112%		0.005%
15	Acetaldehyde	8	6172-D1	0.031	2.50E+01	0.125%		0.005%
15	Acetaldehyde	10	6172-E1	0.027	2.50E+01	0.107%		0.005%
15	Acetaldehyde	12	6172-F1	0.024	2.50E+01	0.096%		0.005%
15	Acetaldehyde	14	6172-G1	0.029	2.50E+01	0.117%		0.005%
15	Acetaldehyde	16	6172-H2	0.029	2.50E+01	0.115%		0.005%
15	Acetaldehyde	2	6173-A1	0.046	2.50E+01	0.185%		0.005%
15	Acetaldehyde	16	6173-H1	0.049	2.50E+01	0.195%		0.005%
15	Acetaldehyde	2	6173-A2	0.027	2.50E+01	0.110%		0.005%
15	Acetaldehyde	4	6173-B1	0.027	2.50E+01	0.110%		0.005%
15	Acetaldehyde	6	6173-C1	0.024	2.50E+01	0.095%		0.005%
15	Acetaldehyde	8	6173-D1	0.025	2.50E+01	0.099%		0.005%
15	Acetaldehyde	10	6173-E1	0.025	2.50E+01	0.099%		0.005%
15	Acetaldehyde	12	6173-F1	0.027	2.50E+01	0.109%		0.005%
15	Acetaldehyde	14	6173-G1	0.027	2.50E+01	0.109%		0.005%
15	Acetaldehyde	16	6173-H2	0.029	2.50E+01	0.117%		0.005%
16	Butanal	2	6172-A1	0.0019	2.50E+01	0.008%		0.001%
16	Butanal	16	6172-H1	0.0017	2.50E+01	0.007%		0.001%
16	Butanal	2	6172-A2	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	4	6172-B1	0.0003	2.50E+01	0.001%		0.001%
16	Butanal	6	6172-C1	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	8	6172-D1	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	10	6172-E1	0.0005	2.50E+01	0.002%		0.001%
16	Butanal	12	6172-F1	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	14	6172-G1	0.0004	2.50E+01	0.002%		0.001%
16	Butanal	16	6172-H2	0.0003	2.50E+01	0.001%	YES	0.001%
16	Butanal	2	6173-A1		2.50E+01			0.001%
16	Butanal	16	6173-H1	0.0012	2.50E+01	0.005%		0.001%
16	Butanal	2	6173-A2		2.50E+01			0.001%
16	Butanal	4	6173-B1	0.0003	2.50E+01	0.001%		0.001%
16	Butanal	6	6173-C1	0.0002	2.50E+01	0.001%	YES	0.001%
16	Butanal	8	6173-D1	0.0002	2.50E+01	0.001%	YES	0.001%
16	Butanal	10	6173-E1	0.0002	2.50E+01	0.001%	YES	0.001%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
16	Butanal	12	6173-F1	0.0002	2.50E+01	0.001%	YES	0.001%
16	Butanal	14	6173-G1	0.0002	2.50E+01	0.001%	YES	0.001%
16	Butanal	16	6173-H2	0.0002	2.50E+01	0.001%	YES	0.001%
19	Furan	2	6172-A1	0.000027	1.00E-03	2.72%		0.87%
19	Furan	16	6172-H1	0.000036	1.00E-03	3.58%		0.87%
19	Furan	2	6172-A2	0.000009	1.00E-03	0.868%	YES	0.87%
19	Furan	4	6172-B1	0.000008	1.00E-03	0.779%	YES	0.87%
19	Furan	6	6172-C1	0.000008	1.00E-03	0.812%	YES	0.87%
19	Furan	8	6172-D1	0.000009	1.00E-03	0.853%	YES	0.87%
19	Furan	10	6172-E1	0.000009	1.00E-03	0.851%	YES	0.87%
19	Furan	12	6172-F1	0.000009	1.00E-03	0.855%	YES	0.87%
19	Furan	14	6172-G1	0.000009	1.00E-03	0.856%	YES	0.87%
19	Furan	16	6172-H2	0.000008	1.00E-03	0.847%	YES	0.87%
19	Furan	2	6173-A1	0.000035	1.00E-03	3.46%		0.87%
19	Furan	16	6173-H1	0.000048	1.00E-03	4.84%		0.87%
19	Furan	2	6173-A2	0.000010	1.00E-03	0.973%		0.87%
19	Furan	4	6173-B1	0.000009	1.00E-03	0.861%	YES	0.87%
19	Furan	6	6173-C1	0.000008	1.00E-03	0.846%		0.87%
19	Furan	8	6173-D1	0.000010	1.00E-03	1.01%		0.87%
19	Furan	10	6173-E1	0.000011	1.00E-03	1.07%		0.87%
19	Furan	12	6173-F1	0.000009	1.00E-03	0.861%	YES	0.87%
19	Furan	14	6173-G1	0.000008	1.00E-03	0.835%	YES	0.87%
19	Furan	16	6173-H2	0.000013	1.00E-03	1.29%		0.87%
20	2,3-Dihydrofuran	2	6172-A1	0.000042	1.00E-03	4.23%		1.77%
20	2,3-Dihydrofuran	16	6172-H1	0.000016	1.00E-03	1.65%	YES	1.77%
20	2,3-Dihydrofuran	2	6172-A2	0.000017	1.00E-03	1.69%	YES	1.77%
20	2,3-Dihydrofuran	4	6172-B1	0.000015	1.00E-03	1.51%	YES	1.77%
20	2,3-Dihydrofuran	6	6172-C1	0.000016	1.00E-03	1.58%	YES	1.77%
20	2,3-Dihydrofuran	8	6172-D1	0.000017	1.00E-03	1.66%	YES	1.77%
20	2,3-Dihydrofuran	10	6172-E1	0.000017	1.00E-03	1.65%	YES	1.77%
20	2,3-Dihydrofuran	12	6172-F1	0.000017	1.00E-03	1.66%	YES	1.77%
20	2,3-Dihydrofuran	14	6172-G1	0.000017	1.00E-03	1.66%	YES	1.77%
20	2,3-Dihydrofuran	16	6172-H2	0.000016	1.00E-03	1.65%	YES	1.77%
20	2,3-Dihydrofuran	2	6173-A1	0.000016	1.00E-03	1.63%	YES	1.77%
20	2,3-Dihydrofuran	16	6173-H1	0.000020	1.00E-03	2.03%		1.77%
20	2,3-Dihydrofuran	2	6173-A2	0.000017	1.00E-03	1.70%	YES	1.77%
20	2,3-Dihydrofuran	4	6173-B1	0.000017	1.00E-03	1.67%	YES	1.77%
20	2,3-Dihydrofuran	6	6173-C1	0.000016	1.00E-03	1.64%	YES	1.77%
20	2,3-Dihydrofuran	8	6173-D1	0.000018	1.00E-03	1.77%	YES	1.77%
20	2,3-Dihydrofuran	10	6173-E1	0.000025	1.00E-03	2.55%		1.77%
20	2,3-Dihydrofuran	12	6173-F1	0.000017	1.00E-03	1.67%	YES	1.77%
20	2,3-Dihydrofuran	14	6173-G1	0.000016	1.00E-03	1.62%	YES	1.77%
20	2,3-Dihydrofuran	16	6173-H2	0.000016	1.00E-03	1.62%	YES	1.77%
21	2,5-Dihydrofuran	2	6172-A1	0.000020	1.00E-03	2.03%	YES	2.17%
21	2,5-Dihydrofuran	16	6172-H1	0.000021	1.00E-03	2.10%	YES	2.17%
21	2,5-Dihydrofuran	2	6172-A2	0.000022	1.00E-03	2.15%	YES	2.17%
21	2,5-Dihydrofuran	4	6172-B1	0.000019	1.00E-03	1.93%	YES	2.17%
21	2,5-Dihydrofuran	6	6172-C1	0.000020	1.00E-03	2.02%	YES	2.17%
21	2,5-Dihydrofuran	8	6172-D1	0.000021	1.00E-03	2.12%	YES	2.17%
21	2,5-Dihydrofuran	10	6172-E1	0.000024	1.00E-03	2.39%		2.17%
21	2,5-Dihydrofuran	12	6172-F1	0.000021	1.00E-03	2.12%	YES	2.17%
21	2,5-Dihydrofuran	14	6172-G1	0.000021	1.00E-03	2.13%	YES	2.17%
21	2,5-Dihydrofuran	16	6172-H2	0.000021	1.00E-03	2.10%	YES	2.17%
21	2,5-Dihydrofuran	2	6173-A1	0.000021	1.00E-03	2.09%	YES	2.17%
21	2,5-Dihydrofuran	16	6173-H1	0.000021	1.00E-03	2.12%	YES	2.17%
21	2,5-Dihydrofuran	2	6173-A2	0.000022	1.00E-03	2.17%	YES	2.17%
21	2,5-Dihydrofuran	4	6173-B1	0.000021	1.00E-03	2.14%	YES	2.17%
21	2,5-Dihydrofuran	6	6173-C1	0.000021	1.00E-03	2.10%	YES	2.17%
21	2,5-Dihydrofuran	8	6173-D1	0.000038	1.00E-03	3.84%		2.17%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
21	2,5-Dihydrofuran	10	6173-E1	0.000022	1.00E-03	2.17%	YES	2.17%
21	2,5-Dihydrofuran	12	6173-F1	0.000021	1.00E-03	2.14%	YES	2.17%
21	2,5-Dihydrofuran	14	6173-G1	0.000021	1.00E-03	2.07%	YES	2.17%
21	2,5-Dihydrofuran	16	6173-H2	0.000021	1.00E-03	2.07%	YES	2.17%
22	2-Methylfuran	2	6172-A1	0.000017	1.00E-03	1.73%	YES	1.93%
22	2-Methylfuran	16	6172-H1	0.000018	1.00E-03	1.79%	YES	1.93%
22	2-Methylfuran	2	6172-A2	0.000018	1.00E-03	1.84%	YES	1.93%
22	2-Methylfuran	4	6172-B1	0.000017	1.00E-03	1.65%	YES	1.93%
22	2-Methylfuran	6	6172-C1	0.000017	1.00E-03	1.72%	YES	1.93%
22	2-Methylfuran	8	6172-D1	0.000018	1.00E-03	1.81%	YES	1.93%
22	2-Methylfuran	10	6172-E1	0.000021	1.00E-03	2.12%		1.93%
22	2-Methylfuran	12	6172-F1	0.000018	1.00E-03	1.81%	YES	1.93%
22	2-Methylfuran	14	6172-G1	0.000018	1.00E-03	1.81%	YES	1.93%
22	2-Methylfuran	16	6172-H2	0.000018	1.00E-03	1.80%	YES	1.93%
22	2-Methylfuran	2	6173-A1	0.000018	1.00E-03	1.78%	YES	1.93%
22	2-Methylfuran	16	6173-H1	0.000018	1.00E-03	1.81%	YES	1.93%
22	2-Methylfuran	2	6173-A2	0.000019	1.00E-03	1.86%	YES	1.93%
22	2-Methylfuran	4	6173-B1	0.000018	1.00E-03	1.82%	YES	1.93%
22	2-Methylfuran	6	6173-C1	0.000018	1.00E-03	1.79%	YES	1.93%
22	2-Methylfuran	8	6173-D1	0.000019	1.00E-03	1.93%	YES	1.93%
22	2-Methylfuran	10	6173-E1	0.000019	1.00E-03	1.85%	YES	1.93%
22	2-Methylfuran	12	6173-F1	0.000018	1.00E-03	1.82%	YES	1.93%
22	2-Methylfuran	14	6173-G1	0.000018	1.00E-03	1.77%	YES	1.93%
22	2-Methylfuran	16	6173-H2	0.000018	1.00E-03	1.76%	YES	1.93%
23	2,5-Dimethylfuran	2	6172-A1	0.000028	1.00E-03	2.76%	YES	3.08%
23	2,5-Dimethylfuran	16	6172-H1	0.000029	1.00E-03	2.87%	YES	3.08%
23	2,5-Dimethylfuran	2	6172-A2	0.000029	1.00E-03	2.94%	YES	3.08%
23	2,5-Dimethylfuran	4	6172-B1	0.000026	1.00E-03	2.64%	YES	3.08%
23	2,5-Dimethylfuran	6	6172-C1	0.000027	1.00E-03	2.75%	YES	3.08%
23	2,5-Dimethylfuran	8	6172-D1	0.000029	1.00E-03	2.89%	YES	3.08%
23	2,5-Dimethylfuran	10	6172-E1	0.000029	1.00E-03	2.88%	YES	3.08%
23	2,5-Dimethylfuran	12	6172-F1	0.000029	1.00E-03	2.89%	YES	3.08%
23	2,5-Dimethylfuran	14	6172-G1	0.000029	1.00E-03	2.90%	YES	3.08%
23	2,5-Dimethylfuran	16	6172-H2	0.000029	1.00E-03	2.87%	YES	3.08%
23	2,5-Dimethylfuran	2	6173-A1	0.000028	1.00E-03	2.85%	YES	3.08%
23	2,5-Dimethylfuran	16	6173-H1	0.000029	1.00E-03	2.89%	YES	3.08%
23	2,5-Dimethylfuran	2	6173-A2	0.000030	1.00E-03	2.96%	YES	3.08%
23	2,5-Dimethylfuran	4	6173-B1	0.000029	1.00E-03	2.91%	YES	3.08%
23	2,5-Dimethylfuran	6	6173-C1	0.000029	1.00E-03	2.86%	YES	3.08%
23	2,5-Dimethylfuran	8	6173-D1	0.000031	1.00E-03	3.08%	YES	3.08%
23	2,5-Dimethylfuran	10	6173-E1	0.000030	1.00E-03	2.96%	YES	3.08%
23	2,5-Dimethylfuran	12	6173-F1	0.000029	1.00E-03	2.91%	YES	3.08%
23	2,5-Dimethylfuran	14	6173-G1	0.000028	1.00E-03	2.83%	YES	3.08%
23	2,5-Dimethylfuran	16	6173-H2	0.000028	1.00E-03	2.82%	YES	3.08%
27	2-Pentylfuran	2	6172-A1	0.000020	0.00100	1.97%		1.70%
27	2-Pentylfuran	16	6172-H1	0.000016	0.00100	1.58%	YES	1.70%
27	2-Pentylfuran	2	6172-A2	0.000016	0.00100	1.61%	YES	1.70%
27	2-Pentylfuran	4	6172-B1	0.000017	0.00100	1.66%		1.70%
27	2-Pentylfuran	6	6172-C1	0.000015	0.00100	1.51%	YES	1.70%
27	2-Pentylfuran	8	6172-D1	0.000016	0.00100	1.59%	YES	1.70%
27	2-Pentylfuran	10	6172-E1	0.000016	0.00100	1.58%	YES	1.70%
27	2-Pentylfuran	12	6172-F1	0.000016	0.00100	1.59%	YES	1.70%
27	2-Pentylfuran	14	6172-G1	0.000016	0.00100	1.59%	YES	1.70%
27	2-Pentylfuran	16	6172-H2	0.000016	0.00100	1.58%	YES	1.70%
27	2-Pentylfuran	2	6173-A1	0.000016	0.00100	1.57%	YES	1.70%
27	2-Pentylfuran	16	6173-H1	0.000016	0.00100	1.59%	YES	1.70%
27	2-Pentylfuran	2	6173-A2	0.000016	0.00100	1.63%	YES	1.70%
27	2-Pentylfuran	4	6173-B1	0.000016	0.00100	1.60%	YES	1.70%
27	2-Pentylfuran	6	6173-C1	0.000016	0.00100	1.62%		1.70%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
27	2-Pentylfuran	8	6173-D1	0.000017	0.00100	1.70%	YES	1.70%
27	2-Pentylfuran	10	6173-E1	0.000027	0.00100	2.73%		1.70%
27	2-Pentylfuran	12	6173-F1	0.000016	0.00100	1.60%	YES	1.70%
27	2-Pentylfuran	14	6173-G1	0.000016	0.00100	1.55%	YES	1.70%
27	2-Pentylfuran	16	6173-H2	0.000015	0.00100	1.55%	YES	1.70%
28	2-Heptylfuran	2	6172-A1	0.000016	0.00100	1.63%		1.06%
28	2-Heptylfuran	16	6172-H1	0.000010	0.00100	1.04%	YES	1.06%
28	2-Heptylfuran	2	6172-A2	0.000013	0.00100	1.34%		1.06%
28	2-Heptylfuran	4	6172-B1	0.000013	0.00100	1.28%		1.06%
28	2-Heptylfuran	6	6172-C1	0.000011	0.00100	1.07%		1.06%
28	2-Heptylfuran	8	6172-D1	0.000014	0.00100	1.36%		1.06%
28	2-Heptylfuran	10	6172-E1	0.000010	0.00100	1.05%	YES	1.06%
28	2-Heptylfuran	12	6172-F1	0.000011	0.00100	1.05%	YES	1.06%
28	2-Heptylfuran	14	6172-G1	0.000011	0.00100	1.05%	YES	1.06%
28	2-Heptylfuran	16	6172-H2	0.000010	0.00100	1.04%	YES	1.06%
28	2-Heptylfuran	2	6173-A1	0.000013	0.00100	1.34%		1.06%
28	2-Heptylfuran	16	6173-H1	0.000010	0.00100	1.05%	YES	1.06%
28	2-Heptylfuran	2	6173-A2	0.000011	0.00100	1.12%		1.06%
28	2-Heptylfuran	4	6173-B1	0.000014	0.00100	1.45%		1.06%
28	2-Heptylfuran	6	6173-C1	0.000018	0.00100	1.81%		1.06%
28	2-Heptylfuran	8	6173-D1	0.000018	0.00100	1.82%		1.06%
28	2-Heptylfuran	10	6173-E1	0.000012	0.00100	1.15%		1.06%
28	2-Heptylfuran	12	6173-F1	0.000011	0.00100	1.06%	YES	1.06%
28	2-Heptylfuran	14	6173-G1	0.000010	0.00100	1.03%	YES	1.06%
28	2-Heptylfuran	16	6173-H2	0.000010	0.00100	1.02%	YES	1.06%
29	2-Propylfuran	2	6172-A1	0.000025	0.00100	2.47%	YES	2.75%
29	2-Propylfuran	16	6172-H1	0.000034	0.00100	3.37%		2.75%
29	2-Propylfuran	2	6172-A2	0.000026	0.00100	2.62%	YES	2.75%
29	2-Propylfuran	4	6172-B1	0.000024	0.00100	2.35%	YES	2.75%
29	2-Propylfuran	6	6172-C1	0.000025	0.00100	2.45%	YES	2.75%
29	2-Propylfuran	8	6172-D1	0.000026	0.00100	2.58%	YES	2.75%
29	2-Propylfuran	10	6172-E1	0.000026	0.00100	2.57%	YES	2.75%
29	2-Propylfuran	12	6172-F1	0.000026	0.00100	2.58%	YES	2.75%
29	2-Propylfuran	14	6172-G1	0.000026	0.00100	2.59%	YES	2.75%
29	2-Propylfuran	16	6172-H2	0.000026	0.00100	2.56%	YES	2.75%
29	2-Propylfuran	2	6173-A1	0.000025	0.00100	2.54%	YES	2.75%
29	2-Propylfuran	16	6173-H1	0.000026	0.00100	2.58%	YES	2.75%
29	2-Propylfuran	2	6173-A2	0.000026	0.00100	2.65%	YES	2.75%
29	2-Propylfuran	4	6173-B1	0.000026	0.00100	2.60%	YES	2.75%
29	2-Propylfuran	6	6173-C1	0.000026	0.00100	2.56%	YES	2.75%
29	2-Propylfuran	8	6173-D1	0.000028	0.00100	2.75%	YES	2.75%
29	2-Propylfuran	10	6173-E1	0.000026	0.00100	2.64%	YES	2.75%
29	2-Propylfuran	12	6173-F1	0.000026	0.00100	2.60%	YES	2.75%
29	2-Propylfuran	14	6173-G1	0.000025	0.00100	2.52%	YES	2.75%
29	2-Propylfuran	16	6173-H2	0.000025	0.00100	2.51%	YES	2.75%
33	Diethylphthalate	2	6172-A1	0.0002	0.55010	0.039%	YES	0.127%
33	Diethylphthalate	16	6172-H1	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	2	6172-A2	0.0002	0.55010	0.035%	YES	0.127%
33	Diethylphthalate	4	6172-B1	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	6	6172-C1	0.0002	0.55010	0.036%	YES	0.127%
33	Diethylphthalate	8	6172-D1	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	10	6172-E1	0.0002	0.55010	0.038%	YES	0.127%
33	Diethylphthalate	12	6172-F1	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	14	6172-G1	0.0002	0.55010	0.038%	YES	0.127%
33	Diethylphthalate	16	6172-H2	0.0002	0.55010	0.037%	YES	0.127%
33	Diethylphthalate	2	6173-A1	0.0004	0.55010	0.067%	YES	0.127%
33	Diethylphthalate	16	6173-H1	0.0007	0.55010	0.127%	YES	0.127%
33	Diethylphthalate	2	6173-A2	0.0002	0.55010	0.040%	YES	0.127%
33	Diethylphthalate	4	6173-B1	0.0002	0.55010	0.040%	YES	0.127%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
33	Diethylphthalate	6	6173-C1	0.0002	0.55010	0.039%	YES	0.127%
33	Diethylphthalate	8	6173-D1	0.0002	0.55010	0.040%	YES	0.127%
33	Diethylphthalate	10	6173-E1	0.0002	0.55010	0.039%	YES	0.127%
33	Diethylphthalate	12	6173-F1	0.0002	0.55010	0.038%	YES	0.127%
33	Diethylphthalate	14	6173-G1		0.55010			0.127%
33	Diethylphthalate	16	6173-H2	0.0004	0.55010	0.079%	YES	0.127%
34	Acetonitrile	2	6172-A1	0.042	20.00000	0.211%		0.001%
34	Acetonitrile	16	6172-H1	0.139	20.00000	0.694%		0.001%
34	Acetonitrile	2	6172-A2	0.016	20.00000	0.081%		0.001%
34	Acetonitrile	4	6172-B1	0.051	20.00000	0.255%		0.001%
34	Acetonitrile	6	6172-C1	0.067	20.00000	0.335%		0.001%
34	Acetonitrile	8	6172-D1	0.292	20.00000	1.46%		0.001%
34	Acetonitrile	10	6172-E1	0.071	20.00000	0.357%		0.001%
34	Acetonitrile	12	6172-F1	0.075	20.00000	0.375%		0.001%
34	Acetonitrile	14	6172-G1	0.100	20.00000	0.501%		0.001%
34	Acetonitrile	16	6172-H2	0.097	20.00000	0.487%		0.001%
34	Acetonitrile	2	6173-A1		20.00000			0.001%
34	Acetonitrile	16	6173-H1	0.095	20.00000	0.475%		0.001%
34	Acetonitrile	2	6173-A2		20.00000			0.001%
34	Acetonitrile	4	6173-B1	0.097	20.00000	0.486%		0.001%
34	Acetonitrile	6	6173-C1	0.131	20.00000	0.655%		0.001%
34	Acetonitrile	8	6173-D1	2.480	20.00000	12.4%		0.001%
34	Acetonitrile	10	6173-E1	0.086	20.00000	0.432%		0.001%
34	Acetonitrile	12	6173-F1	0.082	20.00000	0.411%		0.001%
34	Acetonitrile	14	6173-G1	0.152	20.00000	0.761%		0.001%
34	Acetonitrile	16	6173-H2	0.175	20.00000	0.873%		0.001%
35	Propanenitrile	2	6172-A1	0.0037	6.00000	0.062%		0.004%
35	Propanenitrile	16	6172-H1	0.0040	6.00000	0.066%		0.004%
35	Propanenitrile	2	6172-A2	0.0002	6.00000	0.004%	YES	0.004%
35	Propanenitrile	4	6172-B1	0.0002	6.00000	0.004%	YES	0.004%
35	Propanenitrile	6	6172-C1	0.0003	6.00000	0.005%		0.004%
35	Propanenitrile	8	6172-D1	0.0007	6.00000	0.012%		0.004%
35	Propanenitrile	10	6172-E1	0.0018	6.00000	0.030%		0.004%
35	Propanenitrile	12	6172-F1	0.0026	6.00000	0.043%		0.004%
35	Propanenitrile	14	6172-G1	0.0025	6.00000	0.041%		0.004%
35	Propanenitrile	16	6172-H2	0.0026	6.00000	0.043%		0.004%
35	Propanenitrile	2	6173-A1		6.00000			0.004%
35	Propanenitrile	16	6173-H1	0.0037	6.00000	0.062%		0.004%
35	Propanenitrile	2	6173-A2		6.00000			0.004%
35	Propanenitrile	4	6173-B1	0.0003	6.00000	0.006%		0.004%
35	Propanenitrile	6	6173-C1	0.0007	6.00000	0.012%		0.004%
35	Propanenitrile	8	6173-D1	0.0009	6.00000	0.016%		0.004%
35	Propanenitrile	10	6173-E1	0.0017	6.00000	0.028%		0.004%
35	Propanenitrile	12	6173-F1	0.0014	6.00000	0.024%		0.004%
35	Propanenitrile	14	6173-G1	0.0025	6.00000	0.041%		0.004%
35	Propanenitrile	16	6173-H2	0.0017	6.00000	0.028%		0.004%
36	Butanenitrile	2	6172-A1	0.0034	8.00000	0.043%		0.003%
36	Butanenitrile	16	6172-H1	0.0027	8.00000	0.034%		0.003%
36	Butanenitrile	2	6172-A2	0.0002	8.00000	0.003%	YES	0.003%
36	Butanenitrile	4	6172-B1	0.0002	8.00000	0.003%	YES	0.003%
36	Butanenitrile	6	6172-C1	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	8	6172-D1	0.0002	8.00000	0.003%	YES	0.003%
36	Butanenitrile	10	6172-E1	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	12	6172-F1	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	14	6172-G1	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	16	6172-H2	0.0002	8.00000	0.002%	YES	0.003%
36	Butanenitrile	2	6173-A1		8.00000			0.003%
36	Butanenitrile	16	6173-H1	0.0020	8.00000	0.025%		0.003%
36	Butanenitrile	2	6173-A2		8.00000			0.003%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
36	Butanenitrile	4	6173-B1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	6	6173-C1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	8	6173-D1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	10	6173-E1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	12	6173-F1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	14	6173-G1	0.0001	8.00000	0.001%	YES	0.003%
36	Butanenitrile	16	6173-H2	0.0001	8.00000	0.001%	YES	0.003%
37	Pentanenitrile	2	6172-A1	0.0009	6.00000	0.015%		0.004%
37	Pentanenitrile	16	6172-H1	0.0004	6.00000	0.007%		0.004%
37	Pentanenitrile	2	6172-A2	0.0002	6.00000	0.004%	YES	0.004%
37	Pentanenitrile	4	6172-B1	0.0002	6.00000	0.004%	YES	0.004%
37	Pentanenitrile	6	6172-C1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	8	6172-D1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	10	6172-E1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	12	6172-F1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	14	6172-G1	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	16	6172-H2	0.0002	6.00000	0.003%	YES	0.004%
37	Pentanenitrile	2	6173-A1		6.00000			0.004%
37	Pentanenitrile	16	6173-H1	0.0006	6.00000	0.010%		0.004%
37	Pentanenitrile	2	6173-A2		6.00000			0.004%
37	Pentanenitrile	4	6173-B1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	6	6173-C1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	8	6173-D1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	10	6173-E1	0.0003	6.00000	0.006%		0.004%
37	Pentanenitrile	12	6173-F1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	14	6173-G1	0.0001	6.00000	0.002%	YES	0.004%
37	Pentanenitrile	16	6173-H2	0.0001	6.00000	0.002%	YES	0.004%
38	Hexanenitrile	2	6172-A1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	16	6172-H1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	2	6172-A2	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	4	6172-B1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	6	6172-C1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	8	6172-D1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	10	6172-E1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	12	6172-F1	0.0002	6.00000	0.003%		0.003%
38	Hexanenitrile	14	6172-G1	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	16	6172-H2	0.0002	6.00000	0.003%	YES	0.003%
38	Hexanenitrile	2	6173-A1		6.00000			0.003%
38	Hexanenitrile	16	6173-H1	0.0001	6.00000	0.002%		0.003%
38	Hexanenitrile	2	6173-A2		6.00000			0.003%
38	Hexanenitrile	4	6173-B1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	6	6173-C1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	8	6173-D1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	10	6173-E1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	12	6173-F1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	14	6173-G1	0.0001	6.00000	0.002%	YES	0.003%
38	Hexanenitrile	16	6173-H2	0.0001	6.00000	0.002%	YES	0.003%
42	Ethylamine	2	6172-A1	0.0045	5.00000	0.091%	YES	0.10%
42	Ethylamine	16	6172-H1	0.0168	5.00000	0.337%		0.10%
42	Ethylamine	2	6172-A2	0.0045	5.00000	0.090%	YES	0.10%
42	Ethylamine	4	6172-B1	0.0047	5.00000	0.095%	YES	0.10%
42	Ethylamine	6	6172-C1	0.0046	5.00000	0.092%	YES	0.10%
42	Ethylamine	8	6172-D1	0.0047	5.00000	0.093%	YES	0.10%
42	Ethylamine	10	6172-E1	0.0047	5.00000	0.095%	YES	0.10%
42	Ethylamine	12	6172-F1	0.0047	5.00000	0.094%	YES	0.10%
42	Ethylamine	14	6172-G1	0.0048	5.00000	0.095%	YES	0.10%
42	Ethylamine	16	6172-H2	0.0046	5.00000	0.092%	YES	0.10%
42	Ethylamine	2	6173-A1	0.0046	5.00000	0.092%	YES	0.10%
42	Ethylamine	16	6173-H1	0.0047	5.00000	0.093%	YES	0.10%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
42	Ethylamine	2	6173-A2	0.0046	5.00000	0.091%	YES	0.10%
42	Ethylamine	4	6173-B1	0.0046	5.00000	0.091%	YES	0.10%
42	Ethylamine	6	6173-C1	0.0047	5.00000	0.094%	YES	0.10%
42	Ethylamine	8	6173-D1	0.0048	5.00000	0.097%	YES	0.10%
42	Ethylamine	10	6173-E1	0.0049	5.00000	0.097%	YES	0.10%
42	Ethylamine	12	6173-F1	0.0049	5.00000	0.097%	YES	0.10%
42	Ethylamine	14	6173-G1	0.0048	5.00000	0.095%	YES	0.10%
42	Ethylamine	16	6173-H2	0.0046	5.00000	0.092%	YES	0.10%
43	N-Nitrosodimethylamine	2	6172-A1	0.00067	0.00030	224%		8.40%
43	N-Nitrosodimethylamine	16	6172-H1	0.00052	0.00030	173%		8.40%
43	N-Nitrosodimethylamine	2	6172-A2	0.00002	0.00030	7.00%	YES	8.40%
43	N-Nitrosodimethylamine	4	6172-B1	0.00002	0.00030	6.97%	YES	8.40%
43	N-Nitrosodimethylamine	6	6172-C1	0.00002	0.00030	6.63%	YES	8.40%
43	N-Nitrosodimethylamine	8	6172-D1	0.00003	0.00030	8.40%	YES	8.40%
43	N-Nitrosodimethylamine	10	6172-E1	0.00002	0.00030	6.73%	YES	8.40%
43	N-Nitrosodimethylamine	12	6172-F1	0.00002	0.00030	6.73%	YES	8.40%
43	N-Nitrosodimethylamine	14	6172-G1	0.00002	0.00030	6.80%	YES	8.40%
43	N-Nitrosodimethylamine	16	6172-H2	0.00002	0.00030	6.87%	YES	8.40%
43	N-Nitrosodimethylamine	2	6173-A1	0.00013	0.00030	43.0%		8.40%
43	N-Nitrosodimethylamine	16	6173-H1	0.00056	0.00030	187%		8.40%
43	N-Nitrosodimethylamine	2	6173-A2	0.00002	0.00030	6.90%	YES	8.40%
43	N-Nitrosodimethylamine	4	6173-B1	0.00002	0.00030	6.90%	YES	8.40%
43	N-Nitrosodimethylamine	6	6173-C1	0.00002	0.00030	6.97%	YES	8.40%
43	N-Nitrosodimethylamine	8	6173-D1	0.00002	0.00030	6.90%	YES	8.40%
43	N-Nitrosodimethylamine	10	6173-E1	0.00002	0.00030	6.90%	YES	8.40%
43	N-Nitrosodimethylamine	12	6173-F1	0.00004	0.00030	12.1%	YES	12.13%
43	N-Nitrosodimethylamine	14	6173-G1	0.00004	0.00030	12.1%	YES	12.13%
43	N-Nitrosodimethylamine	16	6173-H2	0.00004	0.00030	12.1%	YES	12.13%
44	N-Nitrosodiethylamine	2	6172-A1	0.00002	0.00010	23.4%	YES	28.70%
44	N-Nitrosodiethylamine	16	6172-H1	0.00005	0.00010	52.3%		28.70%
44	N-Nitrosodiethylamine	2	6172-A2	0.00002	0.00010	23.9%	YES	28.70%
44	N-Nitrosodiethylamine	4	6172-B1	0.00002	0.00010	23.8%	YES	28.70%
44	N-Nitrosodiethylamine	6	6172-C1	0.00002	0.00010	22.7%	YES	28.70%
44	N-Nitrosodiethylamine	8	6172-D1	0.00003	0.00010	28.7%	YES	28.70%
44	N-Nitrosodiethylamine	10	6172-E1	0.00002	0.00010	23.0%	YES	28.70%
44	N-Nitrosodiethylamine	12	6172-F1	0.00002	0.00010	23.0%	YES	28.70%
44	N-Nitrosodiethylamine	14	6172-G1	0.00002	0.00010	23.2%	YES	28.70%
44	N-Nitrosodiethylamine	16	6172-H2	0.00002	0.00010	23.5%	YES	28.70%
44	N-Nitrosodiethylamine	2	6173-A1	0.00007	0.00010	73.6%		28.70%
44	N-Nitrosodiethylamine	16	6173-H1	0.00005	0.00010	49.1%		28.70%
44	N-Nitrosodiethylamine	2	6173-A2	0.00002	0.00010	23.6%	YES	28.70%
44	N-Nitrosodiethylamine	4	6173-B1	0.00002	0.00010	23.5%	YES	28.70%
44	N-Nitrosodiethylamine	6	6173-C1	0.00002	0.00010	23.8%	YES	28.70%
44	N-Nitrosodiethylamine	8	6173-D1	0.00002	0.00010	23.6%	YES	28.70%
44	N-Nitrosodiethylamine	10	6173-E1	0.00002	0.00010	23.6%	YES	28.70%
44	N-Nitrosodiethylamine	12	6173-F1	0.00002	0.00010	23.2%	YES	28.70%
44	N-Nitrosodiethylamine	14	6173-G1	0.00002	0.00010	23.2%	YES	28.70%
44	N-Nitrosodiethylamine	16	6173-H2	0.00002	0.00010	23.2%	YES	28.70%
45	N-Nitrosomethylethylamine	2	6172-A1	0.00003	0.00030	8.62%	YES	11.09%
45	N-Nitrosomethylethylamine	16	6172-H1	0.00003	0.00030	8.89%	YES	11.09%
45	N-Nitrosomethylethylamine	2	6172-A2	0.00003	0.00030	9.23%	YES	11.09%
45	N-Nitrosomethylethylamine	4	6172-B1	0.00003	0.00030	9.21%	YES	11.09%
45	N-Nitrosomethylethylamine	6	6172-C1	0.00003	0.00030	8.77%	YES	11.09%
45	N-Nitrosomethylethylamine	8	6172-D1	0.00003	0.00030	11.1%	YES	11.09%
45	N-Nitrosomethylethylamine	10	6172-E1	0.00003	0.00030	8.89%	YES	11.09%
45	N-Nitrosomethylethylamine	12	6172-F1	0.00003	0.00030	8.89%	YES	11.09%
45	N-Nitrosomethylethylamine	14	6172-G1	0.00003	0.00030	8.97%	YES	11.09%
45	N-Nitrosomethylethylamine	16	6172-H2	0.00003	0.00030	9.06%	YES	11.09%
45	N-Nitrosomethylethylamine	2	6173-A1	0.00003	0.00030	9.07%	YES	11.09%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
45	N-Nitrosomethylethylamine	16	6173-H1	0.00003	0.00030	8.89%	YES	11.09%
45	N-Nitrosomethylethylamine	2	6173-A2	0.00003	0.00030	9.12%	YES	11.09%
45	N-Nitrosomethylethylamine	4	6173-B1	0.00003	0.00030	9.10%	YES	11.09%
45	N-Nitrosomethylethylamine	6	6173-C1	0.00003	0.00030	9.19%	YES	11.09%
45	N-Nitrosomethylethylamine	8	6173-D1	0.00003	0.00030	9.10%	YES	11.09%
45	N-Nitrosomethylethylamine	10	6173-E1	0.00003	0.00030	9.13%	YES	11.09%
45	N-Nitrosomethylethylamine	12	6173-F1	0.00003	0.00030	8.97%	YES	11.09%
45	N-Nitrosomethylethylamine	14	6173-G1	0.00003	0.00030	8.96%	YES	11.09%
45	N-Nitrosomethylethylamine	16	6173-H2	0.00003	0.00030	8.97%	YES	11.09%
46	N-Nitrosomorpholine	2	6172-A1	0.00002	0.00060	3.43%	YES	3.33%
46	N-Nitrosomorpholine	16	6172-H1	0.00002	0.00060	3.37%	YES	3.33%
46	N-Nitrosomorpholine	2	6172-A2	0.00002	0.00060	3.50%	YES	3.33%
46	N-Nitrosomorpholine	4	6172-B1	0.00002	0.00060	3.50%	YES	3.33%
46	N-Nitrosomorpholine	6	6172-C1	0.00002	0.00060	3.33%	YES	3.33%
46	N-Nitrosomorpholine	8	6172-D1	0.00003	0.00060	4.20%	YES	3.33%
46	N-Nitrosomorpholine	10	6172-E1	0.00002	0.00060	3.37%	YES	3.33%
46	N-Nitrosomorpholine	12	6172-F1	0.00002	0.00060	3.37%	YES	3.33%
46	N-Nitrosomorpholine	14	6172-G1	0.00002	0.00060	3.40%	YES	3.33%
46	N-Nitrosomorpholine	16	6172-H2	0.00002	0.00060	3.43%	YES	3.33%
46	N-Nitrosomorpholine	2	6173-A1	0.00004	0.00060	7.20%		3.33%
46	N-Nitrosomorpholine	16	6173-H1	0.00005	0.00060	7.97%		3.33%
46	N-Nitrosomorpholine	2	6173-A2	0.00002	0.00060	3.47%	YES	3.33%
46	N-Nitrosomorpholine	4	6173-B1	0.00002	0.00060	3.45%	YES	3.33%
46	N-Nitrosomorpholine	6	6173-C1	0.00002	0.00060	3.48%	YES	3.33%
46	N-Nitrosomorpholine	8	6173-D1	0.00002	0.00060	3.45%	YES	3.33%
46	N-Nitrosomorpholine	10	6173-E1	0.00002	0.00060	3.47%	YES	3.33%
46	N-Nitrosomorpholine	12	6173-F1	0.00002	0.00060	3.25%	YES	3.33%
46	N-Nitrosomorpholine	14	6173-G1	0.00002	0.00060	3.25%	YES	3.33%
46	N-Nitrosomorpholine	16	6173-H2	0.00002	0.00060	3.25%	YES	3.33%
47	Tributyl phosphate	2	6172-A1	0.00014	0.20000	0.071%	YES	0.23%
47	Tributyl phosphate	16	6172-H1	0.00014	0.20000	0.069%	YES	0.23%
47	Tributyl phosphate	2	6172-A2	0.00013	0.20000	0.065%	YES	0.23%
47	Tributyl phosphate	4	6172-B1	0.00014	0.20000	0.068%	YES	0.23%
47	Tributyl phosphate	6	6172-C1	0.00013	0.20000	0.065%	YES	0.23%
47	Tributyl phosphate	8	6172-D1	0.00014	0.20000	0.068%	YES	0.23%
47	Tributyl phosphate	10	6172-E1	0.00014	0.20000	0.070%	YES	0.23%
47	Tributyl phosphate	12	6172-F1	0.00014	0.20000	0.068%	YES	0.23%
47	Tributyl phosphate	14	6172-G1	0.00014	0.20000	0.069%	YES	0.23%
47	Tributyl phosphate	16	6172-H2	0.00013	0.20000	0.067%	YES	0.23%
47	Tributyl phosphate	2	6173-A1	0.00025	0.20000	0.123%	YES	0.23%
47	Tributyl phosphate	16	6173-H1	0.00047	0.20000	0.233%	YES	0.23%
47	Tributyl phosphate	2	6173-A2	0.00015	0.20000	0.074%	YES	0.23%
47	Tributyl phosphate	4	6173-B1	0.00015	0.20000	0.074%	YES	0.23%
47	Tributyl phosphate	6	6173-C1	0.00014	0.20000	0.071%	YES	0.23%
47	Tributyl phosphate	8	6173-D1	0.00015	0.20000	0.073%	YES	0.23%
47	Tributyl phosphate	10	6173-E1	0.00014	0.20000	0.071%	YES	0.23%
47	Tributyl phosphate	12	6173-F1	0.00014	0.20000	0.070%	YES	0.23%
47	Tributyl phosphate	14	6173-G1		0.20000			0.23%
47	Tributyl phosphate	16	6173-H2	0.00029	0.20000	0.145%	YES	0.23%
48	Dibutyl butylphosphonate	2	6172-A1	0.00010	0.00700	1.38%	YES	4.54%
48	Dibutyl butylphosphonate	16	6172-H1	0.00009	0.00700	1.34%	YES	4.54%
48	Dibutyl butylphosphonate	2	6172-A2	0.00009	0.00700	1.27%	YES	4.54%
48	Dibutyl butylphosphonate	4	6172-B1	0.00009	0.00700	1.33%	YES	4.54%
48	Dibutyl butylphosphonate	6	6172-C1	0.00009	0.00700	1.28%	YES	4.54%
48	Dibutyl butylphosphonate	8	6172-D1	0.00009	0.00700	1.32%	YES	4.54%
48	Dibutyl butylphosphonate	10	6172-E1	0.00010	0.00700	1.37%	YES	4.54%
48	Dibutyl butylphosphonate	12	6172-F1	0.00009	0.00700	1.33%	YES	4.54%
48	Dibutyl butylphosphonate	14	6172-G1	0.00009	0.00700	1.35%	YES	4.54%
48	Dibutyl butylphosphonate	16	6172-H2	0.00009	0.00700	1.32%	YES	4.54%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
48	Dibutyl butylphosphonate	2	6173-A1	0.00017	0.00700	2.40%	YES	4.54%
48	Dibutyl butylphosphonate	16	6173-H1	0.00032	0.00700	4.54%	YES	4.54%
48	Dibutyl butylphosphonate	2	6173-A2	0.00010	0.00700	1.45%	YES	4.54%
48	Dibutyl butylphosphonate	4	6173-B1	0.00010	0.00700	1.44%	YES	4.54%
48	Dibutyl butylphosphonate	6	6173-C1	0.00010	0.00700	1.38%	YES	4.54%
48	Dibutyl butylphosphonate	8	6173-D1	0.00010	0.00700	1.42%	YES	4.54%
48	Dibutyl butylphosphonate	10	6173-E1	0.00010	0.00700	1.39%	YES	4.54%
48	Dibutyl butylphosphonate	12	6173-F1	0.00010	0.00700	1.37%	YES	4.54%
48	Dibutyl butylphosphonate	14	6173-G1		0.00700			4.54%
48	Dibutyl butylphosphonate	16	6173-H2	0.00020	0.00700	2.83%	YES	4.54%
51	Pyridine	2	6172-A1	0.00157	1.00000	0.157%		0.03%
51	Pyridine	16	6172-H1	0.00139	1.00000	0.139%		0.03%
51	Pyridine	2	6172-A2	0.00024	1.00000	0.024%	YES	0.03%
51	Pyridine	4	6172-B1	0.00025	1.00000	0.025%	YES	0.03%
51	Pyridine	6	6172-C1	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	8	6172-D1	0.00024	1.00000	0.024%	YES	0.03%
51	Pyridine	10	6172-E1	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	12	6172-F1	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	14	6172-G1	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	16	6172-H2	0.00023	1.00000	0.023%	YES	0.03%
51	Pyridine	2	6173-A1		1.00000			0.03%
51	Pyridine	16	6173-H1	0.00044	1.00000	0.044%		0.03%
51	Pyridine	2	6173-A2		1.00000			0.03%
51	Pyridine	4	6173-B1	0.00032	1.00000	0.032%	YES	0.03%
51	Pyridine	6	6173-C1	0.00032	1.00000	0.032%	YES	0.03%
51	Pyridine	8	6173-D1	0.00033	1.00000	0.033%	YES	0.03%
51	Pyridine	10	6173-E1	0.00032	1.00000	0.032%	YES	0.03%
51	Pyridine	12	6173-F1	0.00032	1.00000	0.032%	YES	0.03%
51	Pyridine	14	6173-G1	0.00031	1.00000	0.031%	YES	0.03%
51	Pyridine	16	6173-H2	0.00031	1.00000	0.031%	YES	0.03%
52	2,4-Dimethylpyridine	2	6172-A1	0.00024	0.50000	0.047%	YES	0.06%
52	2,4-Dimethylpyridine	16	6172-H1	0.00028	0.50000	0.056%	YES	0.06%
52	2,4-Dimethylpyridine	2	6172-A2	0.00026	0.50000	0.053%	YES	0.06%
52	2,4-Dimethylpyridine	4	6172-B1	0.00027	0.50000	0.053%	YES	0.06%
52	2,4-Dimethylpyridine	6	6172-C1	0.00024	0.50000	0.049%	YES	0.06%
52	2,4-Dimethylpyridine	8	6172-D1	0.00026	0.50000	0.051%	YES	0.06%
52	2,4-Dimethylpyridine	10	6172-E1	0.00025	0.50000	0.050%	YES	0.06%
52	2,4-Dimethylpyridine	12	6172-F1	0.00025	0.50000	0.049%	YES	0.06%
52	2,4-Dimethylpyridine	14	6172-G1	0.00025	0.50000	0.049%	YES	0.06%
52	2,4-Dimethylpyridine	16	6172-H2	0.00025	0.50000	0.049%	YES	0.06%
52	2,4-Dimethylpyridine	2	6173-A1		0.50000			0.06%
52	2,4-Dimethylpyridine	16	6173-H1	0.00020	0.50000	0.041%	YES	0.06%
52	2,4-Dimethylpyridine	2	6173-A2		0.50000			0.06%
52	2,4-Dimethylpyridine	4	6173-B1	0.00021	0.50000	0.042%	YES	0.06%
52	2,4-Dimethylpyridine	6	6173-C1	0.00021	0.50000	0.041%	YES	0.06%
52	2,4-Dimethylpyridine	8	6173-D1	0.00021	0.50000	0.042%	YES	0.06%
52	2,4-Dimethylpyridine	10	6173-E1	0.00021	0.50000	0.041%	YES	0.06%
52	2,4-Dimethylpyridine	12	6173-F1	0.00020	0.50000	0.041%	YES	0.06%
52	2,4-Dimethylpyridine	14	6173-G1	0.00020	0.50000	0.040%	YES	0.06%
52	2,4-Dimethylpyridine	16	6173-H2	0.00020	0.50000	0.040%	YES	0.06%

Appendix E

Plots of Other COPCs with Significant (2–10% of OEL) Detected Values

Appendix E

Plots of Other COPCs with Significant (2–10% of OEL) Detected Values

1,3-Butadiene *(see Figure E.1)* **–** The detection limit (DL) for 1,3-Butadiene corresponds to ~2.4% of the OEL for the SCOTT 7422-SD1 cartridge and 2.6% of the OEL for the SCOTT 7422-SC1. All inlet and outlet concentrations for the two different respirator cartridges were <10% of the OEL, specifically <2.6% of the OEL. No evidence of breakthrough is observed in the data.

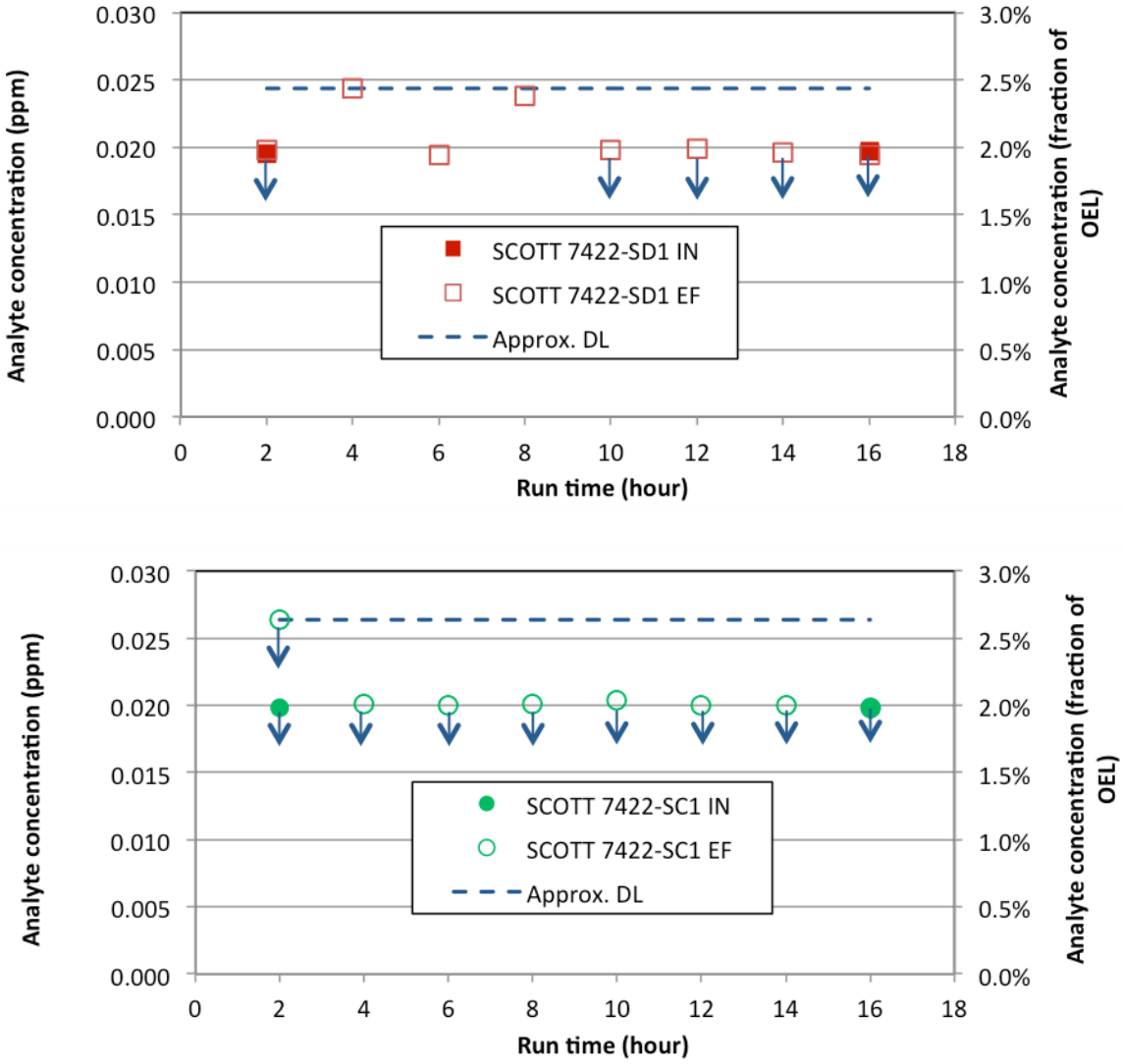

Figure E.1. Plot of Measured 1,3-Butadiene Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or reporting limit (RL).

Formaldehyde *(see Figure E.2)* – The DL for formaldehyde is ~0.61% of its OEL. All inlet and outlet values measured for the two respirator cartridges were <10% of the OEL; specifically <5.2%. Inlet values for both respirator cartridges ranged between 1.7% and 5.2% of the OEL. The outlet measurements for both respirators were greater than the DL but <10% of the OEL for the early readings but decreased with time (like the inlet values). The latter outlet measurements for both cartridges were all less than the DL. This same trend was observed in prior tank analyses, suggesting possible environmental background interference. Nevertheless, more measurements are recommended, with higher inlet concentrations, to confirm this conclusion.

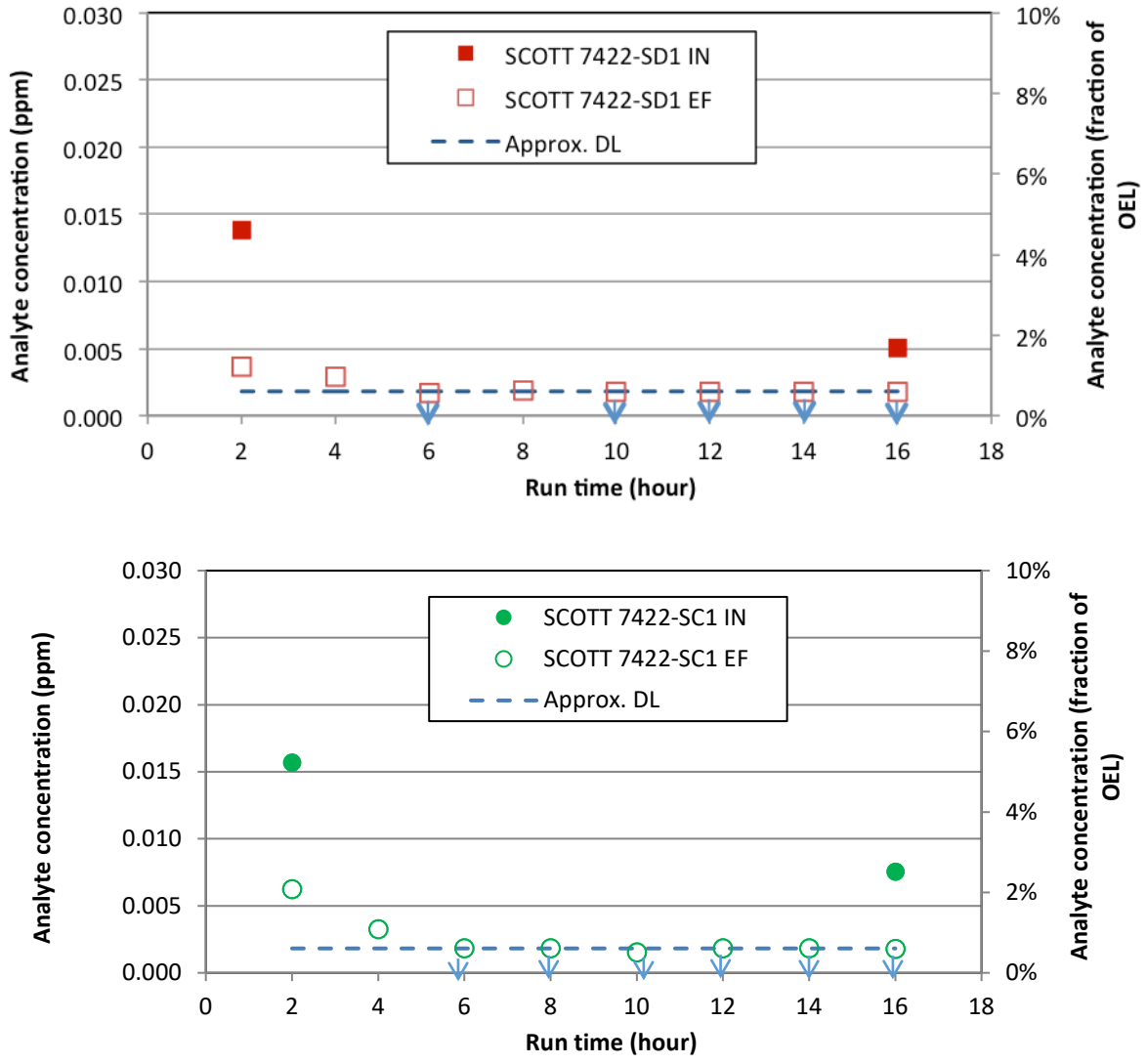

Figure E.2. Plot of Measured Formaldehyde Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

Furan *(see Figure E.3)* – The DL for furan corresponds to ~0.9% of its OEL. All inlet and outlet values measured between the two respirator cartridges were <10% of the OEL; specifically <5%. The inlet values for both respirator cartridges ranged from 2.7% to 4.8% of the OEL. Outlet measurements for both respirator cartridges were less than the DL, with the exception of several measurements for the SCOTT 7422-SC1 cartridge that were slightly greater than the DL. The maximum of these values, occurring at the end of the test, was 1.3% of the OEL. This could suggest some breakthrough for that cartridge although the measurement variability is fairly consistent for furans. More measurements are recommended, with higher inlet concentrations, to better determine the behavior. Still, all of the measured inlet and outlet values were <5% of the OEL.

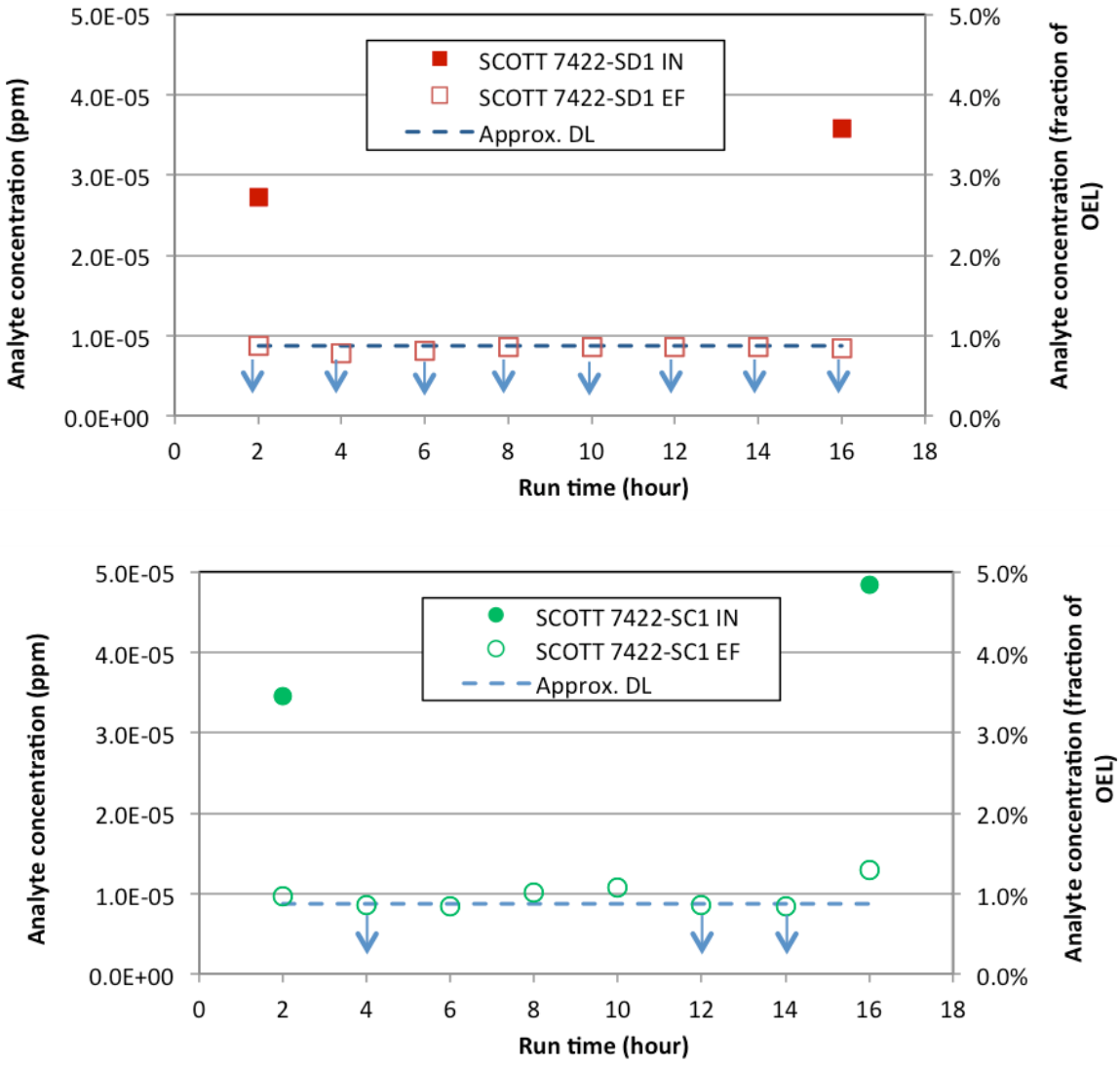

Figure E.3. Plot of Measured Furan Concentrations before the Inlets and after the Outlets of the two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2,3-Dihydrofuran *(see Figure E.4)* **–** The DL for 2,3-Dihydrofuran corresponds to ~1.8% of the OEL. Two initial inlet concentrations for the two different respirator cartridges had measurements above the DL (4.2% and 2.0% of the OEL, respectively). All other measurements were below the DL for 2,3-Dihydrofuran, with the exception of one outlet value for SCOTT 7422-SC1 during the 8-to-10-hour period (2.6% of the OEL). This elevated value could be due to measurement error. No evidence of breakthrough is observed in the data.

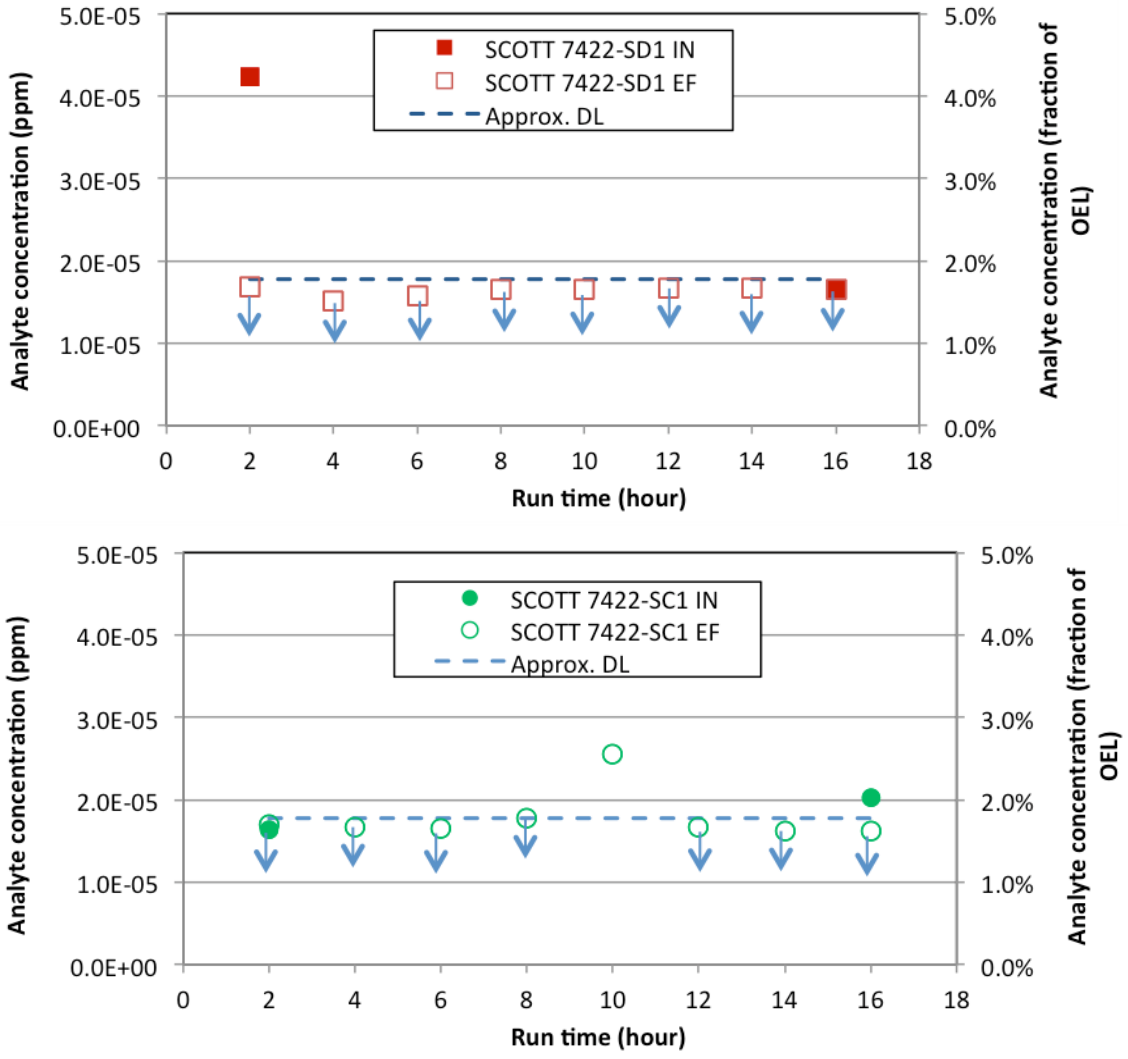

Figure E.4. Plot of Measured 2,3-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2,5-Dihydrofuran *(see Figure E.5)* **–** The DL for 2,5-Dihydrofuran corresponds to ~2.2% of the OEL. All of the inlet and outlet concentrations were below the DL, with two exceptions—one outlet value for the SCOTT 7422-SD1 cartridge during the 8-to-10 hour period (2.4% of the OEL) and one outlet value for SCOTT 7422-SC1 during the 6-to-8-hour period (3.8% of the OEL). These elevated values could be due to measurement error. No evidence of breakthrough is observed in the data.

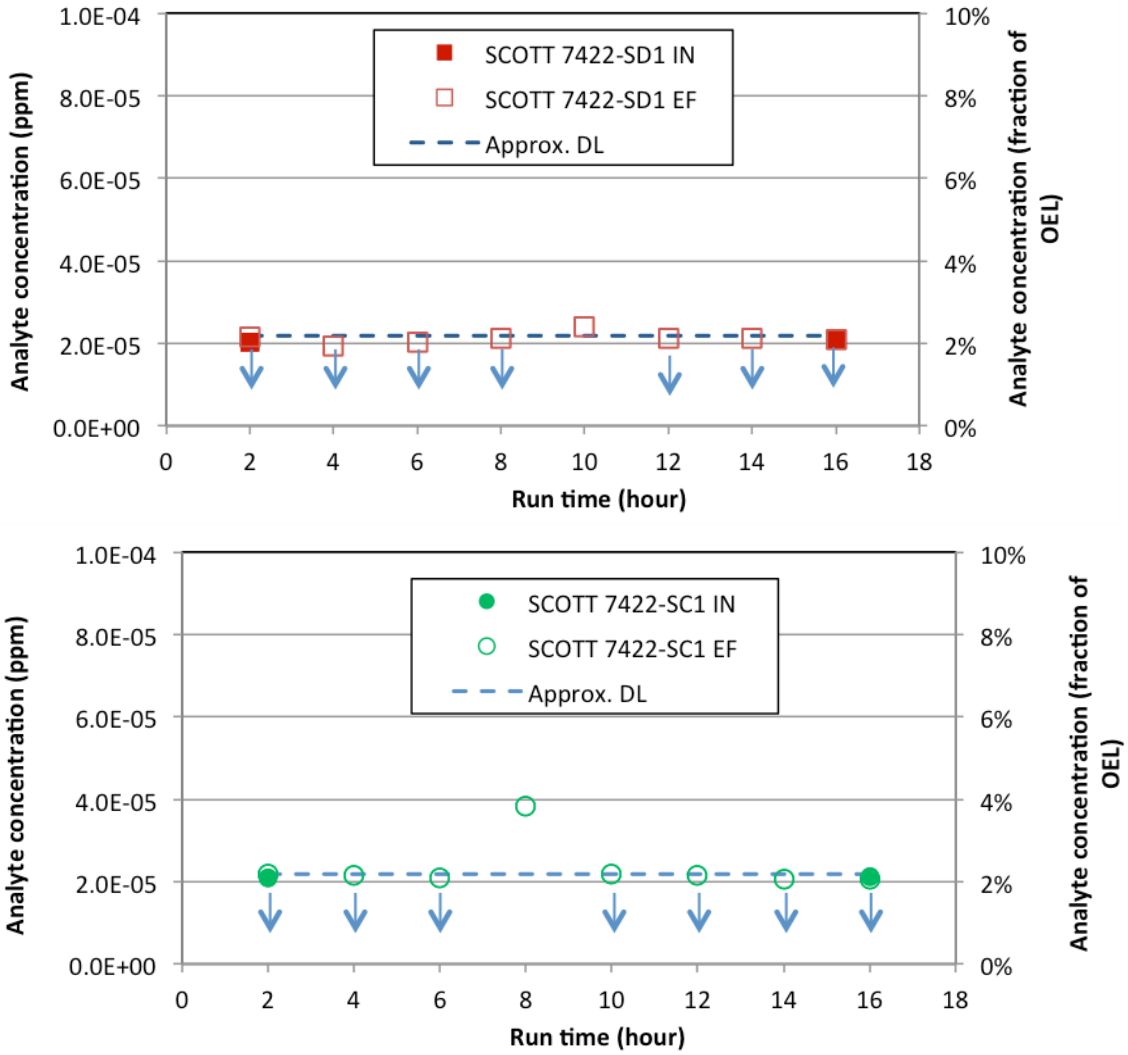

Figure E.5. Plot of Measured 2,5-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2-Methylfuran *(see Figure E.6)* – The DL for 2-Methylfuran corresponds to ~1.9% of the OEL. All inlet values were less than the DL. All outlet measurements were below the DL, with the exception of one outlet value for SCOTT 7422-SD1 during the 8-to-10-hour period (2.1% of the OEL). This elevated value could be due to measurement error. No evidence of breakthrough is observed in the data.

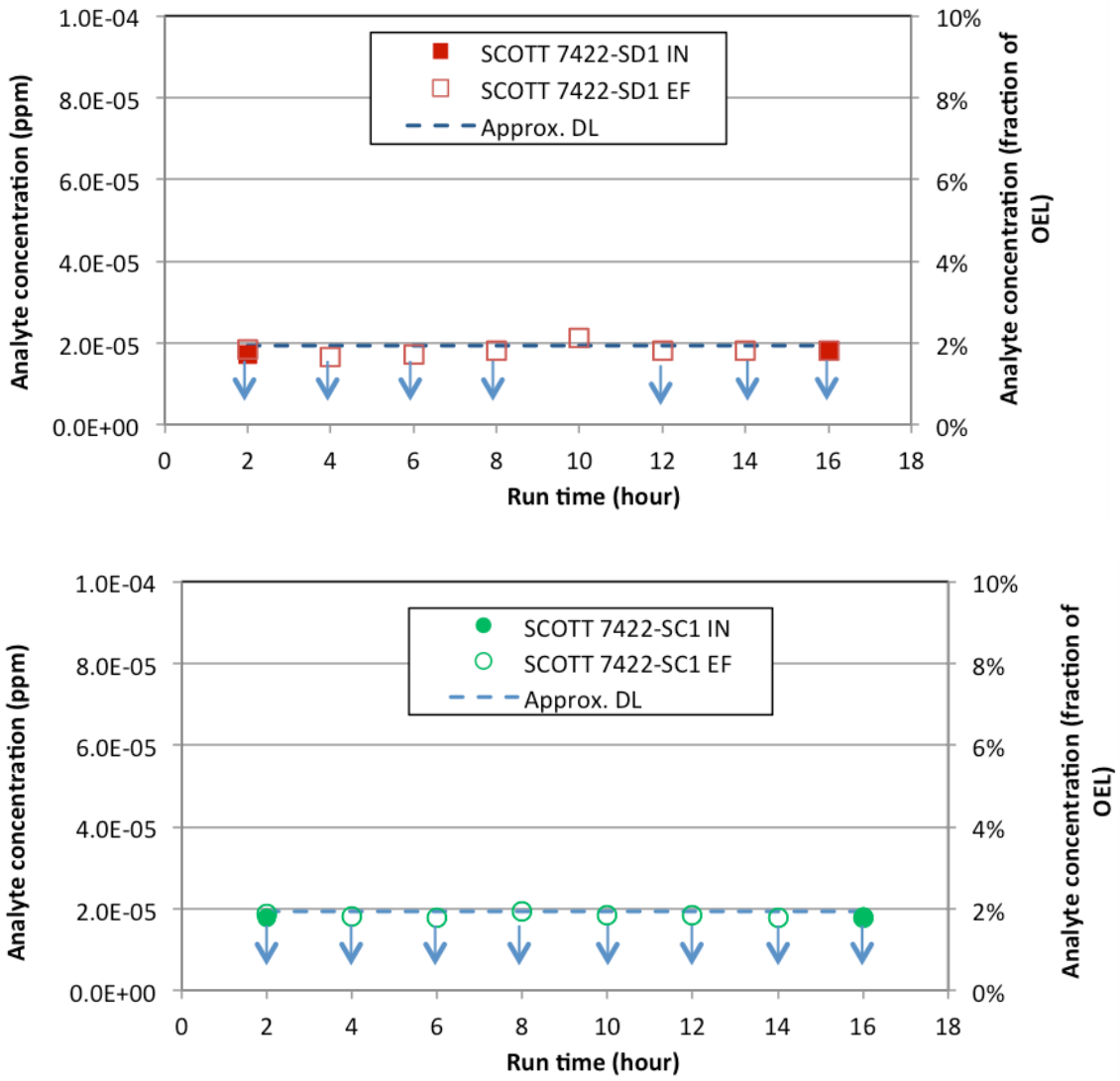

Figure E.6. Plot of Measured 2-Methylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2,5-Dimethylfuran *(see Figure E.7)* – The DL for 2,5-Dimethylfuran corresponds to ~3.1% of the OEL. All inlet and outlet values were less than DL. No evidence of breakthrough is observed in the data.

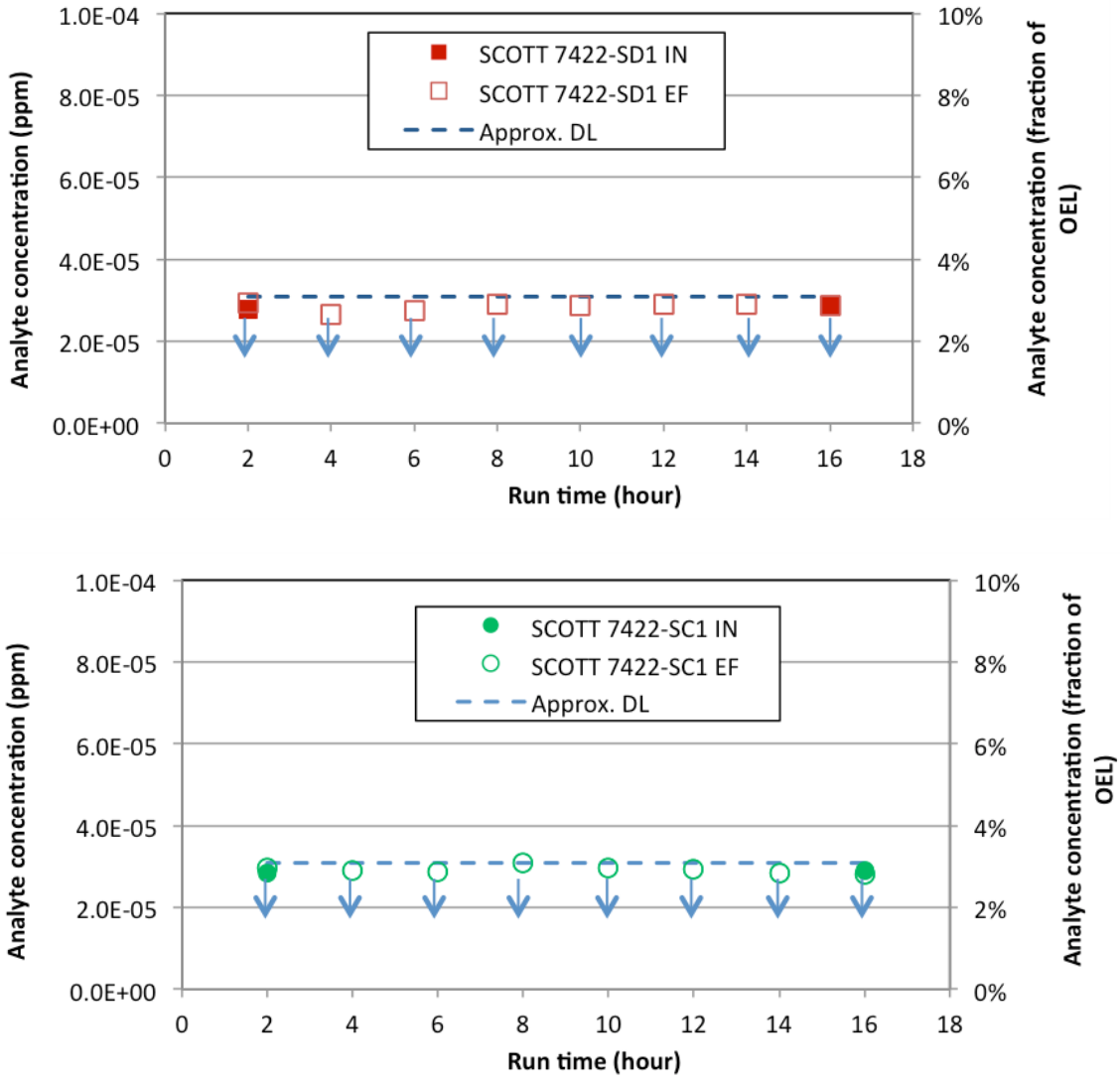

Figure E.7. Plot of Measured 2,5-Dimethylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2-Pentylfuran *(see Figure E.8)* – The DL for 2-Pentylfuran corresponds to ~1.7% of the OEL. All values (inlet and outlet) were <10% of the OEL; specifically <3%. Several inlet and outlet values were greater than the DL, but all of these were <2.7% of the OEL. One elevated outlet reading was observed for SCOTT 7422-SC1 during the 8-to-10-hour period (2.7% of the OEL). This value could be due to measurement error. Thus, there was no evidence of breakthrough is observed in the data.

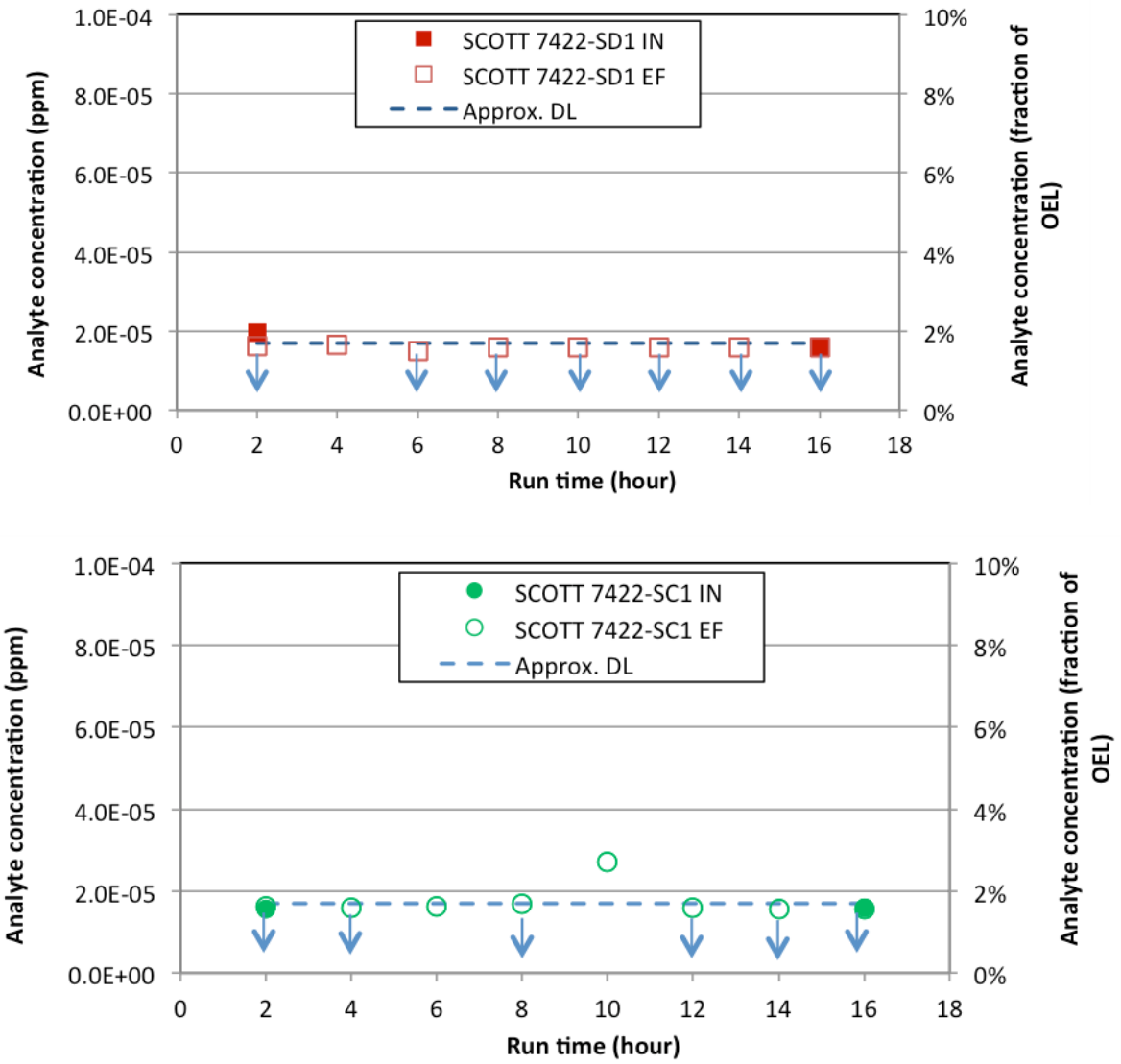

Figure E.8. Plot of Measured 2-Pentylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2-Propylfuran *(see Figure E.9)* – The DL for 2-Propylfuran corresponds to ~2.8% of the OEL. All values (inlet and outlet) were <10% of the OEL; specifically <4%. All of the measured inlet and outlet values from both cartridges were less than the DL, except for the last inlet concentration for SCOTT 7422-SD1 (3.4% of the OEL). Thus, there was no evidence of breakthrough observed in the data.

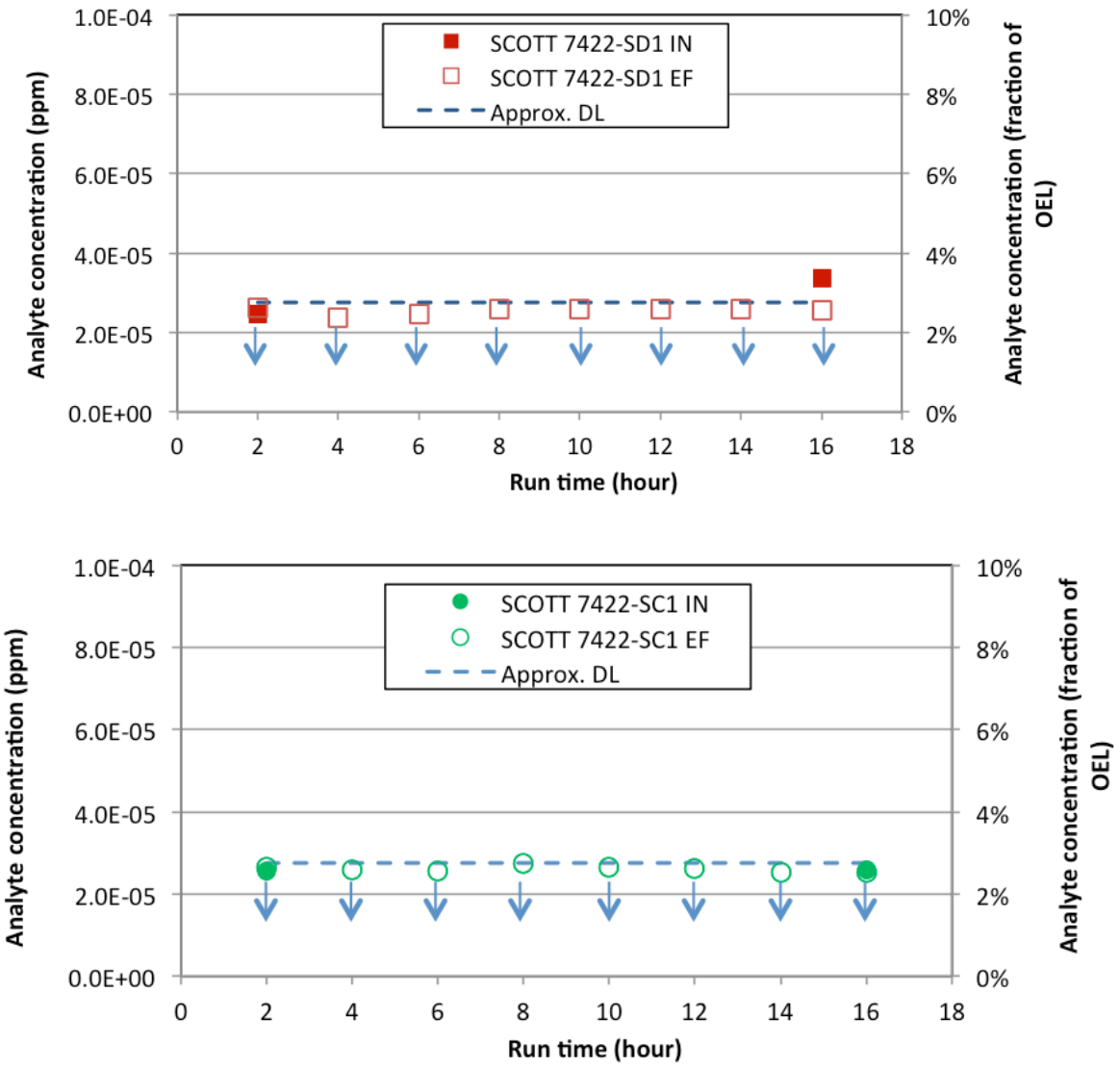

Figure E.9. Plot of Measured 2-Propylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

N-Nitrosomorpholine *(see Figure E.10)* – The DL for N-Nitrosomorpholine corresponds to ~3.3% of the OEL. All the inlet and outlet values for SCOTT 7422-SD1 were below the DL. Both the inlet concentrations for SCOTT 7422-SC1 were greater than the DL (7.2% and 8.0%, respectively); however, none of the corresponding outlet measurements were greater than the DL. Therefore, there was no evidence of breakthrough over the measured time period for either cartridge.

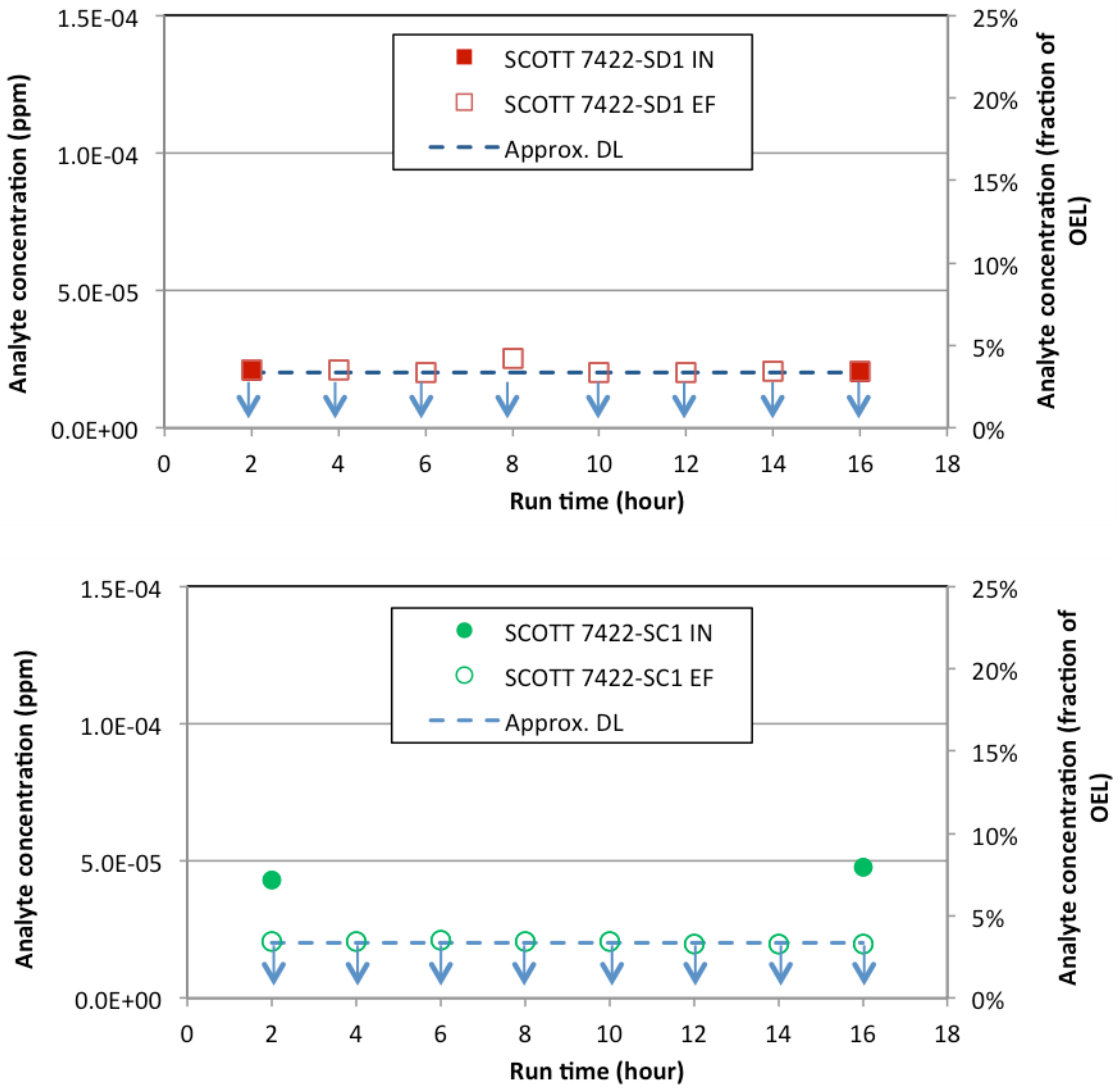

Figure E.10. Plot of Measured N-Nitrosomorpholine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

Dibutyl butylphosphonate *(see Figure E.11)* – The DL for Dibutyl butylphosphonate corresponds to ~4.5% of the OEL. Two initial inlet concentrations for the SCOTT 7422-SD1 were similar (1.4% and 1.3% of the OEL, respectively) and are less than the DL; however, the two inlet concentrations for the SCOTT 7422-SC1 cartridge were a bit scattered but are less than the DL (2.4% and 4.5% of the OEL, respectively). All outlet values were less than the DL; therefore, no evidence of breakthrough is observed in the data.

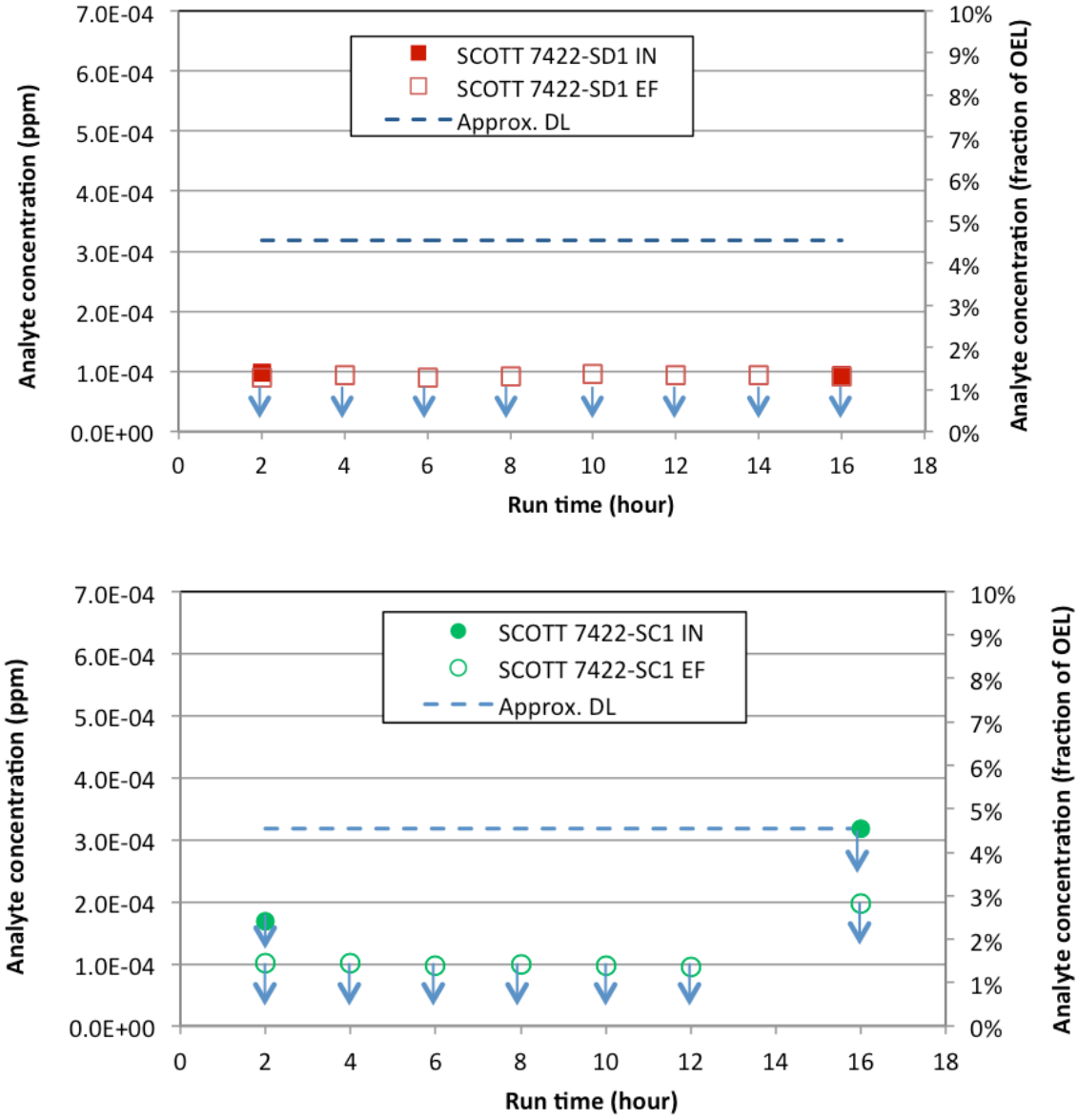

Figure E.11. Plot of Measured Dibutyl butylphosphonate Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

Appendix F

Historical Data Comparison

Appendix F

Historical Data Comparison

F.1 Data Sources

Headspace-characterization data and Industrial Hygiene (IH) data—hereafter referred to as "TWINS HS" and "TWINS IH"—were obtained from the Tank Characterization Database via the Tank Waste Information Network System (TWINS). All vapor analysis results for tank 241-A-101 (A-101) and its exhaust system were obtained via a TWINS query on June 20, 2016, for TWINS HS,[18] and another query on October 7, 2016, for TWINS IH. More recent headspace data were also obtained from the Site-Wide Industrial Hygiene Database (SWIHD) by two queries. The first query, on July 12, 2016, contained all data loaded as of that date. The second query contained all data with survey dates between May 1, 2016, and October 7, 2016. This latter data set was used to update and supplement the former, producing a set referred to as "SWIHD HS."

TWINS HS and TWINS IH data were eliminated from consideration if they met the following criteria:

- Quality Assurance samples (blanks, laboratory control samples, or spikes)
- Marked as suspect (Data Qualifier flag S)
- Associated with a contaminant in a blank, trip blank, or field blank (Data Qualifier flags B, T, or F)
- A laboratory control sample that was out of range (Data Qualifier flag a)
- An excessive relative percent difference (Data Qualifier flag c)
- Marked with a laboratory-defined flag whose meaning was not generically defined and might indicate a serious data-quality issue (Data Qualifier flags L or Y).

Flags a, c, and L were found only in the TWINS IH database, not in TWINS HS.

The exclusions for the SWIHD HS data set were similar:

- Having a laboratory control sample that was out of range (flag a)
- Associated with a contaminant in a blank (flags b or B)
- Having an excessive relative percent difference or relative standard deviation (flags c or d)
- Having an excessive difference between the sample result and its serial dilution (flag e)
- Having a failed mass spectrometer reading on the sample but not on its serial dilution (flag f)
- Marked with a laboratory-defined flag whose meaning was not generically defined and might indicate a serious data-quality issue (flags L or Y).

[18] 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 (CAS) number followed by M, the molecular weight of the identified chemical was added to the data record, the CAS number was used for the Chemical ID, and the concentration expressed in parts per million (absent from the downloaded database) was calculated from the concentration in milligrams per cubic meter at 25°C and the molecular weight.

A number of chemicals in the TWINS IH data set had "needs conversion" notes in the concentration (mg/m^3 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,[19] except that measurements that were non-reports—less than the reporting limit (RL) for the analyte—were excluded in PNNL-25880 and were not excluded in this study.

For comparison to cartridge tests that were made using a gas stream from the A-101 headspace, only headspace measurements were appropriate. This required no scrutiny for the TWINS HS or SWIHD HS databases because they were headspace only for A Farm tanks, but the TWINS IH database required sorting so that only headspace data were used. Almost all A Farm data in the TWINS IH database were attributed to individual tank locations, although three rows had locations of "Inside Farm." Only data that listed A-101 as a location were used. All of these had Survey Titles that included phrases such as "Breather Filter Sampling," or "Headspace." Because the location was specified as A-101 and the Survey Title all referred to headspace or breather filter sampling, all of the TWINS IH A-101 data were considered to be from tank headspace.

Maximum and average[20] headspace concentrations were found for each analyte for the combined TWINS IH and SWIHD HS databases.[21,22] These maxima and averages are given in Table F.1,[23] together with Occupational Exposure Limits (OELs) and counts of the number of samples. The notation "n/a" is used where there were no measurements of the analyte.

Because the TWINS HS data were older, they were considered less representative of the vapors present during cartridge testing, and the default approach was to omit them from calculations. However, in some cases, the maximum and average for an analyte were considerably different if they were determined from a combination of all three databases. When this was the case, results for the three-database combination

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[19] Hoppe, EW, LA Mahoney, J Cole, and KS Rohlfing. 2016. *Hanford Tank Vapors COPCs Update*. PNNL-25880, Pacific Northwest National Laboratory, Richland, Washington.

[20] Arithmetic average.

[21] The A-101 data in the SWIHD HS database were for dates between July 17, 2015, and June 1, 2016.

[22] This evaluation used the concentration data in SWIHD HS and converted them to %OEL, rather than directly using the %OEL data in SWIHD HS. Although this approach was consistent with the methods used on the other two data sets, there are cases where it gave a %OEL value smaller than that found in the SWIHD database. This difference occurs because concentrations in SWIHD HS may be truncated to one or two significant figures, while the %OEL values in SWIHD HS are calculated from concentrations before truncation. The difference between %OEL based on truncated and non-truncated concentrations is small enough to have no effect on conclusions about whether cartridge maxima are consistent with historical maxima.

[23] All % OEL values were calculated from concentration data that had been rounded to a minimum of three significant figures.

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 difference of a factor of 3 or more, in either direction, between the value obtained from the two-database combination and that from the three-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 less than RL historical data be recognized. To do this, it was assumed that all of the non-reports in the databases had concentrations equal to the measurements' RLs. Then the following rules were applied:

1. If a maximum value was a non-report, it was marked as "< RL" in the table.
2. If all the data contributing to an average were non-reports, the average was marked as "< RL".
3. If the presence of non-reports in an average caused it to be more than a factor of two different, in either direction, from the value it would have had if only the reported concentrations were averaged, the average was marked with an asterisk ("*").

Table F.1. COPC Comparison to Historical A-101 Measurements

	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[1]				Measurements in this study			
						Number of Values	Maximum Value	Average Value	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[13] (%OEL)
Inorganic														
1	Ammonia	7664-41-7	-28	Poling et al., 2007[2]	25 ppm	15 *21*	148 *800*	58.7* *257*	592% *3200%*	235%* *1028%*	484%	401%	348%	2.55% (RL)
2	Nitrous Oxide	10024-97-2	-127	Poling et al., 2007	50 ppm	1 *20*	<RL *250*	<RL *158*	<RL *500%*	<RL *316%*	Not Measured			
3	Mercury	7439-97-6	674	Poling et al., 2007	0.025 mg/m^3	15	0.011	0.00482	44%	19%	33.8%	31.7%	<RL	7.38% (RL)
Hydrocarbons														
4	1,3-Butadiene	106-99-0	24	Poling et al., 2007	1 ppm	37	0.512	0.0287*	51%	2.9%*	<RL	<RL	2.44%	2.44-2.64% (RL)
5	Benzene	71-43-2	176	Poling et al., 2007	0.5 ppm	37	0.0085	0.00452	1.7%	0.9%	0.13%	0.12%	0.03%	0.03%
6	Biphenyl	92-52-4	491	Poling et al., 2007	0.2 ppm	26	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.29%
Alcohols														
7	1-Butanol	71-36-3	243	NIOSH	20 ppm	23	0.044	0.0168	0.22%	0.08%	0.13%	0.12%	<DL	0.004%
8	Methanol	67-56-1	148	Poling et al., 2007	200 ppm	6	0.43	0.251	0.22%	0.13%	Not Measured			
Ketones														
9	2-Hexanone	591-78-6	262	NIOSH	5 ppm	37	<RL	0.00421*	<RL	0.08%*	0.02%	<DL	<DL	0.020%
10	3-Methyl-3-butene-2-one	814-78-8	208	CRC Handbook 1989[4]	0.02 ppm	0	n/a	n/a	n/a	n/a	Not detected - TIC[12]			
11	4-Methyl-2-hexanone	105-42-0	282	Predicted ACD/Labs[5]	0.5 ppm	25	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.03%
12	6-Methyl-2-heptanone	928-68-7	333	Predicted ACD/Labs	8 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
13	3-Buten-2-one	78-94-4	179	CRC Handbook 1989	0.2 ppm	35	<RL	0.00509*	<RL	2.5%*	0.38%	0.33%	0.64%	0.09%
Aldehydes														
14	Formaldehyde	50-00-0	-6	NIOSH	0.3 ppm	15	0.024	0.00726	8.0%	2.4%	5.2%	3.5%	2.1%	0.61% (RL)
15	Acetaldehyde	75-07-0	69	NIOSH	25 ppm	24	0.142	0.0308	0.57%	0.12%	0.22%	0.20%	0.13%	0.0055% (RL)
16	Butanal	123-72-8	167	Oxford safety data[6]	25 ppm	50	0.015	0.00542	0.06%	0.02%	0.008%	0.006%	0.002%	0.001%
17	2-Methyl-2-butenal	1115-11-3	244	United Nations[7]	0.03 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
18	2-Ethyl-hex-2-enal	645-62-5	347	Predicted ACD/Labs	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			

Table F.1. COPC Comparison to Historical A-101 Measurements (continued)

COPC Number and Name		CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[1]					Measurements in this study			
						Number of Values	Maximum Value	Average Value	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[13] (%OEL)
Furans														
19	Furan	110-00-9	88	Poling et al., 2007	1 ppb	40	<RL	3.17	<RL	317%	4.8%	3.7%	1.3%	0.87%
20	2,3-Dihydrofuran	1191-99-7	130	Alfa Aesar[8]	1 ppb	13	<RL	<RL	<RL	<RL	4.2%	2.4%	2.6%	1.8%
21	2,5-Dihydrofuran	1708-29-8	152	Aldrich[9]	1 ppb	40	<RL	<RL	<RL	<RL	<DL	<DL	3.8%	2.2%
22	2-Methylfuran	534-22-5	147	Oxford safety data	1 ppb	39	<RL	<RL	<RL	<RL	<DL	<DL	2.1%	1.9%
23	2,5-Dimethylfuran	625-86-5	199	Alfa Aesar	1 ppb	13	<RL	<RL	<RL	<RL	<DL	<DL	<DL	3.1%
24	2-Ethyl-5-methylfuran	1703-52-2	246	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not detected - TIC[12]			
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-Pentylfuran	3777-69-3	333	Alfa Aesar	1 ppb	13	<RL	<RL	<RL	<RL	2.0%	1.7%	2.7%	1.7%
28	2-Heptylfuran	3777-71-7	410	Alfa Aesar	1 ppb	13	<RL	<RL	<RL	<RL	1.6%	1.3%	1.8%	1.1%
29	2-Propylfuran	4229-91-8	231	Alfa Aesar	1 ppb	13	<RL	<RL	<RL	<RL	3.4%	<DL	<DL	2.8%
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-Oxo-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-oxoheptyl)furan	51595-87-0	Not available	Not available	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Phthalates														
33	Diethylphthalate	84-66-2	563	NIOSH	5 mg/m^3	26	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.13%

Table F.1. COPC Comparison to Historical A-101 Measurements (continued)

	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[1]				Measurements in this study			
						Number of Values	Maximum Value	Average Value	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[13] (%OEL)
Nitriles														
34	Acetonitrile	75-05-8	179	NIOSH	20 ppm	35	5.16	0.879	26%	4.4%	0.69%	0.46%	12.4%	0.001%
35	Propanenitrile	107-12-0	207	NIOSH	6 ppm	27	<RL	0.00393	<RL	0.07%	0.07%	0.06%	0.04%	0.004%
36	Butanenitrile	109-74-0	244	NIOSH	8 ppm	25	0.041	0.00824*	0.51%	0.10%*	0.04%	0.03%	<DL	0.003%
37	Pentanenitrile	110-59-8	284	Alfa Aesar	6 ppm	27	<RL	<RL	<RL	<RL	0.015%	0.010%	0.006%	0.004%
38	Hexanenitrile	628-73-9	328	Predicted ACD/Labs	6 ppm	27	<RL	<RL	<RL	<RL	<DL	<DL	0.003%	0.003%
39	Heptanenitrile	629-08-3	368	Alfa Aesar	6 ppm	0	n/a	n/a	n/a	n/a	Not detected - TIC[12]			
40	2-Methylene butanenitrile	1647-11-6	Not available	Not available	0.3 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
41	2,4-Pentadienenitrile	1615-70-9	278	Predicted ACD/Labs	0.3 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Amines														
42	Ethylamine	75-04-7	62	Poling et al., 2007	5 ppm	17	<RL	<RL	<RL	<RL	0.34%	0.15%	<RL	0.10% (RL)
Nitrosamines														
43	N-Nitrosodimethylamine	62-75-9	306	NIOSH	0.3 ppb	15	1.25	0.372*	417%	124%*	224%	157%	<RL	8-12% (RL)
44	N-Nitrosodiethylamine	55-18-5	351	Oxford safety data	0.1 ppb	15	<RL	0.0725	<RL	73%	74%	50%	<RL	28.7% (RL)
45	N-Nitrosomethylethylamine	10595-95-6	310	Predicted ACD/Labs	0.3 ppb	15	<RL	<RL	<RL	<RL	<RL	<RL	<RL	11.1% (RL)
46	N-Nitrosomorpholine	59-89-2	435	Oxford safety data	0.6 ppb	15	0.143	0.0671*	24%	11%*	8.0%	5.5%	<RL	3.3% (RL)
Organophosphates														
47	Tributyl phosphate	126-73-8	552	NIOSH	0.2 ppm	26	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.23%
48	Dibutyl butylphosphonate	78-46-6	602	Predicted ACD/Labs	0.007 ppm	26	<RL	<RL	<RL	<RL	<DL	<DL	<DL	4.5%
Halogenated														
49	Chlorinated Biphenyls	Varies	Varies	Varies	1 mg/m^3	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
50	2-Fluoropropene	1184-60-7	-11	SynQuest[11]	0.1 ppm	1	<RL	<RL	<RL	<RL	Not Detected - TIC			
Pyridines														
51	Pyridine	110-86-1	240	NIOSH	1 ppm	40	<RL	0.00518*	<RL	0.52%*	0.16%	0.11%	<RL	0.03% (RL)
52	2,4-Dimethylpyridine	108-47-4	318	Alfa Aesar	0.5 ppm	39	<RL	<RL	<RL	<RL	<RL	<RL	<RL	0.06% (RL)

Table F.1. COPC Comparison to Historical A-101 Measurements (continued)

	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[1]					Measurements in this study			
						Number of Values	Maximum Value	Average Value	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[13] (%OEL)
Organonitrites														
53	Methyl nitrite	624-91-9	10	Oxford safety data	0.1 ppm	0 *3*	n/a *0.43*	n/a *0.318*	n/a *430%*	n/a *318%*	Not detected - TIC[12]			
54	Butyl nitrite	544-16-1	172	Alfa Aesar	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Organonitrates														
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	0.02 ppm	2	<RL	<RL	<RL	<RL	Not Detected - TIC			

[1] 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 limit.

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.

[2] Poling, B. E.; Prausnitz, J. M.; O'Connell, J. P. The Properties of Gases and Liquids. McGraw Hill, 2007.

[3] NIOSH: National Institute of Occupational Safety and Health

[4] CRC Handbook of Chemistry and Physics, CRC Press, 1989.

[5] ACD/Labs software http://www.acdlabs.com/products/percepta/predictors.php

[6] Oxford safety data from The Physical and Theoretical Chemistry Laboratory at Oxford University

[7] Food and Agriculture Organization of the United Nations

[8] Alfa Aesar: https://www.alfa.com/

[9] Aldrich: https://www.sigmaaldrich.com/

[10] OSHA: Occupational Safety and Health Administration

[11] SynQuest: http://synquestlabs.com/product/id/8330.html

[12] TIC: Tentatively Identified Compounds that were not observed in this study using the specified analytical methods.

[13] 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.

F.2 A-101 Headspace: Comparison with Historical Data

The maximum and average COPC concentrations measured during cartridge testing were compared to the maximum and average historical concentrations, and where differences were found, historical data were examined for explanations in the type or circumstances of sampling.

Much of the waste in A-101 was transferred out during the May 2000–July 2003 period. Hence, all data predating July 2003 are considered inappropriate for comparison to the July 2016 cartridge test data. This includes all data from the TWINS HS database from which the latest A-101 data were taken in September 2002. Earlier data do not appear in Table C.1, although they do appear in the A-101 individual test report.

The headspaces of all six tanks in the A Tank Farm are connected by overflow cascade lines and a ventilation header (Huckaby et al. 2004). Therefore, waste disturbances in any A Farm tank could propagate changes in vapor concentration to the A-101 headspace. However, there have been no such waste disturbances in the post-2003 period. All post-2003 A-101 vapor data were taken under non-disturbance conditions.

The larger discrepancies, or apparent discrepancies, between cartridge inlet and historical concentrations are discussed in the following sections.

F.2.1 Ammonia

The maximum cartridge inlet concentration of 484% of the OEL is low compared to the historical maximum concentration in TWINS HS (i.e., 800 ppm [3200% of the OEL). However, this measurement was made in 1995 and is not pertinent to the waste that was present during cartridge testing in 2016. The maximum historical concentration measured in data sets other than TWINS HS was 148 ppm (592% of the OEL), measured on July 17, 2015 (SWIHD HS). The cartridge-testing inlet concentration is close to and consistent with the historical maximum for more current conditions.

F.2.2 Nitrous Oxide

Nitrous oxide was not measured during cartridge testing. A number of measurements were found in the TWINS HS database, but all were taken in 1998 or earlier and are not a good match for the waste presently in the tank. Only one recent measurement was found in TWINS IH. This was a below-report with an RL of 1.9 ppm (<3.8% of the OEL), which was measured on July 28, 2005, at a breather filter.

F.2.3 1,3-Butadiene

The maximum cartridge inlet concentration was less than the RL (2.6% of the OEL) and <20% of the historical maximum of 0.512 ppm (51% of the OEL) measured on July 17, 2015 (SWIHD HS). There were no other post-2003 above-report data for the chemical; all other measurements were below the RL of 0.019 ppm (1.9% of the OEL). The cartridge inlet concentration is considered to be <20% of historical data[24].

[24] This section uses the thresholds from Appendix C in Freeman et.al. [19]. Discrepancies are discussed if the maximum historical concentration of a compound was >10% of the OEL and the maximum cartridge inlet concentration was <50% of the historical value. However, discrepancies are considered significant only if the maximum historical concentration was >10% of the OEL and the maximum cartridge inlet concentration is <20% of the historical value.

F.2.4 Furan

The maximum cartridge inlet concentration of 45.5% of the OEL (measured by the Carbotrap 300 TDU method) is much lower than the historical maximum, a June 1, 2016, below-report with an RL of 7.06 ppb (<706% of the OEL) that was found in the SWIHD HS database. It was also lower than the only above-report concentration in SWIHD HS, 1.75 ppb (175% of the OEL), which was measured in the headspace on July 17, 2015. There were no above-report concentrations in the TWINS IH database, and the only measurement in the TWINS HS database was a below-report from a sample taken in 2002, before the waste transfer from A-101 was complete. The cartridge inlet maximum concentration is between 20% and 50% of the historical above-report maximum and therefore is not considered significantly lower.

F.2.5 2,5-Dihydrofuran, 2-Methylfuran

For both these chemicals, the cartridge inlet concentration was below the detection limit, 26% of the OEL for 2,5-dihydrofuran and 15% OEL for 2-methylfuran. The concentrations were less than the below-report historical maxima that came from RLs that were 686% and 586% of the OEL for 2,5-dihydrofuran and 2-methylfuran, respectively. The high RLs for 2,5-dihydrofuran and 2-methylfuran come from SWIHD HS and are not unusually high for Carbotrap 300 TDU analyses. There were no above-report historical data, so no conclusion can be drawn about where the cartridge inlet concentrations lie with respect to historical data.

F.2.6 2,3-Dihydrofuran, 2,5-Dimethylfuran, 2-Pentylfuran, 2-Heptylfuran, 2-Propylfuran

For all of these chemicals, the cartridge inlet concentration (or its DL, for less than DL cases) is 5% of the OEL or less. The concentrations were less than the below-report historical maxima that came from RLs that were 15 to 36% of the OEL. There were no above-report historical data, so no conclusion can be drawn about where the cartridge inlet concentrations lie with respect to historical data.

F.2.7 Acetonitrile

The maximum cartridge inlet concentration of 0.69% of the OEL is less than the SWIHD HS historical maximum, 5.16 ppm (26% of the OEL) measured in 2015. There are a number of other historical measurements in SWIHD HS, all taken in 2015–2016, that are greater than 5× the maximum cartridge inlet concentration. The cartridge inlet concentration is <20% of historical data.

F.2.8 N-Nitrosomorpholine

The maximum cartridge inlet concentration of 8% of the OEL was less than the historical maximum concentration of 0.143 ppb (24% of the OEL). This measurement was in SWIHD HS. It was the only above-report in the databases and was taken on May 24, 2016. The maximum cartridge inlet concentration was <50% but >20% of the single above-report historical concentration, and therefore was not substantially lower than available historical data.

F.2.9 Dibutyl Butylphosphonate (DBBP)

The maximum cartridge inlet concentration of <4.5% of the OEL, which is below its DL, is low compared to the historical maximum concentration, a below-report datum with an RL of 0.002 ppm (<29% of the OEL). This was not an unusually high RL value in the 2015–2016 SWIHD HS database. There were no above-report historical data, so no conclusion can be drawn about where the cartridge inlet concentration lies with respect to historical data.

F.2.10 Methyl Nitrite

The cartridge inlet concentration was a non-detect—a Tentatively Identified Compound—while the historical maximum concentration was 0.43 ppm (430% of the OEL). Historical data were present only in the TWINS HS database, three measurements taken in 1995. Those measurements are not applicable because they were taken before waste removal during 2000–2003. There were no above-report historical data after 2003, so no conclusion can be drawn about where the cartridge inlet concentration lies with respect to historical data.

F.2.11 Methyl Isocyanate

This chemical was a Tentatively Identified Compound at the inlet in cartridge testing. There were only two historical concentrations, both below-report. The maximum had an RL of 0.00702 ppm (<35% of the OEL). Given the scarcity of data, no conclusion can be drawn about where the cartridge inlet concentration for this chemical lies with respect to historical data.

F.2.12 Summary of Historical Data for the A-101 Headspace

In summary, cartridge inlet concentrations for the A-101 headspace that were substantially lower than historical data can be described as follows:

- Differences arose from using historical data taken during disturbance for the historical maximum: none.
- Differences arose from using the RLs of below-report data for the historical maximum: none.
- Differences arose from using data for vapor produced by a no-longer-existing inventory for the historical maximum: ammonia.
- Differences could not be resolved because of the scarcity of non-disturbance above-report data: 2,3-dihydrofuran, 2,5-dihydrofuran, 2-methylfuran, 2,5-dimethylfuran, 2-heptylfuran, 2-pentylfuran, 2-propylfuran, dibutyl butylphosphonate, methyl nitrite, methyl isocyanate.
- Cartridge inlet concentrations were determined to be significantly lower than above-report historical concentrations: 1,3-butadiene, acetonitrile.

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