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

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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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 BY-108 on the Hanford Site. The Occupational Safety and Health Administration (OSHA) recognizes cartridge testing as a valid approach for establishing a cartridge change schedule.[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 assure measurement and/or control of the key variables OSHA identified as important to estimate cartridge service life, including temperature, humidity, COPC concentration, breathing rate, and cartridge adsorption capacity.

Testing was conducted over a period from July 15–17, 2016, using headspace vapors from Hanford tank BY-108 under static conditions fed to a respirator cartridge test stand developed by WRPS in collaboration with HiLine Engineering (Richland, Washington). Multipurpose respirator cartridges, SCOTT 7422-SD1 and SCOTT 7422-SC1 (SCOTT Safety, Monroe, North Carolina) were assessed on separate days with BY-108 headspace vapors. Sample media (sorbent tubes) were used to collect samples of the vapor stream entering and exiting the respirator cartridge and were subsequently analyzed for COPC concentrations. Pacific Northwest National Laboratory was tasked with conducting an independent analysis of the analytical results and making recommendations based on the results for respiratory cartridge performance and change-out frequency. Key conclusions from the assessment of the 59 COPCs in this study are described below:

- Based on measured cartridge inlet vapor concentrations from tank BY-108 headspace, Six COPCs - ammonia, 1,3-butadiene, furan[2], 2,5-dihydrofuran, N-nitrosodimethylamine (NDMA), and N-nitrosomethylethylamine (NMEA) exceeded their Occupational Exposure Limit (OEL).[3] Seven additional COPCs—mercury, 3-buten-2-one, 2,3-dihydrofuran, 2-methylfuran, 2-propylfuran, N-nitrosodiethylamine (NDEA), and N-nitrosomorpholine—had inlet concentrations greater than 10% of their corresponding OELs.
- Ammonia inlet concentrations during the testing reached 479 ppm or 1,915% of its OEL, comparable to BY-108 headspace measurements previously obtained.[4] Ammonia appeared to breakthrough above 10% of its OEL for both respirator cartridges (SCOTT 7422-SD1 and SCOTT 7422-SC1) quickly during testing (i.e., less than 2 hours). Direct reading instrument measurements taken at intervals

[1] "Adequate performance" refers to being below the breakthrough criteria used in this analysis. The breakthrough criteria for this analysis is having measured (above DL/RL limits) sustained cartridge outlet concentrations above 10% of the compound's OEL. 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] A re-evaluation of furan, 2,5-dihydrofuran, and 2-methylfuran results was performed using the Carbotrap 300 TDU after the original issue (Rev. 0) of this report. The re-evaluation is discussed in Freeman et.al. [20]. This revision incorporates the results from the *Assessment of the Use of Alternate Furan Measurements for Respirator Cartridge Performance Determinations* in Appendix G and the body of this report.

[3] OELs accepted for Hanford tank farm use are based on regulatory guidelines established by U.S. governmental agencies or national professional organizations (e.g., OSHA, NIOSH, American Conference of Governmental Industrial Hygienists), or if no U.S. OEL exists, standard toxicological practices are applied to develop OELs based upon the best available science. The OEL for NDMA and other nitrosamines was established in 2005 based on the MAK (Maximale Arbeitsplatzkonzentration) Commission standard adopted in Europe.

[4] Comparison was made to the most recent BY-108 sampling and analysis (2008–2009) available from the Site-Wide Industrial Hygiene Database at the time of this report.

during the first 90 minutes of testing indicate that breakthrough occurred after 40 minutes. This breakthrough is consistent with expectations, considering the high inlet concentrations.

- 1,3-Butadiene inlet measurements were lower than previous headspace measurements and appeared to exhibit breakthrough for both cartridges tested. Breakthrough above 10% of its OEL for the SCOTT 7422-SD1 cartridge was after 2 hours and for the SCOTT 7422-SC1 cartridge was after 4 hours.
- Furan inlet concentrations reached a maximum of 819% of the OEL when assessed using the Carbotrap 300 sorbent tube-derived data. Furan breakthrough above 10% of its OEL occurred after 6 hours for the SCOTT 7422-SD1 cartridge (maximum inlet 819% of the OEL), and after 8 hours for the SCOTT 7422-SC1 cartridge (maximum inlet 298% of the OEL). In comparison, ammonia breakthrough was observed in less than 2 hours.
- The maximum 2,5-Dihydrofuran inlet concentration reached 278% of the OEL when assessed using the Carbotrap 300 sorbent tube for the SCOTT 7422-SD1 cartridge test only. Breakthrough above 10% of its OEL occurred between 12 and 14 hours. All inlet and outlet concentrations were below DL for the SCOTT 7422-SC1 cartridge test, where no breakthrough was observed. In comparison, ammonia breakthrough was observed in less than 2 hours.
- NDMA and NMEA inlet concentrations reached 0.4 ppb or approximately 130% of their OELs. All outlet concentrations were less than their analytical reporting limit at approximately 12% and 9.9% of their OELs, respectively, indicating no breakthrough above 10% of its OEL at the measured levels for either cartridge during the testing period.
- Outlet concentrations for mercury, 3-buten-2-one and 2-methylfuran were above detection limits[1] (DL) for one or more measurements. Mercury outlet concentrations reached 13.5% of its OEL at the 16-hour time period on one cartridge, but were <DL for all other outlet measurements, indicating the potential beginning of breakthrough at the end of testing. Outlet measurements for the other COPCs never exceeded 10% of their OELs. In addition, outlet concentrations for 2,3-dihydrofuran, 2-propylfuran, NDEA, and N-nitrosomorpholine were all less than their DLs, indicating no breakthroughs above 10% of their OELs during the testing period for the cartridges used.

Based on the measurements taken for this study, breakthrough above 10% of their OELs occurred early in the test sequence for ammonia and 1,3-butadiene. The ammonia breakthrough was less than 2 hours for both cartridges tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Because outlet measurements from laboratory analysis are unavailable between time zero and 2 hours, and inlet ammonia concentrations exceed Centers for Disease Control and Prevention–National Institute for Occupational Safety and Health (CDC–NIOSH) recommendations for APR use,[2] identification of an acceptable service life is not possible or recommended for the use of these cartridges in similar concentration environments.

Breakthrough of all other COCPs occurred after ammonia breakthrough, indicating ammonia may be used as a leading indicator for estimating cartridge service life. Variations in humidity, temperature, or cartridge inlet concentration for any COPCs, compared to those measured in this 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.

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[1] The term "detection limit" is used here to refer either to an analytical reporting limit or a DL. 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.

[2] *CDC–NIOSH Pocket Guide to Chemical Hazards – Ammonia*. Available at https://www.cdc.gov/niosh/npg/npgd0028.html.

The *Overview of 2016 through 2018 Testing of Air-Purifying Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhausters* Freeman et.al. [20], provides additional information on the use of the cartridge testing results for the first 28 cartridge tests with the manufacturers service life models.

Revision History

Revision Number	Effective Date	Description of Change
0		Initial issue
1	July 2020	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), 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 versus 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 Freeman et al. [20][1] and Appendix G of this report. The values for furan, 2,5-dihydrofuran, and 2-methylfuran have been updated in this revision of the report.

[1] See Appendix F of Freeman CJ, J Liu, C Clayton, SK Nune, LA Mahoney, CL Bottenus, TM Brouns, MJ Minette, and P Humble. 2020. *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.

Acronyms and Abbreviations

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

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1.0 Introduction/Project Description

As the Tank Operations Contractor for U.S. Department of Energy operations at the Hanford site, Washington River Protection Solutions (WRPS) is responsible for managing highly radioactive wastes stored in tanks at Hanford. WRPS recently identified the need to test air-purifying respirator (APR) chemical cartridges commonly used at Hanford tank farms. 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 (COPCs) from any vapors exiting headspaces in the tanks. Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulations (CFR) 1910.134(d)(3)(iii)(b)(2) specifies that for protection against gases and vapors, employers shall implement a change schedule for cartridges to ensure that change-outs occur before the end of service life.[1-4] The change schedule can be based on objective information or data that ensures cartridge change-outs occur before the end of their service life.[2-5] The primary function of the WRPS APR Cartridge Test Program is to obtain objective data to determine service life schedules for the APR cartridges in use at Hanford tank farms. WRPS contracted Pacific Northwest National Laboratory (PNNL) to analyze the test data and offer an independent analysis and any recommendations. This report summarizes data analyses of cartridge testing on headspace vapors from the Hanford BY-108 single shell tank.

2.0 Regulatory Requirements

2.1 Background on Regulatory Requirements

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

Protective respirator cartridges are frequently used in workplaces with low contaminant concentrations, and where respirators provide essential protection for longer periods of time (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 SCBAs offers more protection, a tradeoff exists, particularly for SCBAs that employ a large, heavy (~30 pounds), back-mounted compressed air cylinder.[1]

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

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

- *Conduct experimental tests* – First, gather available information about the nature of all contaminants present in the workplace. Obtain breathing rates of workers and estimate worst-case exposures. This approach is the most time consuming and resources needed to perform these tests may not be available. However, if an employer has the resources needed to pursue this approach, it is the most reliable method of estimating cartridge service life. Concentrations at different points in time are obtained using actual respirator cartridges exposed to actual or simulated gases to gather service-life information. A safety factor that includes the assumptions made, variable factors, or conditions needs to be applied to the service life and used in the respiratory protection program. This approach is commonly used in situations where mixtures of contaminants are present and can also be used to validate an existing cartridge change-out schedule.
- *Use the manufacturer's recommendation* – Once information on airborne contaminants (including concentrations, temperature, and humidity) has been obtained, 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 can be obtained quickly. However, the estimates are not as accurate as testing; sometimes it might result in a service-life estimate that is shorter than needed because assumptions used during calculations were too conservative.

- In addition to the methods described above, "rules of thumb" can be allowed as part of the overall workplace organic vapor assessment for determining a cartridge change-out schedule. Chapter 36 of the American Industrial Hygiene Association publication, *The Occupational Environment: Its Evaluation and Control and Management*, outlines the approach.[12] The "rules of thumb" may not work for every chemical or situation, but provide an estimation of cartridge life. The following are rules of thumb outlined in the publication:
    - If the compound's boiling point is >70°C and the concentration is <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[1] can help in interpreting the results obtained from experimental testing of respirator cartridges.

[1] 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 BY-108 headspace.[13-15] The test system and methodology were developed in consultation with recognized subject matter experts to follow the example of tank farm headspace field sampling for the purposes of cartridge testing.

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

The APR cartridge test assembly was designed and constructed to operate 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 30 L/min (equivalent to 60 L/min for a pair of cartridges), which corresponds to more than twice the normal breathing rate and is slightly higher than OSHA recommended testing flow rate of 53.3 L/min.[3,5]
- Tank farm vapor source sampling was performed on headspace 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[1] for Survey 2.[16] These cartridges were chosen because they are suitable for capturing organic vapors, acid gases, ammonia, formaldehyde, and particulates.[16]

[1] 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 application. 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.

Prior to the revision 1 report a re-evaluation of the furans measurements was conducted. The re-evaluation recommended using the Carbotrap 300 TDU for measuring furan, 2,5-dihydrofuran and 2-methylfuran. Details of the furan alternative methods evaluation were documented in Letter Report 69802-01 *Assessment of the Use of Alternate Furan Measurements for Respirator Cartridge Performance Determinations* which is included in Appendix G.

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 at concentrations greater than 10% of their respective 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 BY-108 headspace was conducted from July 15–17, 2016. Each cartridge was tested for approximately 16 hours of continuous run time. Testing and analysis focused on the 59 COPCs identified in Table 1 and other hazardous airborne contaminants. Sorbent tubes were changed every 2 hours, and more than 200 sorbent tubes were sent to the 222S Laboratory at Hanford and dispositioned for analysis. Appendix C lists the raw data for all of contaminants analyzed during the tests, and Appendix D lists the corresponding calculated concentrations for the detected COPCs. Appendix C also gives the average temperatures of the sample slipstream during testing, which ranged from 66 to 91°F as well as the average relative humidity measurements, which ranged from 34 to 86%. Table 1 provides an overview of the results for each of the 59 COPCs. Note that nitrous oxide was not analyzed as it is not susceptible to respirator filtration, and there are no known NIOSH-approved respirator filtration cartridges approved for nitrous oxide. Additionally, methanol was not quantified as part of the COPC data set because it is used as a standard solvent and calibration standard in the analytical procedure for VOCs.

Table 1 shows the measured concentrations in the current study for all COPCs tested. This table further provides a summary of the test information. For example, if all of the measurements for a specific compound were less than detection limits (DL), that compound is marked accordingly. Further, if concentrations were detected for a compound, the extent of the detection also is described. The inlet concentrations of six COPCs—ammonia, 1,3-butadiene, furan, 2,5-dihydrofuran N-nitrosodimethylamine (NDMA), and N-nitrosomethylethylamine (NMEA)—exceeded their OELs. The inlet concentrations of seven additional COPCs—mercury, 3-buten-2-one, 2,3-dihydrofuran[1], 2-methylfuran, 2-propylfuran, N-nitrosodiethylamine, and N-nitrosomorpholine—exceeded 10% of their OELs. All 13 of these COPCs are highlighted in yellow in Table 1 and are assessed in more detail in Section 5.0. Appendix E shows similar detailed assessments for an additional five COPCs with cartridge inlet concentrations less than 10%, but greater than 2% of their OELs. Note that all of the other COPCs had inlet concentrations less than 2% of their OELs or their detection limits (DL).[2]

[1] The furan, 2,5-dihydrofuran, and 2-methylfuran values have been restated to reflect measurement from the Carbotrap 300 TDU method. The 2,3-dihydrofuran (and the 2,5-dimethylfuran) results are based on the Tenax method. The 2,3-dihydrofuran results were above the report limits using the Tenax method. The 2,5-dimethylfuran measurements using the Tenax method were all below the reporting limits. It is possible that the Tenax method results are providing a false-negative concentration measurement for the 2,5-dimethylfuran compound. The detailed evaluation of the use of the Tenax and Carbotrap 300 methods is provided in Appendix G.

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

Table 1. Summary of Analyzed COPCs

COPC Number and Name	CAS Number	HIghest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL[1] (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
Inorganic						
1 Ammonia	7664-41-7	479 ppm	25 ppm	2.35%		Up to 1915% of OEL for inlet and outlet values. None <100% OEL
2 Nitrous Oxide	10024-97-2	Not Measured	50 ppm			
3 Mercury	7439-97-6	13.0 ug/m3	25 ug/m3	7.43%		Up to 52.0% of OEL for inlet values. All outlets <13.5%
Hydrocarbons						
4 1,3-Butadiene	106-99-0	2.68 ppm	1 ppm	2.02%		Up to 138% of OEL for inlets and 268% of OEL for outlets
5 Benzene	71-43-2	0.0043 ppm	0.5 ppm	0.024%		Up to 0.9% of OEL for inlets. All outlets <0.05%
6 Biphenyl	92-52-4	0.0002 ppm	0.2 ppm	0.048-0.092%	X	
Alcohols						
7 1-Butanol	71-36-3	1.00 ppm	20 ppm	0.005%		Up to 5.0% of OEL for inlet values. All outlets <0.008%
8 Methanol	67-56-1	Not Measured	200 ppm			
Ketones						
9 2-Hexanone	591-78-6	0.0183 ppm	5 ppm	0.003%		Up to 0.4% of OEL for inlet values. All outlets <DL
10 3-Methyl-3-butene-2-one	814-78-8	Not Detected	0.02 ppm	TIC[2]	X	
11 4-Methyl-2-hexanone	105-42-0	0.0014 ppm	0.5 ppm	0.030%		Up to 0.3% of OEL for inlet values. All outlets <DL
12 6-Methyl-2-heptanone	928-68-7	Not Detected	8 ppm	TIC	X	
13 3-Buten-2-one	78-94-4	0.0469 ppm	0.2 ppm	0.090%		Up to 23.5% of OEL for inlet values. All outlets <1.9%
Aldehydes						
14 Formaldehyde	50-00-0	0.0257 ppm	0.3 ppm	0.631%		Up to 8.6% of OEL for inlet values. All outlets <0.9%
15 Acetaldehyde	75-07-0	0.279 ppm	25 ppm	0.005%		Up to 1.1% of OEL for inlet values. All outlets <0.8%
16 Butanal	123-72-8	0.0338 ppm	25 ppm	0.001%		Up to 0.13% of OEL for inlet values. All outlets <0.001%
17 2-Methyl-2-butenal	1115-11-3	Not Detected	0.03 ppm	TIC	X	
18 2-Ethyl-hex-2-enal	645-62-5	Not Detected	0.1 ppm	TIC	X	

[1] Approximate Detection Limit (DL) is 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 the respirator cartridge testing, this mass of TIC represents an approximate concentration of <1.0 ppb, based on the average of all TICs in the COPC list.
[3] Values have been revised to the measurements using the Carbotrap 300 TDU method.

Table 1. (continued)

COPC Number and Name	CAS Number	Highest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL[1] (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
Furans						
19 Furan[3]	110-00-9	8.19 ppb	1 ppb	819%		Up to 819% of OEL for inlet values. Outlet up to 698%
20 2,3-Dihydrofuran	1191-99-7	0.74 ppb	1 ppb	1.81%		Up to 74.5% OEL for inlet values. All outlets <DL
21 2,5-Dihydrofuran[3]	1708-29-8	3.77 ppb	1 ppb	377%		Up to 278% OEL for inlet values. Max outlet 377%
22 2-Methylfuran[3]	534-22-5	0.39 ppb	1 ppb	39.2%		Up to 39.2% OEL for inlet values. All outlets <DL/RL.
23 2,5-Dimethylfuran	625-86-5	0.03 ppb	1 ppb	3.16%	X	
24 2-Ethyl-5-methylfuran	1703-52-2	Not Detected	1 ppb	TIC	X	
25 4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9	Not Detected	1 ppb	TIC	X	
26 3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4	Not Detected	1 ppb	TIC	X	
27 2-Pentylfuran	3777-69-3	0.04 ppb	1 ppb	1.74%		Up to 3.6% of OEL for inlet values. All outlets <2.5%.
28 2-Heptylfuran	3777-71-7	0.05 ppb	1 ppb	1.15%		Up to 4.5% of OEL for inlet values. All outlets <1.4%
29 2-Propylfuran	4229-91-8	0.11 ppb	1 ppb	2.82%		Up to 11.1% OEL for inlet values. All outlets <DL.
30 2-Octylfuran	4179-38-8	Not Detected	1 ppb	TIC	X	
31 2-(3-Oxo-3-phenylprop-1-enyl)furan	717-21-5	Not Detected	1 ppb	TIC	X	
32 2-(2-Methyl-6-oxoheptyl)furan	51595-87-0	Not Detected	1 ppb	TIC	X	
Phthalates						
33 Diethylphthalate	84-66-2	0.0020 mg/m3	5 mg/m3	0.017-0.041%	X	
Nitriles						
34 Acetonitrile	75-05-8	1.89 ppm	20 ppm	0.001%		Up to 0.8% of OEL for inlets and 9.5% of OEL for outlets
35 Propanenitrile	107-12-0	0.0540 ppm	6 ppm	0.003%		Up to 0.4% of OEL for inlets and 0.9% of OEL for outlets
36 Butanenitrile	109-74-0	0.0185 ppm	8 ppm	0.003%		Up to 0.2% of OEL for inlet values. All outlets <0.004%
37 Pentanenitrile	110-59-8	0.0113 ppm	6 ppm	0.003%		Up to 0.2% of OEL for inlet values. All outlets <0.008%
38 Hexanenitrile	628-73-9	0.0028 ppm	6 ppm	0.003%		Up to 0.05% of OEL for inlet values. All outlets <DL
39 Heptanenitrile	629-08-3	Not Detected	6 ppm	TIC	X	
40 2-Methylene butanenitrile	1647-11-6	Not Detected	0.3 ppm	TIC	X	
41 2,4-Pentadienenitrile	1615-70-9	Not Detected	0.3 ppm	TIC	X	

Table 1. (continued)

COPC Number and Name	CAS Number	Highest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL[1] (% of OEL)	All Data Values (inlet and outlet) < Detection Limit	Highest Detected Value Compared to OEL
Amines						
42 Ethylamine	75-04-7	0.181 ppm	5 ppm	0.103%	X	Up to 3.6% of OEL for inlet values. All outlets <DL
Nitrosamines						
43 N-Nitrosodimethylamine	62-75-9	0.40 ppb	0.3 ppb	11.7%		Up to 134% of OEL for inlet values. All outlets <DL
44 N-Nitrosodiethylamine	55-18-5	0.03 ppb	0.1 ppb	24.4%		Up to 35% of OEL for inlet values. All outlets <DL
45 N-Nitrosomethylethylamine	10595-95-6	0.40 ppb	0.3 ppb	9.85%	X	Up to 132% of OEL for inlet values. All outlets <DL
46 N-Nitrosomorpholine	59-89-2	0.11 ppb	0.6 ppb	3.58%	X	Up to 18.3% of OEL for inlet values. All outlets <DL
Organophospates						
47 Tributyl phosphate	126-73-8	0.0002 ppm	0.2 ppm	0.084%	X	
48 Dibutyl butylphosphonate	78-46-6	0.0001 ppm	0.007 ppm	1.46%	X	
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	0.0028 ppm	1 ppm	0.150%		Up to 0.3% of OEL for inlet values. All outlets <DL
52 2,4-Dimethylpyridine	108-47-4	0.0027 ppm	0.5 ppm	0.220%		Up to 0.5% of OEL for inlet values. All outlets <DL
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 listed in Table 1, six COPCs - ammonia, 1,3-butadiene, furan, 2,5-dihydrofuran, NDMA, and NMEA had detected (cartridge inlet) concentrations greater than their OELs. Seven additional COCPs—mercury, 3-buten-2-one, 2,3-dihydrofuran, 2-methylfuran, 2-propylfuran, N-nitrosodiethylamine (NDEA), and N-nitrosomorpholine—had inlet concentrations greater than 10% of their corresponding OELs (see COPCs highlighted in yellow in Table 1). This section provides more detail on these 13 COPCs, along with plots of the corresponding data. Note that Appendix E shows plots and descriptions for other COPCs with measured inlet concentrations between 2% and 10% of their corresponding OELs.

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

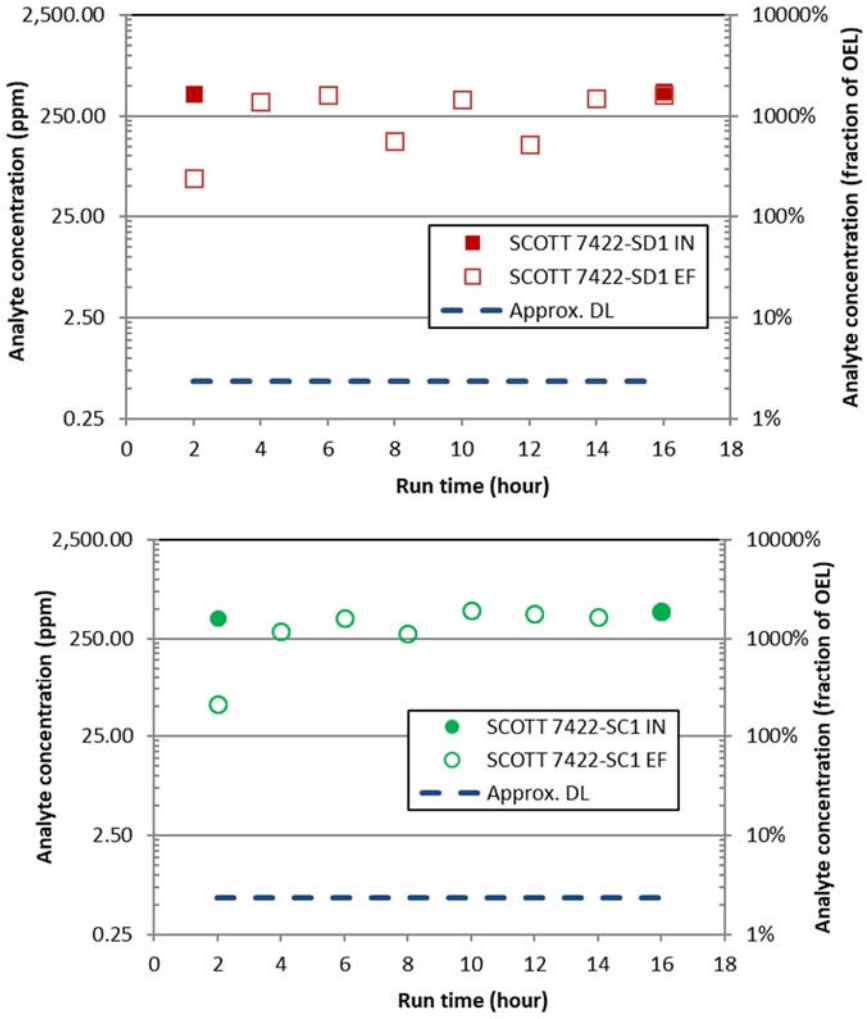


Figure 1. Plot of Measured Ammonia Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1**)**

Outlet concentrations exceeded 212% of the OEL for ammonia within the first 2 hours of testing for each cartridge, and remained above 500% of the OEL—near inlet concentrations for all subsequent sample times. Breakthrough[1] for each cartridge was evident within the first 2 hours of testing. For the second cartridge test (SCOTT 7422-SC1), direct reading instrument measurements using a MultiRAE Pro (RAE Systems, Inc., San Jose, California), were made several times during the first 2-hour time period. The ammonia instrument readings shown in Figure 2 provide further indication that breakthrough was initiated between 40 and 60 minutes.

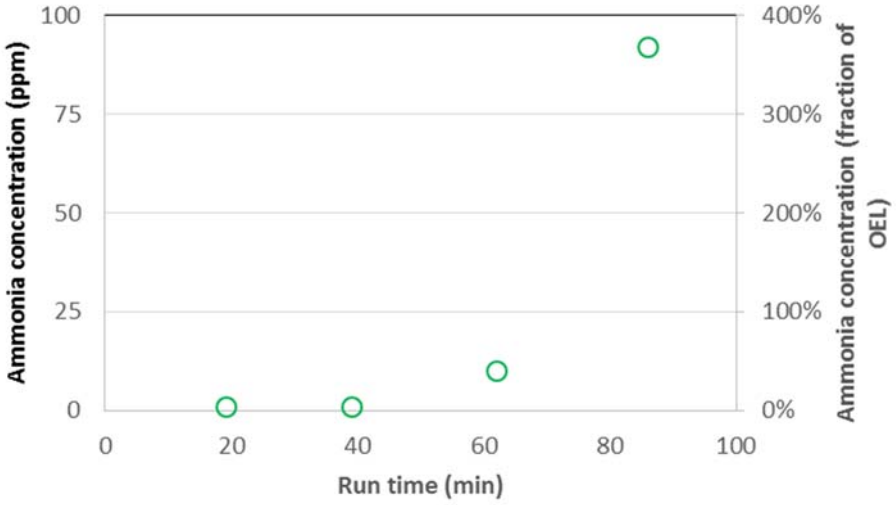


Figure 2. Plot of Direct Reading Instrument Measurements of Ammonia Concentrations after the Outlet of the SCOTT 7422-SC1 Respirator Cartridge Tested

[1] The breakthrough criteria for this analysis is having a measured (above DL/RL limits) sustained cartridge outlet concentrations above 10% of the compound's OEL.

Mercury *(see Figure 3)* – The DL for mercury corresponds to approximately 7.4% of the OEL. Inlet concentrations exceeded 42% of the OEL for mercury at the beginning and end of each cartridge test, with the highest value recorded at the beginning of the SCOTT 7422-SD1 cartridge test at 52% of the OEL (13 µg/m3). All outlet concentrations were below the DL, except for the final sample taken at 16 hours for SCOTT 7422-SC1, with a measured value of 13.5% of the OEL. This single data point could indicate the beginning of breakthrough after 14 hours for the SCOTT 7422-SC1 cartridge, however, the possibility of analytical variation should also be considered.

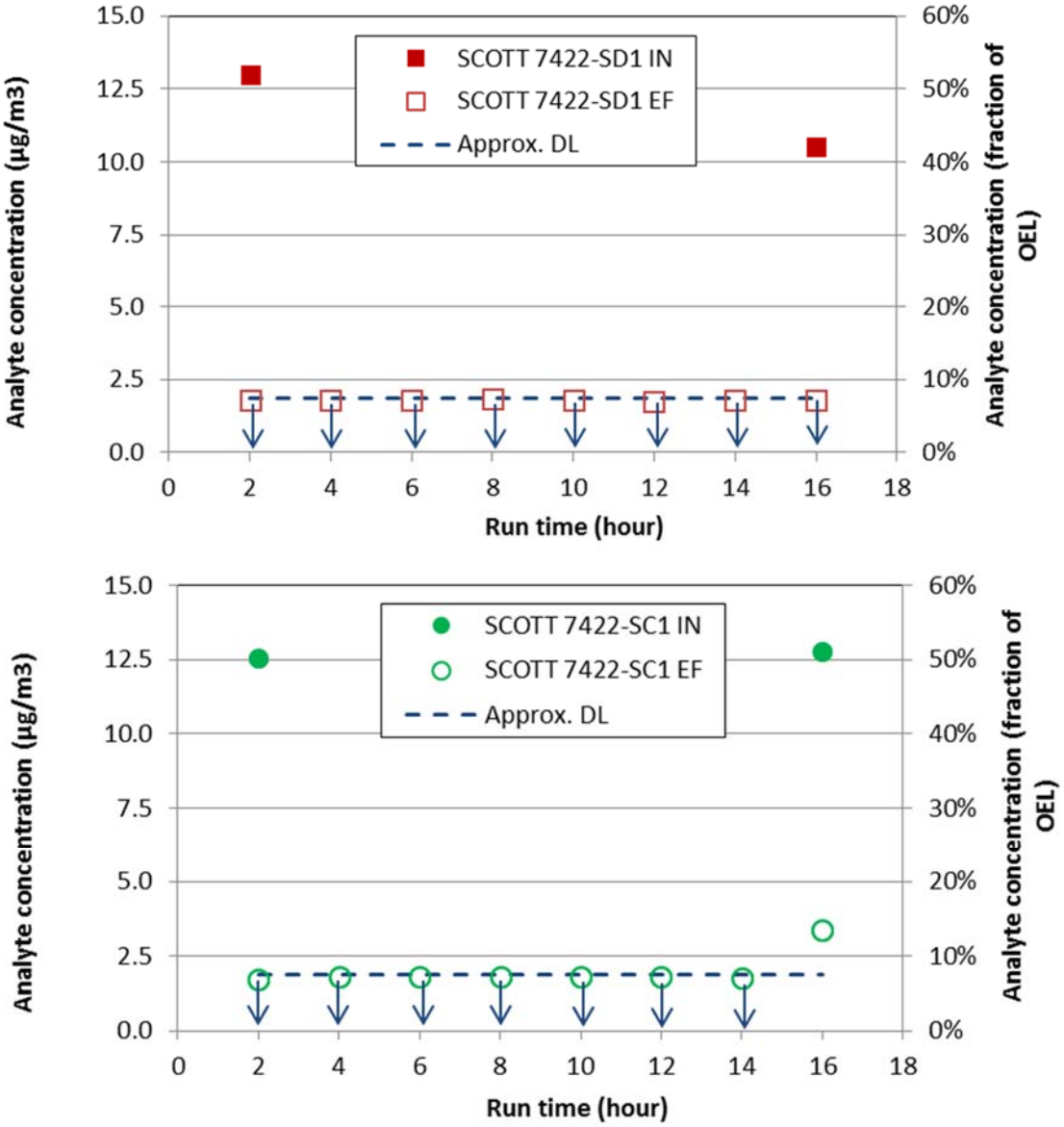


Figure 3. Plot of Measured Mercury Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1).Data points noted with ↓ indicates measurements less than the DL or RL.

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

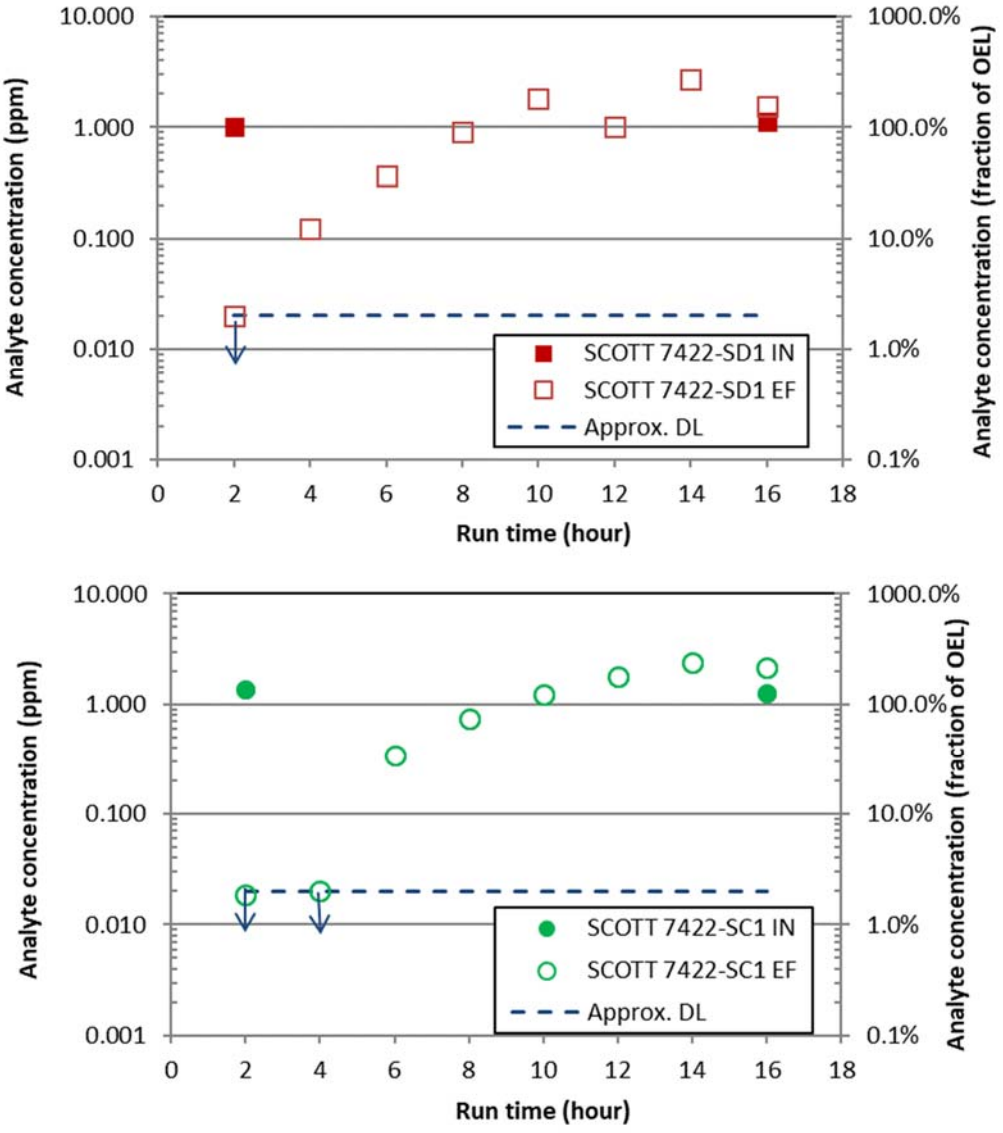


Figure 4. Plot of Measured 1,3-Butadiene Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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

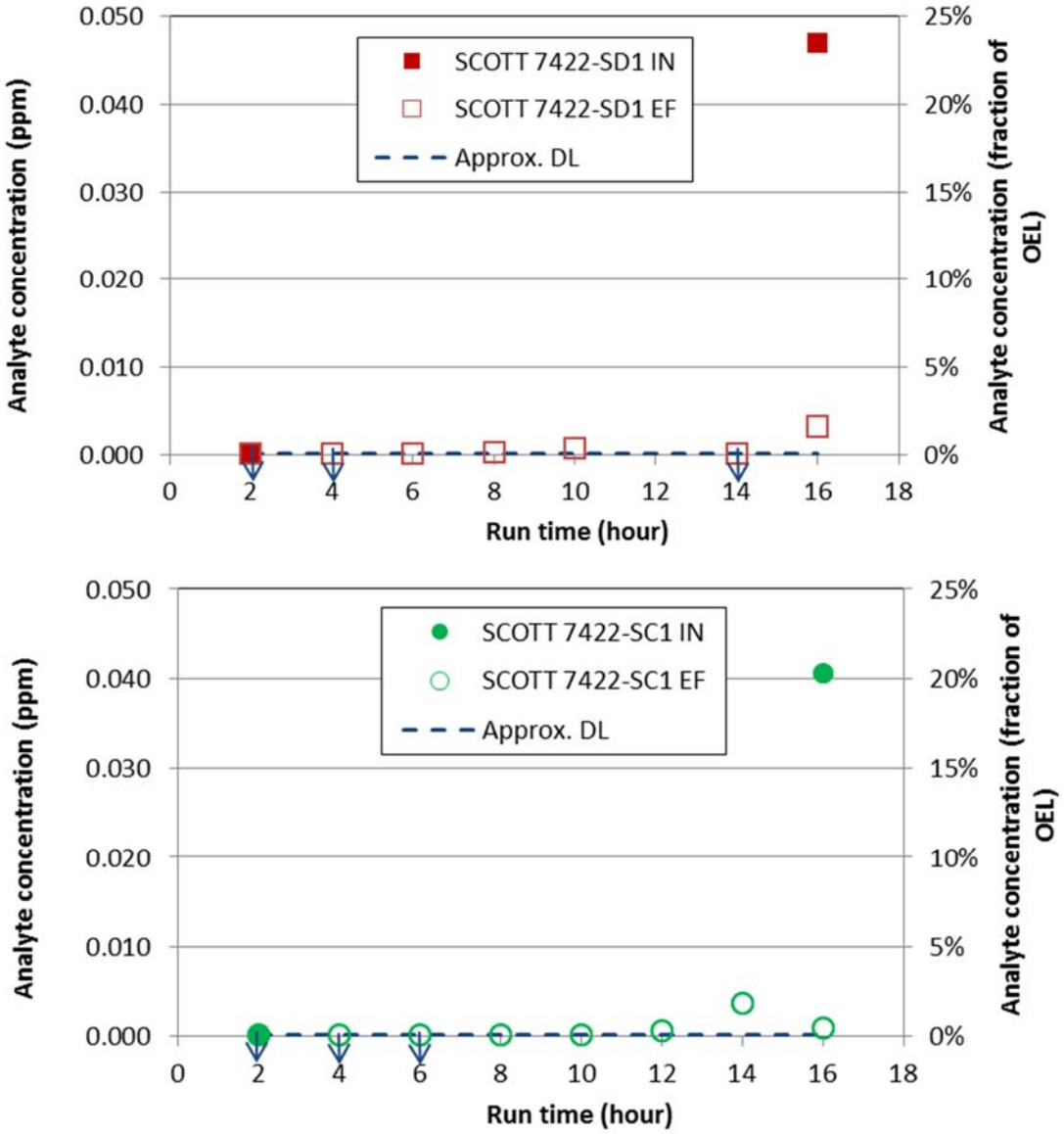


Figure 5. Plot of Measured 3-Buten-2-one Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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

Furan *(see Figure 6)* – Furan was added to this section in Revision 1. The DL for furan using the Carbotrap 300 tube corresponds to approximately 17.2% of the OEL. A re-evaluation of the furan methods (see Appendix G) determined that the use of the Carbotrap 300 TDU method results identified much higher inlet concentrations and breakthroughs above 10% of the OEL. For the BY-108 tests using the Carbotrap 300 TDU method, furan breakthrough above DL occurred after 6 hours for the SCOTT SD1 cartridge (maximum inlet 819% of the OEL) and after 8 hours for the SCOTT SC1 cartridge (maximum inlet 298% of the OEL).[1] In comparison, ammonia breakthrough was observed in less than 2 hours.

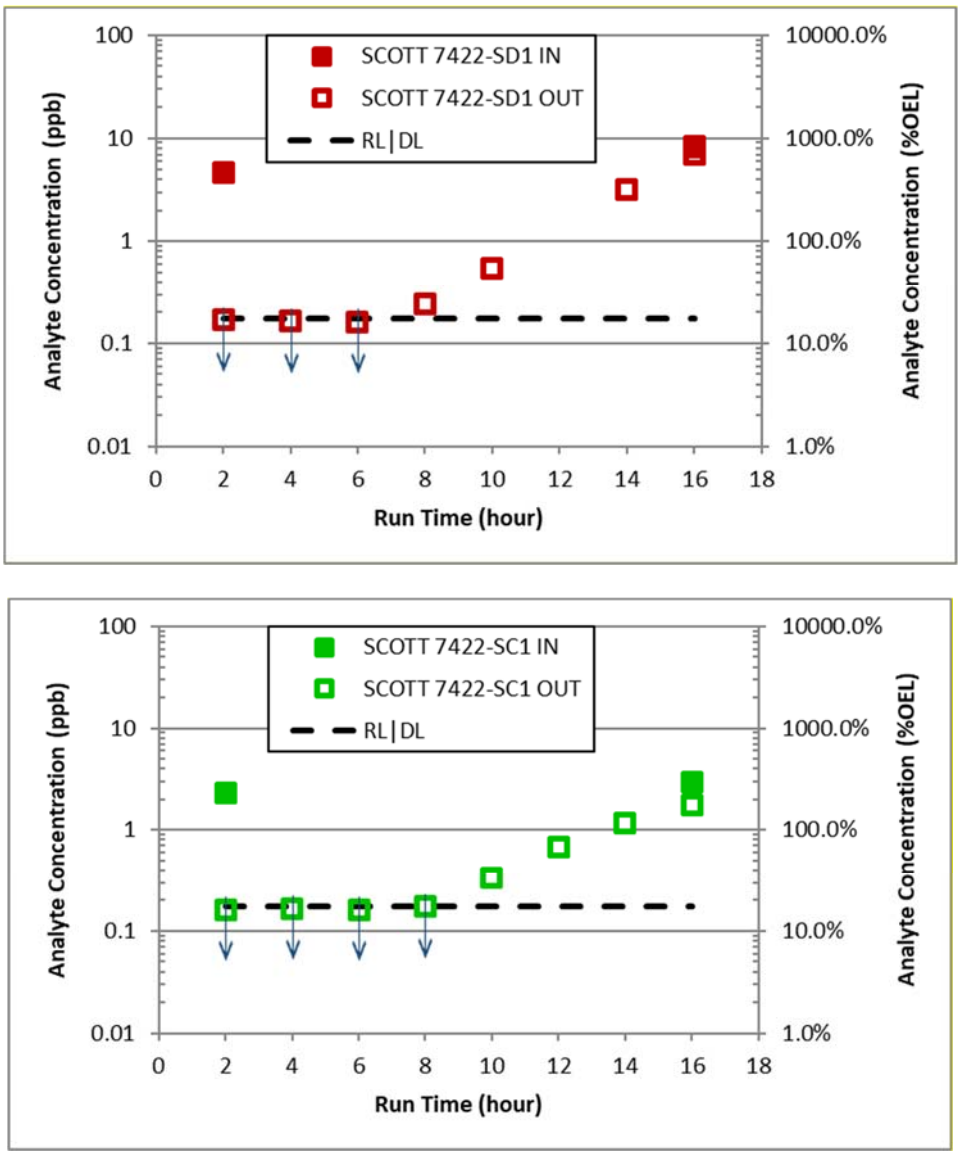


Figure 6. Plot of Measured Furan Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

[1] Because the DL for furan was above 10% of the OEL, the DL was used as an alternate breakthrough criteria for furan and other COPCs with elevated DLs.

2,3-Dihydrofuran *(see Figure 7)* – The DL for 2,3-dihydrofuran corresponds to approximately 1.8% of the OEL. All of the respirator outlet measurements were below analytical DLs. For both respirator cartridges, two of the four inlet values were greater than the DL (up to 74.5% of the OEL). The first inlet concentration measured for SCOTT 7422-SD1 was 74.5% of the OEL, and the second, after 16 hours, was less than the DL, which could either indicate a change in inlet concentration or an error in the latter measurement. The first inlet concentration for SCOTT 7422-SC1 was less than the DL, whereas the second inlet concentration after 16 hours measured 70.0% of the OEL. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.

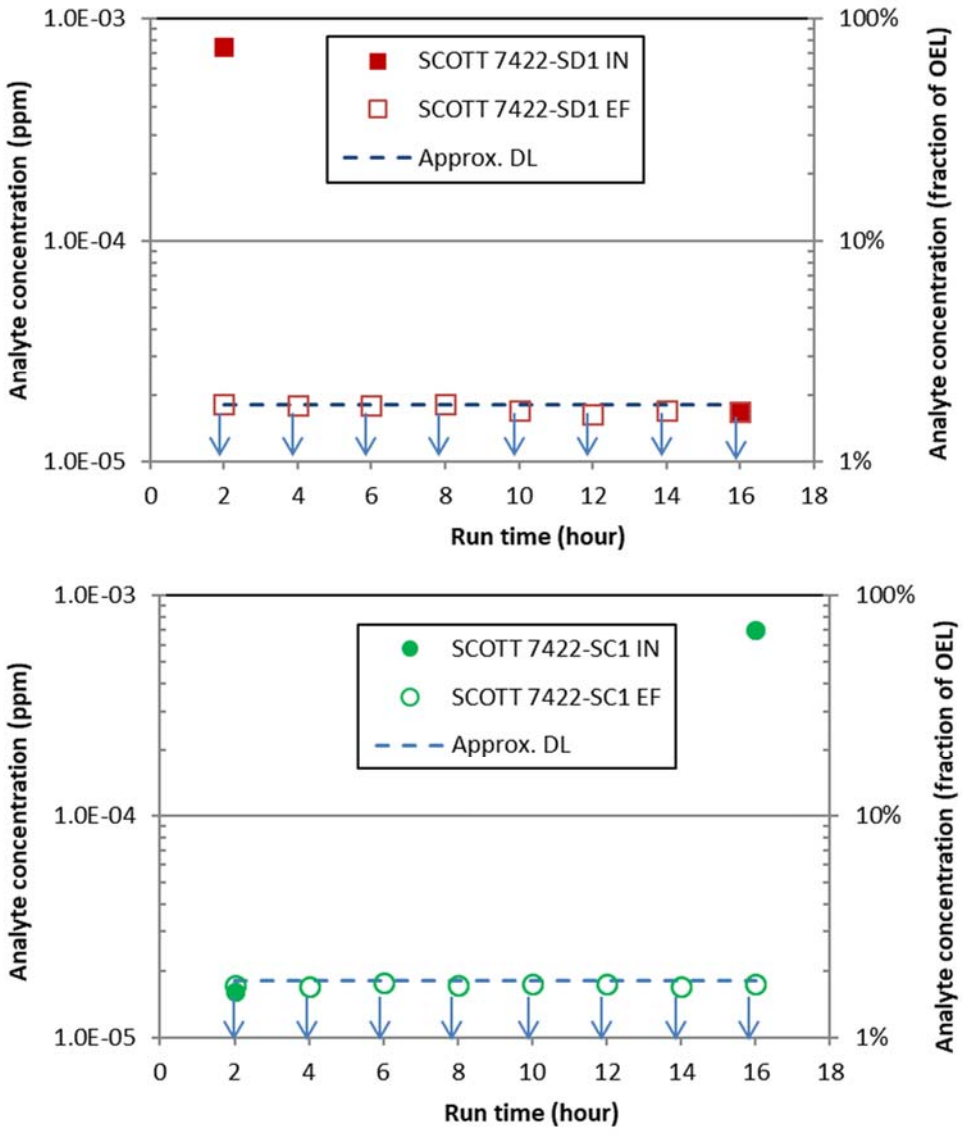


Figure 7. Plot of Measured 2,3-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2,5-Dihydrofuran *(see Figure 8)* – The DL for 2,5-dihydrofuran when using the Carbotrap 300 TDU method corresponds to approximately 32.2% of the OEL. A re-evaluation of the 2,5-dihydrofuran sampling methods is discussed in Appendix G. Use of the Carbotrap 300 tube identified much higher inlet concentrations and breakthroughs above 10% of the OEL for 2,5-dihydrofuran (see Figure 8).

For the BY-108 SCOTT SD1 cartridge test using the Carbotrap 300 TDU method, the, 2,5-dihydrofuran breakthrough above 10% of the OEL occurred between 12 and 14 hours (maximum inlet 278% of the OEL, maximum outlet 377% of the OEL). In comparison, ammonia breakthrough was observed in less than 2 hours.

The effluent measurements for the SCTT SC1 cartridge measured using the Carbotrap 300 tube were all below the DL. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for the SCOTT SC1 cartridge tested.

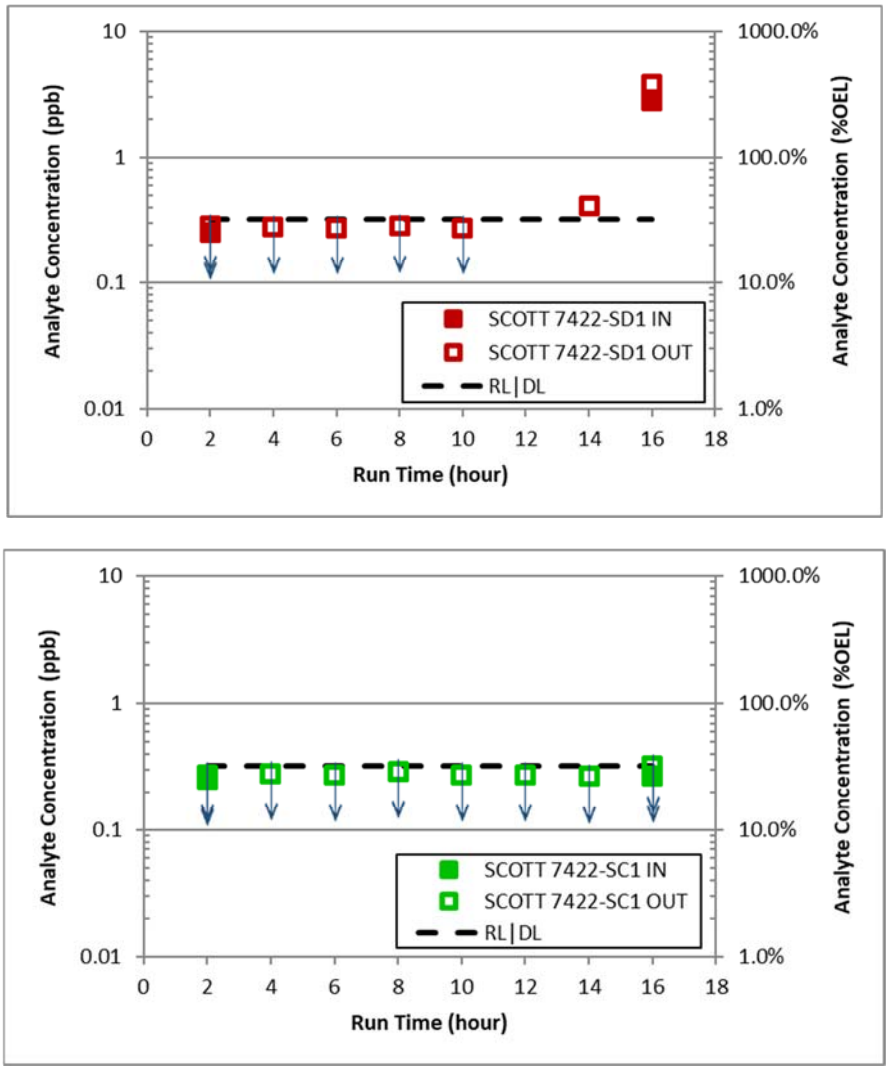
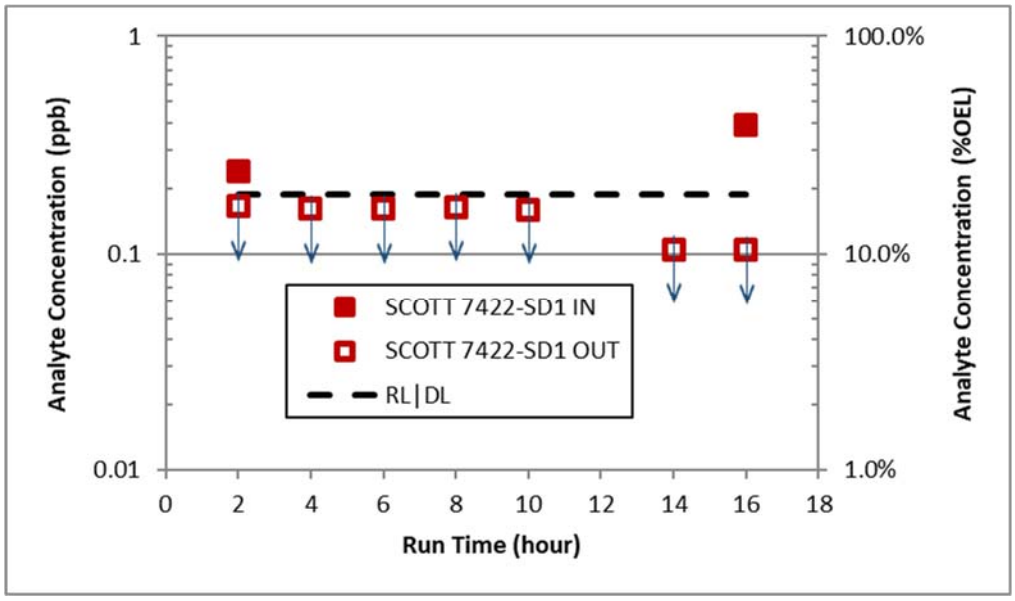


Figure 8. Plot of Measured 2,5-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2-Methylfuran *(see Figure 9)* – The DL for 2-methylfuran measured using the Carbotrap 300 TDU method corresponds to approximately 18.6% of the OEL. A re-evaluation of the 2-methylfuran sampling method is discussed in Appendix G. Use of the Carbotrap 300 tube identified higher inlet concentrations for 2-methylfuran (see Figure 9). The maximum concentrations for 2-methylfuran in the inlet for SD1 and SC1 tests measured using the Carbotrap 300 TDU method were 39.2% and 34.1% of the OEL, respectively. All outlet measurements using the Carbotrap 300 TDU method were below the DL (18.6% of the OEL) indicating no evidence of breakthrough for either cartridge during the testing.



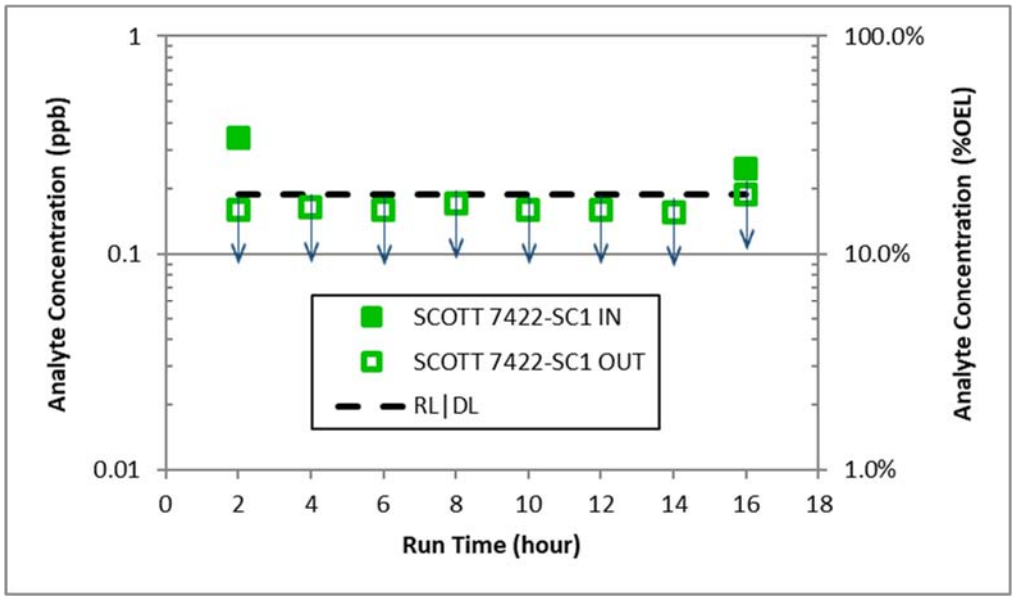


Figure 9. Plot of Measured 2-Methylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2-Propylfuran *(see Figure 10)* – The DL for 2-propylfuran corresponds to approximately 2.8% of the OEL. All respirator outlet measurements were below analytical DLs. For both respirator cartridges, only one inlet value, the final measured inlet concentration for SCOTT 7422-SC1, was greater than the DL (up to 11.1% of the OEL). Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.

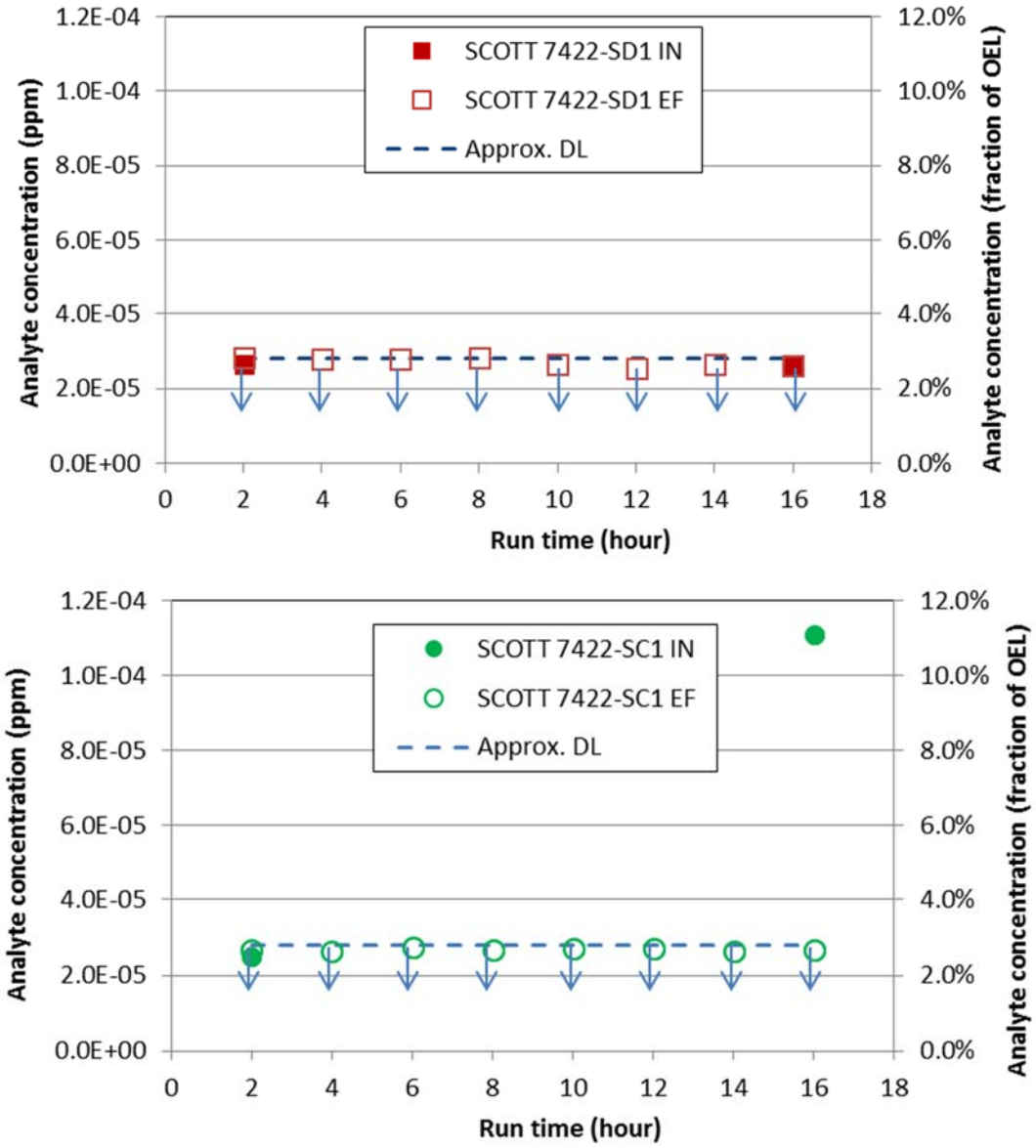


Figure 10. Plot of Measured 2-Propylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

N-nitrosodimethylamine *(see Figure 11)* – The DL for NDMA corresponds to approximately 11.7% of the OEL. All respirator outlet measurements were below analytical DLs. For both respirator cartridges, all four inlet values were greater than the DL (up to 134% of the OEL). The first inlet concentration measured for SCOTT 7244-SD1 was 134% of the OEL and the second, after 16 hours, was lower at 29.3% of the OEL. Inlet concentrations for SCOTT 7244-SC1 were at 60.6% of the OEL and 94% of the OEL for the first and second inlet samples, respectively. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.

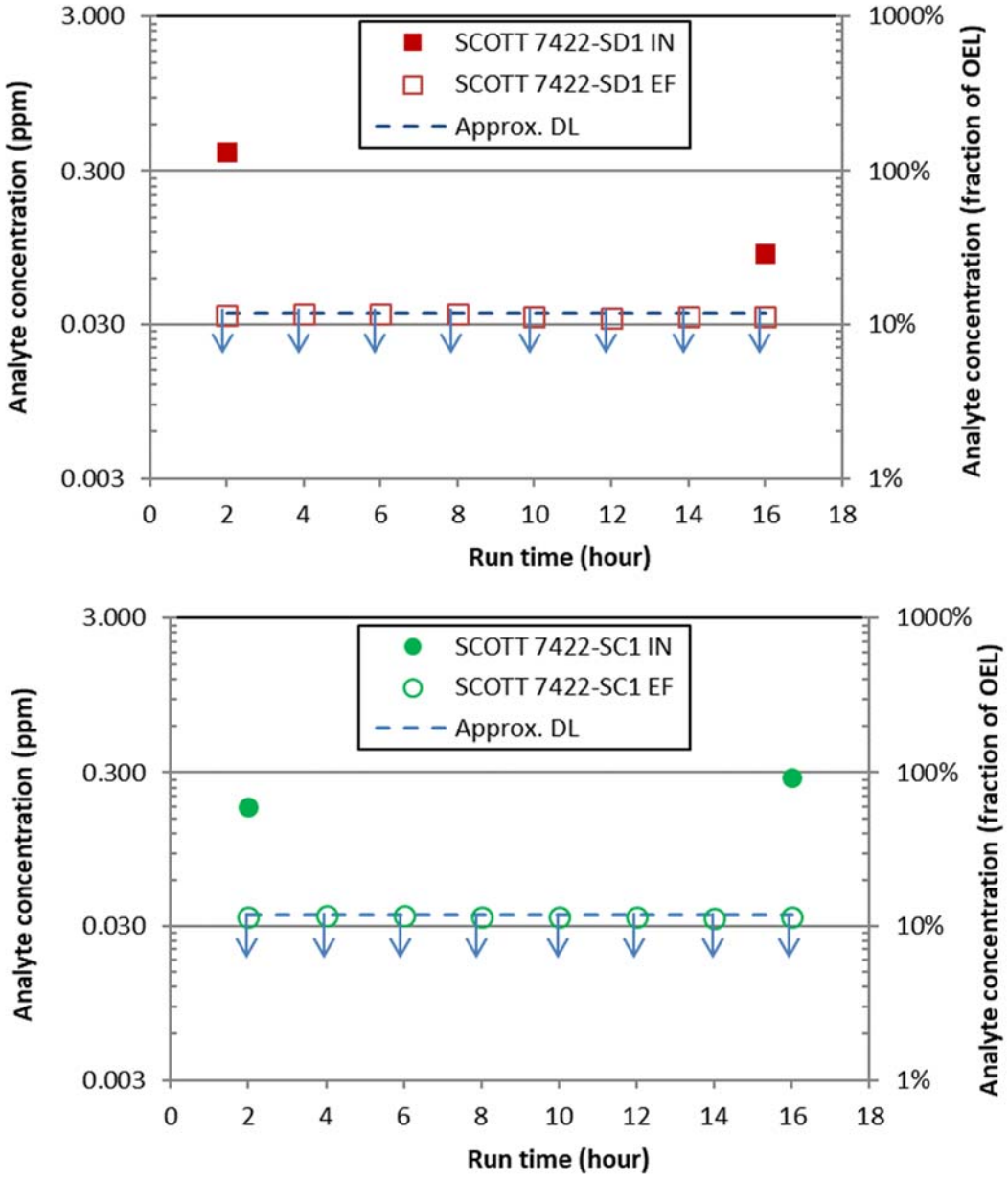


Figure 11. Plot of Measured N-nitrosodimethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

N-nitrosodiethylamine *(see Figure 12)* – The DL for NDEA corresponds to approximately 24.4% of the OEL. All respirator outlet measurements were below analytical DLs. For both respirator cartridges, the first inlet values were greater than the DL, up to 26.5% and 34.5% of the OEL for SCOTT 7244-SD1 and SC1, respectively. The final inlet concentrations after 16 hours for both cartridges were less than the DL. Because the DL is greater than 10%, it is recommended that this current NDEA DL (~24% of the OEL) be used for making respirator performance determinations. Based on the outlet measurements there is no evidence of breakthrough over the measured time period for either cartridge tested.

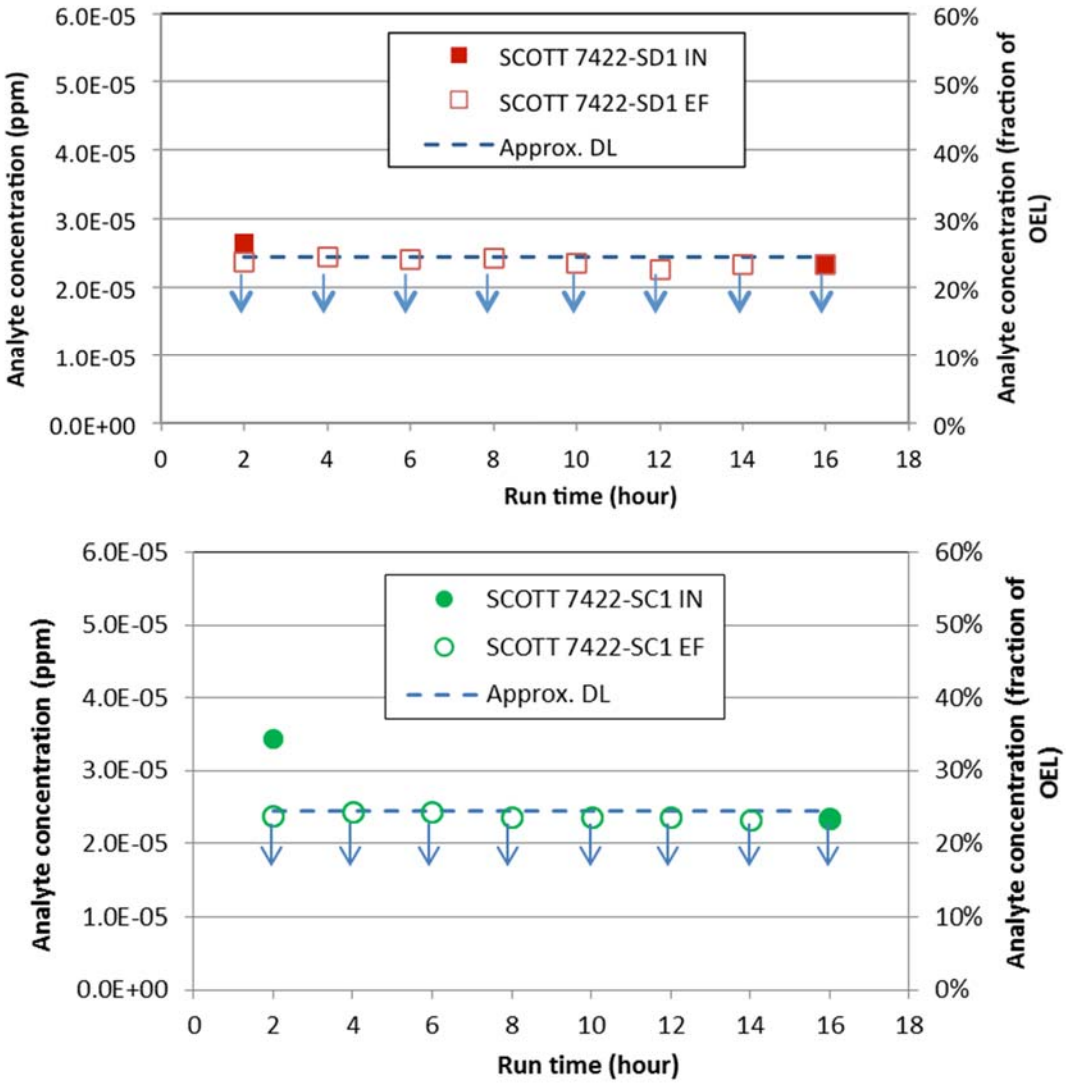


Figure 12. Plot of Measured N-nitrosodiethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

N-nitrosomethylethylamine *(see Figure 13)* – The DL for NMEA corresponds to approximately 9.9% of the OEL. All respirator outlet measurements were below analytical DLs. For both respirator cartridges, the first inlet values were greater than the OEL, up to 132% and 101% of the OEL for SCOTT 7244-SD1 and SC1, respectively. The final inlet concentrations for both cartridges were substantially lower, at 10.2% and 17.7% of the OEL, respectively. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.

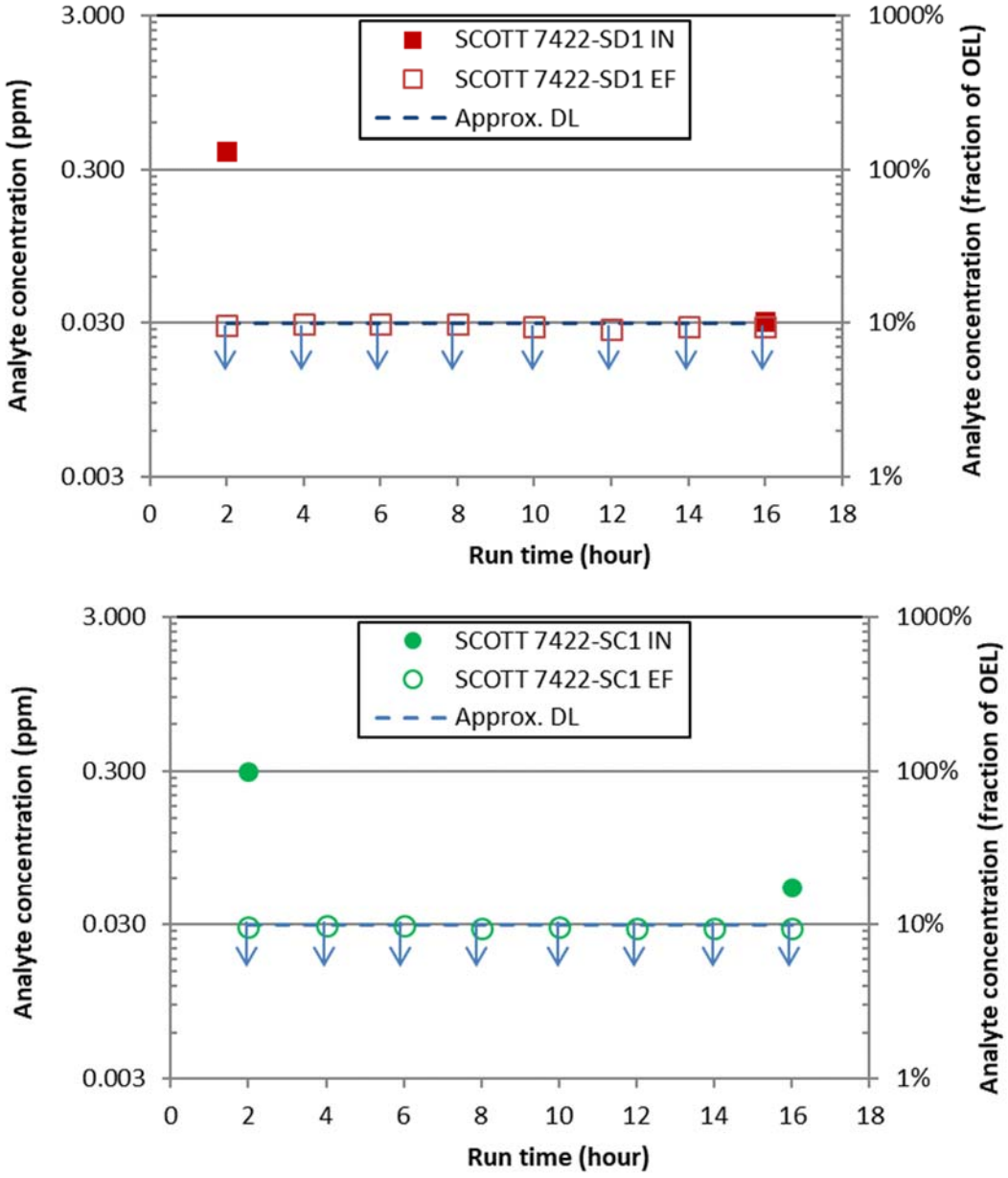


Figure 13. Plot of Measured N-nitrosomethylethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

N-nitrosomorpholine *(see Figure 14)* – The DL for N-nitrosomorpholine corresponds to approximately 3.6% of the OEL. All respirator outlet measurements were below the analytical DL. For both respirator cartridges, all four inlet values were greater than the DL (up to 18.3% of the OEL). The first inlet concentration measured for SCOTT 7422-SD1 was 18.3% of the OEL and the second, after 16 hours, was near the DL (0.02 ppb), which could either indicate a change in inlet concentration or an error in the latter measurement. Inlet concentrations for SCOTT 7422-SC1 were 8.74% and 6.25% of the OEL for the first and second inlet samples, respectively. Based on the outlet measurements, there is no evidence of breakthrough over the measured time period for either cartridge tested.

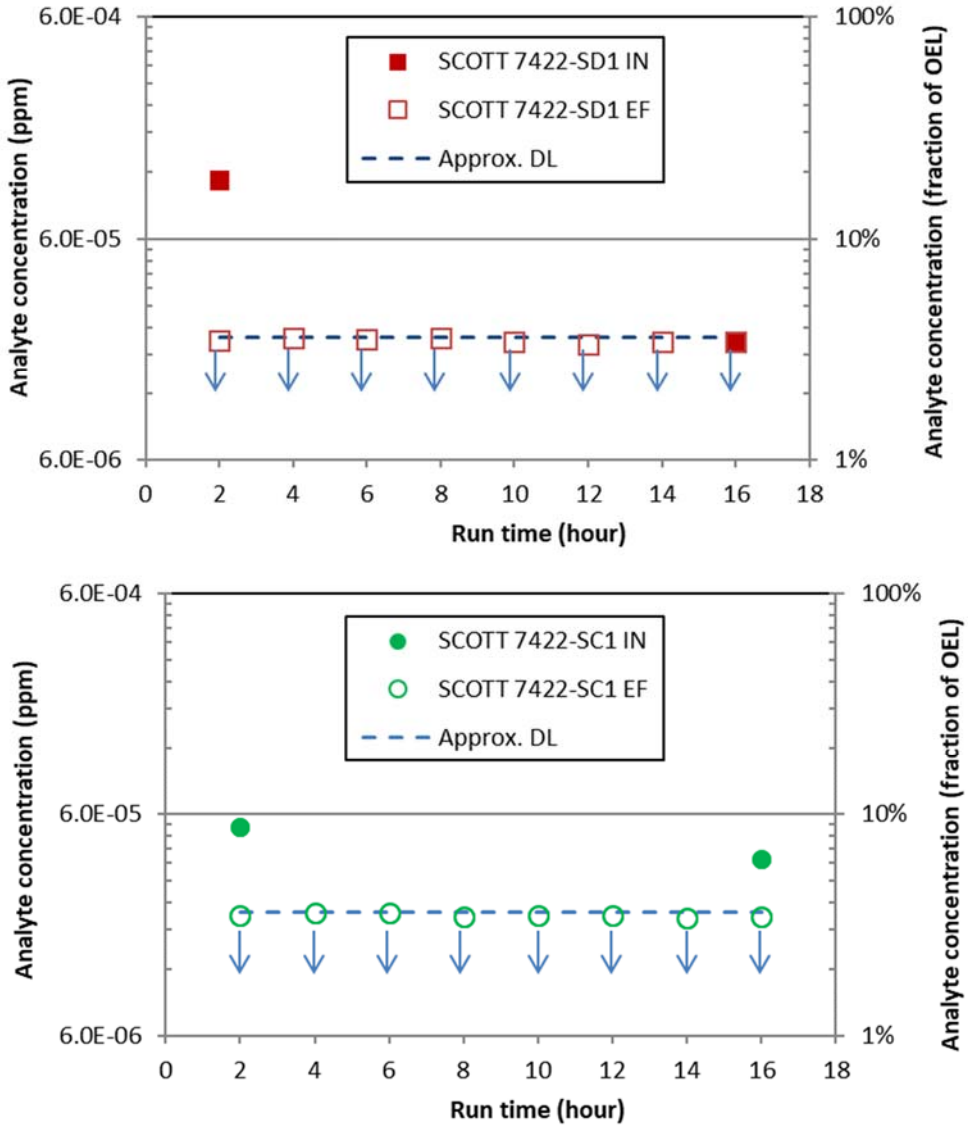


Figure 14. Plot of Measured N-nitrosomorpholine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

6.0 Factoring in Historical Concentration Data

To fully assess respirator cartridge performance for COPC removal, historical data were reviewed to determine if the recent inlet measurements were representative of typical values. Historical BY-108 data from the Tank Waste Information Network System and the SWIHD were used for this assessment.

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

In total, 10 COPCs have been previously measured in the BY-108 headspace at concentrations above 10% of their respective OELs and above analytical RLs. These COPCs include ammonia, nitrous oxide, mercury, 1,3-butadiene, 1-butanol, acetaldehyde, furan, 2-heptylfuran, NDMA, and 2-fluoropropene. Of these 10 COPCs:

- Ammonia, mercury, and NDMA average and maximum inlet concentrations measured in this cartridge study were generally consistent[1] with historic headspace measurements. 1,3-Butadiene average and maximum inlet concentrations were 30% and 59% lower than historic headspace concentrations, respectively.
- Furan maximum inlet concentrations from testing using the Carbotrap 300 TDU method were measured at approximately 819% of the OEL, which is lower than historical headspace analysis where reported concentrations exceeded 1000% of the OEL. Historic measurements of other furan-based compounds (i.e., substituted furans) have been consistently less than the RL, except for 2-heptyfuran where several pre-2006 measurements reported a maximum of more than 6000% of the OEL.
- 1-Butanol and acetaldehyde average and maximum inlet concentrations were a factor of 5 and 10 lower than historical concentrations, respectively. In more recent headspace sampling results, 1-butanol concentrations averaged approximately 19% of the OEL, compared to average cartridge inlet concentrations of 3.7% of the OEL. Recent acetaldehyde concentrations were measured at 11% of the OEL, compared to cartridge testing inlet concentrations of 1% of the OEL.
- 2-Fluoropropene is a TIC with a single, historic analysis result from pre-2006 BY-108 headspace sampling that measured 530% of the OEL. No recent analysis results for this COPC are available, and it was not detected in the inlet during this cartridge study.

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

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

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

Nitrous oxide was not measured in this cartridge study as previously noted but has been reported in pre-2006 headspace samples at a concentration greater than 1000% of the OEL. A single, more recent headspace analysis result reported a concentration of only 3.6% of the OEL.

Table 2. Historical Tank BY-108 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)	Occupational Exposure Limit (OEL)	# of Values	Max. Value ppm	Average Value ppm	Max. Value (% OEL)	Average Value (% OEL)	Max Inlet Value (% OEL)	Highest Value from Respirator Outlet (% OEL)
2 Nitrous Oxide	10024-97-2	-127	50 ppm	1 *40*	1.8 *831*	1.8 *545*	3.6% *1662%*	3.6% *1090%*	Not Measured	
1 Ammonia	7664-41-7	-28	25 ppm	1	644	644	2576%	2576%	1915%	1912%
50 2-Fluoropropene	1184-60-7	-11	0.1 ppm	0 *1*	n/a *0.53*	n/a *0.53*	n/a *530%*	n/a *530%*	Not Detected - TIC	
14 Formaldehyde	50-00-0	-6	0.3 ppm	1	0.00381	0.00381	1.3%	1.3%	8.6%	0.85%
53 Methyl nitrite	624-91-9	10	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC	
4 1,3-Butadiene	106-99-0	24	1 ppm	2 *31*	3.38 *3.38*	1.7 *0.174**	338% *338%*	170% *17%**	138%	268%
42 Ethylamine	75-04-7	62	5 ppm	1	<RL	<RL	<RL	<RL	3.6%	0.10% (RL)[2]
15 Acetaldehyde	75-07-0	69	25 ppm	1	2.82	2.82	11%	11%	1.1%	0.78%
19 Furan	110-00-9	88	1 ppb	5 *6*	<RL *547*	23.1* *110**	<RL *54700%*	2310%* *11000%**	819%	698%
59 Methyl Isocyanate	624-83-9	103	20 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC	
20 2,3-Dihydrofuran	1191-99-7	130	1 ppb	1	<RL	<RL	<RL	<RL	74.5%	1.8% (DL)
22 2-Methylfuran	534-22-5	147	1 ppb	5	<RL	<RL	<RL	<RL	39.2%	<RL
8 Methanol	67-56-1	148	200 ppm	1	<RL	<RL	<RL	<RL	Not Measured	
21 2,5-Dihydrofuran	1708-29-8	152	1 ppb	5	<RL	<RL	<RL	<RL	278%	377%

[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 level

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

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

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

[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

[3] Updated for the Carbotrap 300 TDU method measurements.

7.0 Conclusions

Testing was conducted during the July 15–17, 2016, period using headspace vapors from Hanford tank BY-108 under static conditions. The vapors were fed to a respirator cartridge test stand developed by WRPS in collaboration with HiLine Engineering (Richland, Washington). Multipurpose respirator cartridges SCOTT 7422-SD1 and SCOTT 7422-SC1 (SCOTT Safety, Monroe, North Carolina) were each assessed with the tank headspace vapors in tests conducted on separate days. Sorbent tubes were used to collect samples of the vapor stream entering and exiting the respirator cartridge and were subsequently analyzed for COPC concentrations. PNNL was tasked to independently analyze the collected data, and make recommendations based on the results for respiratory cartridge performance and service life.

The BY-108 data are expected to provide conservatively high COPC concentrations compared to the ambient concentrations inside and outside the tank farm. Further, the flow rate through each respirator cartridge was maintained conservatively high compared to normal human breathing rates. The average temperatures of the sample slipstream during testing ranged from 66 to 91°F, and the average relative humidity ranged from 34 to 86%. The inlet concentrations measured are shown in Table 1. Thus, any conclusions on respirator cartridge performance pertain to the above-stated conditions.

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

- Based on measurements of the cartridge inlet vapor concentrations from tank BY-108, six COPCs—ammonia, 1,3-butadiene, furan, 2,5-dihydrofuran, NDMA, and NMEA—exceeded their OELs[1]. Seven additional COCPs—mercury, 3-buten-2-one, 2,3-dihydrofuran, 2-methylfuran, 2-propylfuran, NDEA, and N-nitrosomorpholine—had inlet concentrations greater than 10% of their corresponding OEL.
- Ammonia inlet concentrations during the testing reached 479 ppm, comparable to BY-108 headspace measurements previously obtained.[2] The apparent breakthrough above 10% of the OEL for both respirator cartridges occurred quickly during the testing—less than 2 hours. Direct reading instrument measurements taken at intervals during the first 90 minutes of testing of SCOTT 7422-SC1 indicate that breakthrough for that cartridge occurred after 40 minutes. This breakthrough is consistent with expectations, considering the high inlet concentrations.
- 1,3-Butadiene measurements were almost 60% lower than previous maximum headspace measurements,[1] but did appear to exhibit breakthrough above 10% of the OEL for both cartridges tested. The observed breakthrough above 10% of the OEL for the SCOTT 7422-SD1 cartridge was after 2 hours and the breakthrough above 10% of the OEL for the SCOTT 7422-SC1 cartridge was after 4 hours.
- Furan inlet concentrations reached a maximum of 819% of the OEL when assessed using the Carbotrap 300 sorbent tube-derived data. Furan breakthrough above 10% of its OEL occurred after 6 hours for the SCOTT 7422-SD1 cartridge (maximum inlet 819% of the OEL), and after 8 hours for the SCOTT 7422-SC1 cartridge (maximum inlet 298% of the OEL). In comparison, ammonia breakthrough was observed in less than 2 hours.

[1] Occupational Exposure Limits accepted for Hanford tank farm use are based on OELs established by a U.S. governmental agency or national professional organization (e.g., OSHA, NIOSH, 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. The OEL for NDMA was established in 2005 based on the MAK (Maximale Arbeitsplatzkonzentration) Commission standard adopted in Europe.

[2] Comparison was made to the most recent BY-108 sampling and analysis (2008–2009) available from the SWIHD at the time of this report.

- The maximum 2,5-Dihydrofuran inlet concentration reached 278% of the OEL when assessed using the Carbotrap 300 sorbent tube for the SCOTT 7422-SD1 cartridge test only. Breakthrough above 10% of its OEL occurred between 12 and 14 hours. All inlet and outlet concentrations were below DL for the SCOTT 7422-SC1 cartridge test, where no breakthrough was observed. In comparison, ammonia breakthrough was observed in less than 2 hours.
- Outlet concentrations for mercury and 3-buten-2-one were above DLs for one or more measurements. Mercury exceeded 10% of the OEL at the end of testing on one cartridge but was less than the DL for all other outlet measurements. Outlet measurements for the other COPCs never exceeded 10% of their OELs. These observations do not conclusively indicate breakthrough for any of these COPCs.
- All other COPCs had outlet concentrations less than detection limits, indicating no cartridge breakthrough above 10% of the OELs for the testing period.

8.0 Recommendations

Based on the measurements taken for this study, breakthrough occurred early in the test sequence for ammonia and 1,3-butadiene. The ammonia breakthrough above 10% of the OEL was less than 2 hours for both cartridges tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Breakthrough of all other COCPs including furan and 2,5-dihydrofuran occurred after ammonia breakthrough, indicating ammonia may be used as a leading indicator for estimating cartridge service life. Because outlet measurements from laboratory analysis are unavailable between time zero and 2 hours, and inlet ammonia concentrations exceed NIOSH recommendations for APR use,[19] identification of an acceptable change-out frequency is not possible or recommended for the use of these cartridges in similar concentration environments.

Additional recommendations related to NDMA and NDEA DLs, TICs, further data assessment, and future testing documented in PNNL-25860[1] for respirator cartridge testing on a slipstream from the Hanford AP tank exhauster also are relevant to BY-108. BY-108 headspace provided higher concentrations of several COPCs than other tanks or exhausters used in respirator cartridge testing to date[2] (e.g., ammonia, 1,3-butadiene, furan, 2,3-dihydrofuran, 2,5-dihydrofuran, and NMEA). Future testing and multi-tank analysis of cartridge performance with a wider range of COPC concentrations and test conditions should help improve understanding of overall cartridge performance.

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

[2] At the time of this report, analysis of results of cartridge testing on the AP exhauster and headspace from tanks SY-102, A-101, and BY-108 have been performed.

9.0 References

1. OSHA 29 CFR 1910.134. Available at https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=12716
2. OSHA Respirator Change Schedules - Decision Logic Flowcharts. Available at https://www.osha.gov/SLTC/etools/respiratory/decisionlogic/flowcharti.html
3. OSHA Respirator Change Schedules Mathematical Modeling, and Factors that Influence Cartridge Service Life. Available at https://www.osha.gov/SLTC/etools/respiratory/change_schedule.html
4. OSHA Standard Respirator Testing Procedures. Available at http://www.cdc.gov/niosh/npptl/stps/aprespcbrn.html
5. Wood, GO. Estimating Service Lives of Organic Vapor Cartridges. *Am Ind Hyg Assoc J* 1994, *55*, 11-15.
6. Wood, GO. Estimating Service Lives of Organic Vapor Cartridges II: A Single Vapor at All Humidities. *J Occup Environ Hyg* 2004, *1*, 472-492.
7. Wood, GO, JL Snyder. Estimating Service Lives of Organic Vapor Cartridges III: Multiple Vapors at All Humidities. *J Occup Environ Hyg* 2007, *4*, 363-374.
8. Janvier, F, L Tuduri, D Cossement, D Drolet, J Lara. Systematic Evaluation of the Adsorption of Organic Vapors onto a Miniaturized Cartridge Device using Breakthrough Tests in Parallel Experiment with a Full Size Respirator Cartridge. *Adsorpt Sci Technol* 2016, *34*, 287-306.
9. Yoon, YH, JH Nelson, J Lara. Respirator Cartridge Service Life: Exposure to Mixtures. *Am Ind Hyg Assoc J* 1996, *57*, 809-819.
10. 3M Service life software Version 3.3. Available at http://extra8.3m.com/SLSWeb/serviceLifeDisclaimer.html?reglId=20&langCode=EN&countryName=United%20States
11. Scotts Surelife Cartridge Calculator, https://www.scottsurelife.com/DesktopUI/SelectRegion.aspx
12. Respiratory Protection, Chapter 36 of the American Industrial Hygiene Association publication, *The Occupational Environment: Its Evaluation and Control and Management,* ISBN 1-931504-43-1
13. Industrial Hygiene Sampling and Analysis plan for Respirator Cartridge Testing, TFC-PLN-168, REV A, June 16, 2016
14. Air Purifying Respirator Cartridge Test Apparatus Special Tool and Equipment Evaluation, RPP-STE-59226, Rev 0, June 22, 2016.
15. Cohen, HJ, SP Levine, RP Garrison. Development of a Field Method for Calculating the Service Lives of Organic Vapor Cartridges - Part IV. Results of field validation trials, *American Industrial Hygiene Association Journal* (1991), pages 263-270.
16. Scott Air Purifying Respirators (742 Twin Cartridges). Available at https://www.scottsafety.com/en/us/DocumentandMedia1/Poster_742SelectionGuide_HS_6411_0313.pdf
17. Meacham JE, JO Honeyman, TJ Anderson, ML Zabel, and JL Huckaby. 2006. *Industrial Hygiene Chemical Vapor Technical Basis*. RPP-22491, Rev. 1, CH2M Hill Hanford Group, Inc., Richland, Washington.
18. Industrial Hygiene Exposure Assessment Strategy. Available at TFC-PLN-34, REV E-6, Feb 22, 2013.
19. Centers for Disease Control and Prevention–National Institute for Occupational Safety and Health (CDC–NIOSH). 2017. *CDC–NIOSH Pocket Guide to Chemical Hazards–Ammonia*. Available at https://www.cdc.gov/niosh/npg/npgd0028.html.

20. Freeman CJ, J Liu, C Clayton, SK Nune, LA Mahoney, CL Bottenus, TM Brouns, MJ Minette, and P Humble. 2020. *Overview of 2016 through 2018 Testing of Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhausters*. PNNL-26821 Revision 1, Pacific Northwest National Laboratory, Richland, Washington.

Appendix A

Description of Respirator Cartridge Testing Setup

Appendix A

Description of Respirator Cartridge Testing Setup

The respirator cartridge-testing system was developed by Washington River Protection Solutions and HiLine Engineering (Richland, Washington) 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 directly 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 in-line 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 performance for a given COPC can be quantified. Sorbent media tubes were used to capture the COPCs and other hazardous contaminants. After a given test segment, the sorbent tubes were removed and analyzed. Sampling of the exhaust gas was performed every 2 hours, but this timing can be modified as necessary.

Figure A.1 provides a general schematic diagram for the respirator cartridge test apparatus, and Figure A.2 shows photographs of the actual equipment. The test system operates using vacuum to draw tank gases/vapors into the unit so the potential for leakage to atmosphere is minimized until the gases/vapors are under positive pressure downstream of the vacuum pumps. By the time gases reach the vacuum pump, 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 were 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 were 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.

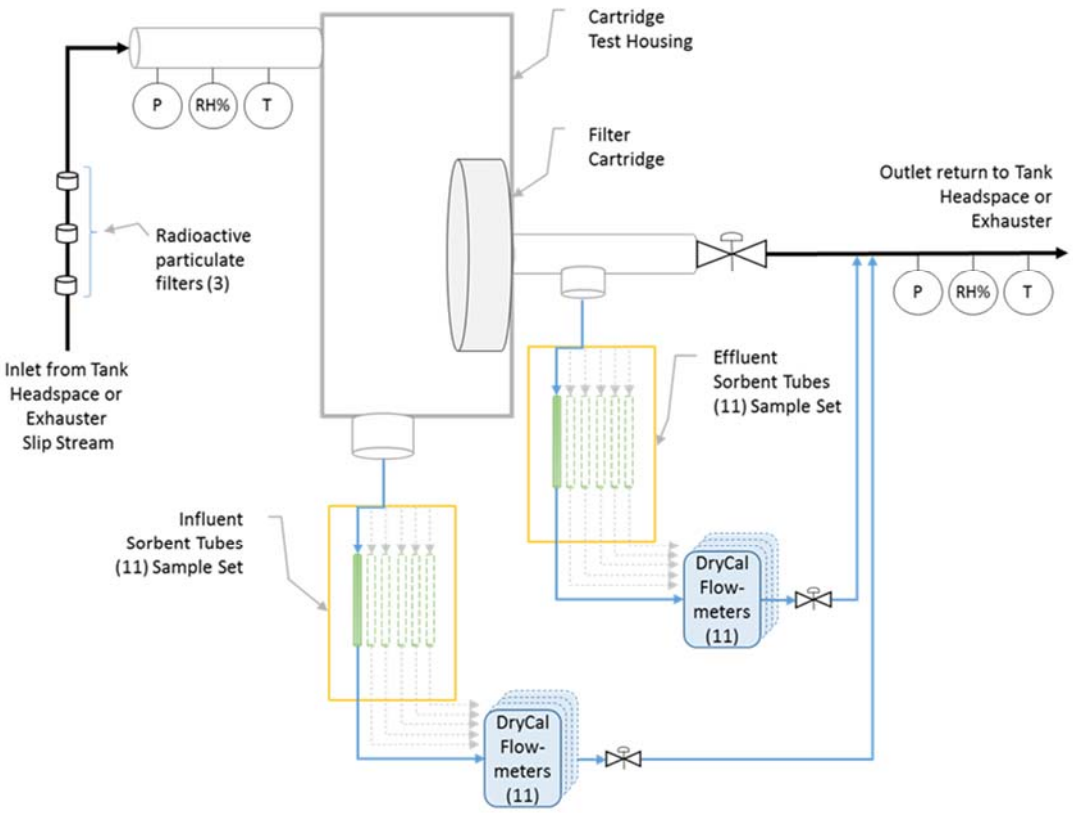


Figure A.1. General Schematic of Respirator Cartridge Test Apparatus

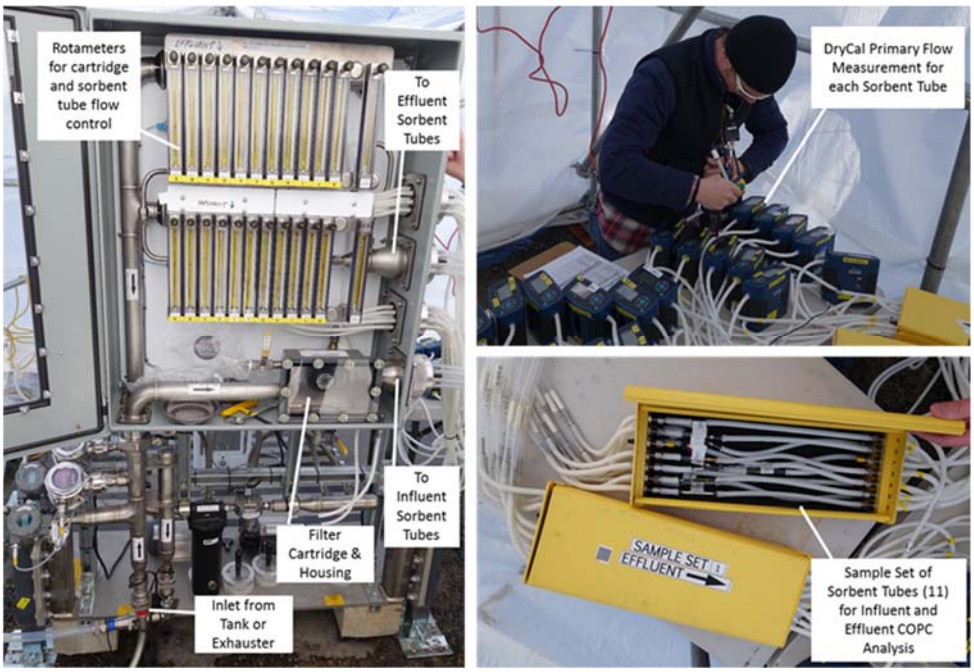


Figure A.2. Photographs of the Respirator Cartridge Test Equipment

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 (NIOSH)-approved methods for quantifying hazardous airborne contaminants in the tank farm vapors. Methods including gas chromatography/mass spectrometry were used as the primary analytical techniques for identifying hazardous airborne contaminants (see Table B.1).

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

Analyte	Media	Flow Rate (mL/min)	Analytical Method[a]	Instrument Used[b]	Analysis Location[c]
Acetonitrile	Charcoal Tube, SKC-226-09	100	NIOSH 1606	GC-FID	ALS
Acetonitrile	Carbotrap 300 TDU Tube	33	EPA TO-17 Modified	GC/MS	WRPS
Furans	TDU Tenax TA	33	EPA TO-17 Modified	GC/MS	WRPS
Semivolatile Organic Compounds	Carbotrap 150 TDU Tube	33	EPA TO-17 Modified	GC/MS	WRPS
Volatile Organic Compounds	Carbotrap 300 TDU tube	33	EPA TO-17 Modified	GC/MS	WRPS
Mercury	Anasorb C300, SKC-226-17-1A	250	NIOSH-6009	CVAA	WHL
Ammonia	Anasorb 747 (sulfuric acid), SKC-226-29	200	OSHA-ID-188	IC	WHL
1,3-butadiene	Charcoal, SKC-226-37, (Parts A and B)	200	NIOSH-1024	GC-FID	ALS
Aldehyde	DNPH Treated Silica Gel, SKC-226-119	200	EPA TO-11A	HPLC	ALS
Pyridine	Coconut Shell Charcoal, SKC-226-01offsite	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 BY-108 data set. Calculations using this data are given in Appendix D.

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

The analytical measurement results listed in results spreadsheet columns were transferred from entries labeled 'result' in the raw analytical .pdf files. The results were transferred into three rows in the spreadsheets. The first row contained the relevant information with the appropriate units. Where a results entry was given as 'ND' in the .pdf, a '<' symbol was used. Where a detection limit (DL)/reporting limit (RL) was listed as 'n/a,' the result entry in the spreadsheet was given as '0.0.'

The use of the RL or DL varied among analytical laboratories. The term RL (equivalent to a limit of quantification) was used instead of the term DL by ALS Environmental Salt Lake City, Columbia Basin Analytical Laboratory, and 222S–Wastren Hanford Laboratory (see Table F.1 in Appendix F for a complete correlation of which Chemicals of Potential Concern used an RL or a DL). The WRPS laboratory provided a DL, in contrast to an RL. Neither RLs nor DLs were provided for tentatively identified compounds (TIC).

Chain of custody information is provided clearly in the raw analytical data .pdf files, including analyte name, sample numbers, and laboratory-assigned numbers. Chemical Abstract Service numbers were not provided.

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

- 'BK-BASE' means measurements obtained for blank experiment before plugging into the system. 'BASE' means measurement obtained for ambient air (fresh air vs. tank vapor).
- '5982' designations correspond to testing with the SCOTT 7422-SD1 respirator cartridge, whereas '5983' designations correspond to testing with the SCOTT 7422-SC1 respirator cartridge.
- Position designators 'A1' and 'H1' were respirator cartridge inlet measurements at 0 to 2 hours and 14 to 16 hours, respectively. The other position designators corresponded to respirator cartridge outlet measurements: A2 (0 to 2 hours), B1 (2 to 4 hours), C1 (4 to 6 hours), D1 (6 to 8 hours), (8 to 10 hours), F1 (10 to 12 hours), G1 (12 to 14 hours), and H2 (14 to 16 hours).
- For example, sample ID 16-05982-5-A1 corresponds to the first cartridge survey (16-05982), sample line 5, and the first (0 to 2 hours) influent sample bundle (A1).

The flow rate passing through the respirator cartridge was approximately 30 L/min, while the sampling flow rates through the sorption tubes ranged between 30 and 200 mL/min for different chemicals that were being collected. WRPS provided these flow rates in files 'BY Farm 7-15 7-16.xlsx and BY Farm 7-16 7-17.xlsx.' The information is shown in the tables below.

WRPS provided the temperature and humidity information in files 'BY-108 DRI July 15-16.xls' and 'BY-108 DRI July 16-17.xls.' DRI in these file names is the abbreviation for direct reading instrument. 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 DRI 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 volatile organic compounds (VOC) 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 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" sample 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 (i.e. fresh air, not 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:

- Semivolatile organic compounds (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 (7/15-7/16) BY-108

Volumes Air Collected (L)

Sample Box Number		Mach.	Mach.	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2
Analyte	Line	Base 1	Base 2										
SVOC	A	3.9222	4.2076	3.7164	4.1801	4.068	3.828	3.6198	3.9078	3.96	3.948	4.056	3.876
VOC	B	4.1615	4.0114	4.2239	3.7704	3.888	3.894	3.804	3.8159	3.954	3.936	3.8271	1.308
Furans	C	3.9209	3.901	3.9978	3.7884	3.816	3.84	3.774	3.9326	3.978	3.894	3.8952	1.298
Ethylamine	D	12.404	12.876	12.543	12.814	11.778	11.928	11.418	12.004	12.186	12.234	24.21	11.946
Acetonitrile	E	11.744	12.172	12.313	12.061	12.54	12.468	12.108	11.712	11.91	12.294	12.066	12.048
Mercury	F	30.45	29.558	30.125	30.703	30.385	30.972	29.55	29.705	30.12	29.928	29.982	29.676
Ammonia	G	24.949	23.95	24.379	23.727	24.294	24.294	23.946	23.917	24.432	23.838	23.858	23.646
Aldehyde	H	24.336	24.194	23.921	23.735	24.576	24.918	24.426	23.828	23.898	24	23.562	23.886
1,3-Butadiene	I	24.188	24.663	24.013	24.526	24.042	24.012	23.172	23.391	23.55	23.796	23.736	23.586
Pyridine	J	125.28	126.54	123	124.2	124.8	125.4	123	124.2	123.6	119.94	120	118.8
Nitrosamines	K	238.98	250.74	238.8	247.2	240.6	242.4	240.6	243.6	246	241.2	238.8	241.2

Flow Rates (ml/min)

Sample Box Number		Mach.	Mach.	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2
Analyte	Line	Base 1	Base 2										
SVOC	A	32.685	35.064	30.97	34.835	33.9	31.9	30.165	32.565	33	32.9	33.8	32.3
VOC	B	34.68	33.428	35.199	31.42	32.4	32.45	31.7	31.8	32.95	32.8	31.893	10.9
Furans	C	32.674	32.509	33.315	31.57	31.8	32	31.45	32.772	33.15	32.45	32.46	10.817
Ethylamine	D	103.37	107.3	104.53	106.79	98.15	99.4	95.15	100.04	101.55	101.95	201.75	99.55
Acetonitrile	E	97.869	101.43	102.61	100.51	104.5	103.9	100.9	97.6	99.25	102.45	100.55	100.4
Mercury	F	253.75	246.32	251.05	255.86	253.21	258.1	246.25	247.55	251	249.4	249.85	247.3
Ammonia	G	207.91	199.58	203.16	197.73	202.45	202.45	199.55	199.31	203.6	198.65	198.82	197.05
Aldehyde	H	202.8	201.62	199.35	197.79	204.8	207.65	203.55	198.57	199.15	200	196.35	199.05
1, 3-Butadiene	I	201.57	205.53	200.11	204.39	200.35	200.1	193.1	194.93	196.25	198.3	197.8	196.55
Pyridine	J	1044	1054.5	1025	1035	1040	1045	1025	1035	1030	999.5	1000	990
Nitrosamines	K	1991.5	2089.5	1990	2060	2005	2020	2005	2030	2050	2010	1990	2010

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

Volumes Air Collected (L)

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

Flow Rates (ml/min)

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

C.2.2 Temperature, Pressure, and Relative Humidity

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

Influent- Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	76.3	83.7	87	88.2	87.4	76.6	70.9	71	65.5
Pressure	Torr	738.5	719.7	720.6	721.8	722	720	734.1	723.6	721.2
Relative Humidity	%	38.4	86	49.8	47.5	48.4	63.6	75.2	73.5	81.2
NH3	ppm									
VOC	ppm									

Influent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	82.9	87.4	88.3	88.1	87.4	70.7	70.7	68	66
Pressure	Torr	736.6	719	719.7	721.3	722	721	734.3	723.5	721.4
Relative Humidity	%	34.4	48.9	48	48	48.4	74.8	76.3	78.6	76.9
NH3	ppm		99+	99+	99+	99+	99+	99+	99+	99+
VOC	ppm		24.3	27.7	28.1	24.9	26.1	9.8	22.6	9.6

Effluent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	75.6	81.9	87.2	91.2	89.3	78	71.8	69.6	66.4
Pressure	Torr	373.6	386.9	383.8	400.4	401.1	389.6	394.1	383.8	395
Relative Humidity	%	45.2	74	45.6	43	43.4	47.2	49.4	52.6	56.4
NH3	ppm									
VOC	ppm									

Effluent- Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	81.2	88.6	92.1	90.8	89.3	72.5	69.4	67.8	66
Pressure	Torr	401.7	406.4	404.9	406.6	401	400.6	401	398.6	400.2
Relative Humidity	%	40.4	44.8	42.9	43.3	43.4	52.2	52	56.3	56.9
NH3	ppm		99+	99+	99+	99+	99+	99+	99+	99
VOC	ppm		8.7	17.6	22.3	21.5	25.2	9.8	10.6	17.1

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

Influent- Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	76.1	83.1	87.8	89.2	90.7	83.9	80.3	74.6	72.9
Pressure	Torr	735.8	719.4	726.2	720	720.2	718.2	719.2	720	718
Relative Humidity	%	60.7	59.5	49.6	47.6	45.2	53.6	59.6	67.9	71.3
NH3	ppm									
VOC	ppm									

Influent - Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	82.9	89	91.3	91.1	84.1	79.6	74.8	72.7	71.2
Pressure	Torr	735.7	718.9	725.3	719	720	718	719.4	720.8	718.1
Relative Humidity	%	51.3	48.7	45.5	45.8	53	60.4	68.4	71.3	74.8
NH3	ppm									
VOC	ppm									

Effluent - Pre		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	75.9	82.6	88.4	90.7	91.4	85.3	83.2	75.7	73.4
Pressure	Torr	399.5	393.2	397.7	395.4	395	395.2	395	398.6	399.2
Relative Humidity	%	47.3	43	43.4	41.1	40.8	41.9	43.1	47	48.6
NH3	ppm									
VOC	ppm									

Effluent- Post		After Sample Taken								
Reading	UOM	Baseline	A	B	C	D	E	F	G	H
Temperature	F	82.2	90.3	94.9	94.6	87	83.4	76.4	73.5	71.8
Pressure	Torr	409.5	410.8	410.5	412	410.1	407	406.6	403.5	404.9
Relative Humidity	%	43.1	43.6	39.8	39.9	41.8	43.7	47.7	49.7	51.8
NH3	ppm		99+							
VOC	ppm		21.7							

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2														
S16T021061		3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021061		95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021061		108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021061		92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021061		78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021061		84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021061		112-40-3	Dodecane	NGS	90	<0.81	61	n/a	n/a	n/a	n/a	0.81	n/a	E
S16T021061		544-76-3	Hexadecane-	NGS	88	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021061		629-59-4	Tetradecane	NGS	87	<1.2	6.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021061		126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021061		629-50-5	Tridecane	NGS	95	<0.50	18	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021061		629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021061		629-62-9	Pentadecane	NGS	88	<2.8	7.6	n/a	n/a	n/a	n/a	2.8	n/a	J

8/11/16

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J - Estimated
N - Named TIC

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021062			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021062			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021062			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021062			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021062			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021062			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021062			112-40-3	Dodecane	NGS	90	<0.81	42	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021062			544-76-3	Hexadecane-	NGS	88	<1.9	2.6	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021062			629-59-4	Tetradecane	NGS	87	<1.2	4.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021062			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021062			629-50-5	Tridecane	NGS	95	<0.50	13	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021062			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021062			629-62-9	Pentadecane	NGS	88	<2.8	5.1	n/a	n/a	n/a	n/a	2.8	n/a	J

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021063			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021063			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021063			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021063			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021063			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021063			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021063			112-40-3	Dodecane	NGS	90	<0.81	70	n/a	n/a	n/a	n/a	0.81	n/a	E
S16T021063			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021063			629-59-4	Tetradecane	NGS	87	<1.2	5.1	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021063			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021063			629-50-5	Tridecane	NGS	95	<0.50	18	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021063			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021063			629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2														
S16T021064		3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021064		95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021064		108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021064		92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021064		78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021064		84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021064		112-40-3	Dodecane	NGS	90	<0.81	<0.81	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021064		544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021064		629-59-4	Tetradecane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021064		126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021064		629-50-5	Tridecane	NGS	95	<0.50	<0.50	n/a	n/a	n/a	n/a	0.50	n/a	
S16T021064		629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021064		629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021065			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021065			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021065			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021065			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021065			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021065			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021065			112-40-3	Dodecane	NGS	90	<0.81	81	n/a	n/a	n/a	n/a	0.81	n/a	E
S16T021065			544-76-3	Hexadecane-	NGS	88	<1.9	6.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021065			629-59-4	Tetradecane	NGS	87	<1.2	8.5	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021065			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021065			629-50-5	Tridecane	NGS	95	<0.50	36	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021065			629-78-7	Heptadecane	NGS	100	<5.2	6.2	n/a	n/a	n/a	n/a	5.2	n/a	J
S16T021065			629-62-9	Pentadecane	NGS	88	<2.8	10	n/a	n/a	n/a	n/a	2.8	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range
N - Named TIC

B - Blank Contamination

T - Tentatively Identified Compound

J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021066			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021066			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021066			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021066			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021066			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021066			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021066			112-40-3	Dodecane	NGS	90	<0.81	40	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021066			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021066			629-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021066			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021066			629-50-5	Tridecane	NGS	95	<0.50	11	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021066			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021066			629-62-9	Pentadecane	NGS	88	<2.8	3.5	n/a	n/a	n/a	n/a	2.8	n/a	J

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B - Blank Contamination

T - Tentatively Identified Compound

J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021067			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021067			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021067			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021067			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021067			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021067			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021067			112-40-3	Dodecane	NGS	90	<0.81	34	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021067			544-76-3	Hexadecane-	NGS	88	<1.9	2.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021067			629-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021067			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021067			629-50-5	Tridecane	NGS	95	<0.50	9.3	n/a	n/a	n/a	n/a	0.46	n/a	J
S16T021067			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021067			629-62-9	Pentadecane	NGS	88	<2.8	4.5	n/a	n/a	n/a	n/a	2.8	n/a	J

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021069			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021069			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021069			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021069			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021069			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021069			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021069			112-40-3	Dodecane	NGS	90	<0.81	31	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021069			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021069			629-59-4	Tetradecane	NGS	87	<1.2	3.2	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021069			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021069			629-50-5	Tridecane	NGS	95	<0.50	12	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021069			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021069			629-62-9	Pentadecane	NGS	88	<2.8	3.2	n/a	n/a	n/a	n/a	2.8	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021070			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021070			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021070			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021070			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021070			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021070			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021070			112-40-3	Dodecane	NGS	90	<0.81	27	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021070			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021070			629-59-4	Tetradecane	NGS	87	<1.2	1.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021070			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021070			629-50-5	Tridecane	NGS	95	<0.50	6.6	n/a	n/a	n/a	n/a	0.46	n/a	J
S16T021070			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021070			629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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T - Tentatively Identified Compound
J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021072			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021072			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021072			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021072			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021072			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021072			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021072			112-40-3	Dodecane	NGS	90	<0.81	37	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021072			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021072			629-59-4	Tetradecane	NGS	87	<1.2	2.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021072			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021072			629-50-5	Tridecane	NGS	95	<0.50	14	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021072			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021072			629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021073			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<1.1	<10	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021073			95-48-7	2-Methylphenol	NGS	90	<3.4	<10	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021073			108-39-4M	Cresol (m & p)	NGS	96	<2.4	<10	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021073			92-52-4	Biphenyl	NGS	93	<2.0	<10	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021073			78-46-6	Dibutyl butylphosphonate	NGS	100	<2.9	<10	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021073			84-66-2	Diethylphthalate	NGS	78	<2.8	<10	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021073			112-40-3	Dodecane	NGS	92	1.0	27	n/a	n/a	n/a	n/a	0.81	n/a	B
S16T021073			544-76-3	Hexadecane-	NGS	92	<1.9	<10	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021073			629-59-4	Tetradecane	NGS	97	<1.2	<10	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021073			126-73-8	Tributyl phosphate	NGS	130	<6.0	<10	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021073			629-50-5	Tridecane	NGS	89	1.8	<10	n/a	n/a	n/a	n/a	0.46	n/a	BJ
S16T021073			629-78-7	Heptadecane	NGS	120	<5.2	<10	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021073			629-62-9	Pentadecane	NGS	96	<2.8	<10	n/a	n/a	n/a	n/a	2.8	n/a	

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T - Tentatively Identified Compound

J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021203			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<1.1	<10	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021203			95-48-7	2-Methylphenol	NGS	90	<3.4	<10	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021203			108-39-4M	Cresol (m & p)	NGS	96	<2.4	<10	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021203			92-52-4	Biphenyl	NGS	93	<2.0	<10	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021203			78-46-6	Dibutyl butylphosphonate	NGS	100	<2.9	<10	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021203			84-66-2	Diethylphthalate	NGS	78	<2.8	<10	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021203			112-40-3	Dodecane	NGS	92	1.0	55	n/a	n/a	n/a	n/a	0.81	n/a	BE
S16T021203			544-76-3	Hexadecane-	NGS	92	<1.9	<10	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021203			629-59-4	Tetradecane	NGS	97	<1.2	<10	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021203			126-73-8	Tributyl phosphate	NGS	130	<6.0	<10	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021203			629-50-5	Tridecane	NGS	89	1.8	13	n/a	n/a	n/a	n/a	0.46	n/a	B
S16T021203			629-78-7	Heptadecane	NGS	120	<5.2	<10	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021203			629-62-9	Pentadecane	NGS	96	<2.8	<10	n/a	n/a	n/a	n/a	2.8	n/a	J

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T - Tentatively Identified Compound

J - Estimated

12/5/16

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021061			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021061			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021061			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021061			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021061			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021061			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021061			112-40-3	Dodecane	NGS	90	<0.81	61	n/a	n/a	n/a	n/a	0.81	n/a	E
S16T021061			544-76-3	Hexadecane-	NGS	88	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021061			629-59-4	Tetradecane	NGS	87	<1.2	6.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021061			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021061			629-50-5	Tridecane	NGS	95	<0.50	18	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021061			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021061			629-62-9	Pentadecane	NGS	88	<2.8	7.6	n/a	n/a	n/a	n/a	2.8	n/a	J

AMENDED REPORT

~~Please see Comments~~
CWK 12/5/16

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range
B - Blank Contamination
N - Named TIC
T - Tentatively Identified Compound
J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021062			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021062			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021062			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021062			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021062			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021062			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021062			112-40-3	Dodecane	NGS	90	<0.81	42	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021062			544-76-3	Hexadecane-	NGS	88	<1.9	2.6	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021062			629-59-4	Tetradecane	NGS	87	<1.2	4.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021062			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021062			629-50-5	Tridecane	NGS	95	<0.50	13	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021062			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021062			629-62-9	Pentadecane	NGS	88	<2.8	5.1	n/a	n/a	n/a	n/a	2.8	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021063			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021063			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021063			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021063			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021063			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021063			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021063			112-40-3	Dodecane	NGS	90	<0.81	70	n/a	n/a	n/a	n/a	0.81	n/a	E
S16T021063			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021063			629-59-4	Tetradecane	NGS	87	<1.2	5.1	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021063			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021063			629-50-5	Tridecane	NGS	95	<0.50	18	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021063			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021063			629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021064			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021064			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021064			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021064			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021064			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021064			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021064			112-40-3	Dodecane	NGS	90	<0.81	<0.81	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021064			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021064			629-59-4	Tetradecane	NGS	87	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021064			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021064			629-50-5	Tridecane	NGS	95	<0.50	<0.50	n/a	n/a	n/a	n/a	0.50	n/a	
S16T021064			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021064			629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021065			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021065			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021065			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021065			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021065			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021065			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021065			112-40-3	Dodecane	NGS	90	<0.81	81	n/a	n/a	n/a	n/a	0.81	n/a	E
S16T021065			544-76-3	Hexadecane-	NGS	88	<1.9	6.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021065			629-59-4	Tetradecane	NGS	87	<1.2	8.5	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021065			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021065			629-50-5	Tridecane	NGS	95	<0.50	36	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021065			629-78-7	Heptadecane	NGS	100	<5.2	6.2	n/a	n/a	n/a	n/a	5.2	n/a	J
S16T021065			629-62-9	Pentadecane	NGS	88	<2.8	10	n/a	n/a	n/a	n/a	2.8	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162089
SDG Number:
Customer Sample ID: 16-05982-1-D1
Customer Sample ID: 16-05982-1-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															
S16T021066			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021066			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021066			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021066			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021066			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021066			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021066			112-40-3	Dodecane	NGS	90	<0.81	40	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021066			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021066			629-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021066			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021066			629-50-5	Tridecane	NGS	95	<0.50	11	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021066			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021066			629-62-9	Pentadecane	NGS	88	<2.8	3.5	n/a	n/a	n/a	n/a	2.8	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021067			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021067			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021067			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021067			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021067			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021067			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021067			112-40-3	Dodecane	NGS	90	<0.81	34	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021067			544-76-3	Hexadecane-	NGS	88	<1.9	2.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021067			629-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021067			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021067			629-50-5	Tridecane	NGS	95	<0.50	9.3	n/a	n/a	n/a	n/a	0.46	n/a	J
S16T021067			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021067			629-62-9	Pentadecane	NGS	88	<2.8	4.5	n/a	n/a	n/a	n/a	2.8	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021069			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021069			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021069			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021069			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021069			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021069			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021069			112-40-3	Dodecane	NGS	90	<0.81	31	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021069			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021069			629-59-4	Tetradecane	NGS	87	<1.2	3.2	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021069			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021069			629-50-5	Tridecane	NGS	95	<0.50	12	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021069			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021069			629-62-9	Pentadecane	NGS	88	<2.8	3.2	n/a	n/a	n/a	n/a	2.8	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021070			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021070			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021070			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021070			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021070			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021070			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021070			112-40-3	Dodecane	NGS	90	<0.81	27	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021070			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021070			629-59-4	Tetradecane	NGS	87	<1.2	1.4	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021070			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021070			629-50-5	Tridecane	NGS	95	<0.50	6.6	n/a	n/a	n/a	n/a	0.46	n/a	J
S16T021070			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021070			629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021072			3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021072			95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021072			108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021072			92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021072			78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021072			84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021072			112-40-3	Dodecane	NGS	90	<0.81	37	n/a	n/a	n/a	n/a	0.81	n/a	
S16T021072			544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021072			629-59-4	Tetradecane	NGS	87	<1.2	2.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021072			126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021072			629-50-5	Tridecane	NGS	95	<0.50	14	n/a	n/a	n/a	n/a	0.46	n/a	
S16T021072			629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021072			629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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E - Outside Calibration Range
B - Blank Contamination
N - Named TIC
T - Tentatively Identified Compound
J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021073			3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021073			95-48-7	2-Methylphenol	NGS	90	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021073			108-39-4M	Cresol (m & p)	NGS	96	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021073			92-52-4	Biphenyl	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021073			78-46-6	Dibutyl butylphosphonate	NGS	100	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021073			84-66-2	Diethylphthalate	NGS	78	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021073			112-40-3	Dodecane	NGS	92	1.0	27	n/a	n/a	n/a	n/a	0.81	n/a	B
S16T021073			544-76-3	Hexadecane-	NGS	92	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021073			629-59-4	Tetradecane	NGS	97	<1.2	2.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021073			126-73-8	Tributyl phosphate	NGS	130	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021073			629-50-5	Tridecane	NGS	89	1.8	8.0	n/a	n/a	n/a	n/a	0.46	n/a	BJ
S16T021073			629-78-7	Heptadecane	NGS	120	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021073			629-62-9	Pentadecane	NGS	96	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2														
S16T021203		3891-98-3	2,6,10-Trimethyldodecane	NGS	98	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	n/a	
S16T021203		95-48-7	2-Methylphenol	NGS	90	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a	
S16T021203		108-39-4M	Cresol (m & p)	NGS	96	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021203		92-52-4	Biphenyl	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021203		78-46-6	Dibutyl butylphosphonate	NGS	100	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a	
S16T021203		84-66-2	Diethylphthalate	NGS	78	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021203		112-40-3	Dodecane	NGS	92	1.0	55	n/a	n/a	n/a	n/a	0.81	n/a	BE
S16T021203		544-76-3	Hexadecane-	NGS	92	<1.9	3.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021203		629-59-4	Tetradecane	NGS	97	<1.2	6.0	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021203		126-73-8	Tributyl phosphate	NGS	130	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a	
S16T021203		629-50-5	Tridecane	NGS	89	1.8	13	n/a	n/a	n/a	n/a	0.46	n/a	B
S16T021203		629-78-7	Heptadecane	NGS	120	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a	
S16T021203		629-62-9	Pentadecane	NGS	96	<2.8	6.4	n/a	n/a	n/a	n/a	2.8	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021061			Ethylene Glycol	107-21-1	3.38	NGS	2.7E+03	JNT
S16T021061			Undecanal, 2-methyl-	110-41-8	4.18	NGS	53	JNT
S16T021061			Unknown-1	--	4.27	NGS	39	JT
S16T021061			Cyclotetrasiloxane, octamethyl	556-67-2	4.39	NGS	300	JNT
S16T021061			Phenol	108-95-2	4.46	NGS	37	JNT
S16T021061			1-Hexene, 3,5-dimethyl-	7423-69-0	4.85	NGS	63	JNT
S16T021061			Tetrasiloxane, decamethyl-	141-62-8	5.00	NGS	48	JNT
S16T021061			Undecane	1120-21-4	5.07	NGS	82	JNT
S16T021061			Hydroxylamine, O-decyl-	29812-79-1	5.12	NGS	48	JNT
S16T021061			N-Benzyloxy-2,2-bis(trifluorom	55734-40-2	5.21	NGS	49	JNT
S16T021061			2-Hexyl-1-octanol	19780-79-1	5.39	NGS	48	JNT
S16T021061			2,6-Dimethyldecane	13150-81-7	5.46	NGS	150	JNT
S16T021061			Decane, 2,4,6-trimethyl-	62108-27-4	5.51	NGS	16	JNT
S16T021061			Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	56	JNT
S16T021061			Ethanol, 2-phenoxy-	122-99-6	6.57	NGS	72	JNT
S16T021061			Benzothiazole	95-16-9	6.63	NGS	62	JNT
S16T021061			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	48	JNT
S16T021061			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	43	JNT
S16T021061			Dodecane, 2,6,11-trimethyl-	31295-56-4	7.27	NGS	32	JNT
S16T021061			Dodecane, 2,6,10-trimethyl-	3891-98-3	7.35	NGS	28	JNT
S16T021061			Propanoic acid, 2-methyl-, 1-(	74381-40-1	9.20	NGS	26	JNT

8/11/16

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021062				Formamide	75-12-7	2.65	NGS	200	JNT
S16T021062				Tetrachloroethene	127-18-4	2.83	NGS	110	JNT
S16T021062				Propanoic acid, 2,2-dimethyl-	75-98-9	3.26	NGS	120	JNT
S16T021062				2,5,6-Trimethyldecane	62108-23-0	3.66	NGS	28	JNT
S16T021062				Decane, 2,6,8-trimethyl-	62108-26-3	3.72	NGS	72	JNT
S16T021062				2,2,7,7-Tetramethyloctane	1071-31-4	4.22	NGS	26	JNT
S16T021062				Cyclotetrasiloxane, octamethyl	556-67-2	4.39	NGS	520	JNT
S16T021062				Phenol	108-95-2	4.43	NGS	100	JNT
S16T021062				Hexane, 2,2-dimethyl-	590-73-8	4.51	NGS	500	JNT
S16T021062				1-Octanol, 2-butyl-	3913-02-8	4.60	NGS	29	JNT
S16T021062				Heptane, 4-ethyl-2,2,6,6-tetra	62108-31-0	4.78	NGS	72	JNT
S16T021062				1-Pentanol, 2-ethyl-4-methyl-	106-67-2	4.85	NGS	130	JNT
S16T021062				3,3-Dimethylhexane	563-16-6	4.89	NGS	300	JNT
S16T021062				1,1,1,3,5,5,5-Heptamethyltrisi	1873-88-7	5.00	NGS	43	JNT
S16T021062				Decane, 2,5,9-trimethyl-	62108-22-9	5.15	NGS	93	JNT
S16T021062				Acetophenone	98-86-2	5.20	NGS	40	JNT
S16T021062				2-Hexyl-1-octanol	19780-79-1	5.38	NGS	52	JNT
S16T021062				2,6-Dimethyldecane	13150-81-7	5.45	NGS	200	JNT
S16T021062				Undecane, 2,6-dimethyl-	17301-23-4	5.51	NGS	15	JNT
S16T021062				Decamethylcyclopentasiloxane	541-02-6	5.72	NGS	65	JNT
S16T021062				Heptanoic acid, 2-ethyl-	3274-29-1	5.82	NGS	27	JNT
S16T021062				Benzothiazole	95-16-9	6.62	NGS	80	JNT
S16T021062				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	55	JNT
S16T021062				Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	43	JNT
S16T021062				Dodecane, 2,6,11-trimethyl-	31295-56-4	7.27	NGS	34	JNT
S16T021062				Propanoic acid, 2-methyl-, 1-(	74381-40-1	9.20	NGS	45	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021063				Propanoic acid, 2,2-dimethyl-	75-98-9	3.30	NGS	31	JNT
S16T021063				Cyclotetrasiloxane, octamethyl	556-67-2	4.39	NGS	210	JNT
S16T021063				Phenol	108-95-2	4.45	NGS	49	JNT
S16T021063				1-Pentanol, 2-ethyl-4-methyl-	106-67-2	4.51	NGS	80	JNT
S16T021063				Isooctanol	26952-21-6	4.86	NGS	71	JNT
S16T021063				1-Octene, 3,7-dimethyl-	4984-01-4	4.91	NGS	67	JNT
S16T021063				5-Methyl-1-heptanol	7212-53-5	4.98	NGS	25	JNT
S16T021063				Tetrasiloxane, decamethyl-	141-62-8	5.00	NGS	32	JNT
S16T021063				Acetophenone	98-86-2	5.20	NGS	27	JNT
S16T021063				2-Hexyl-1-octanol	19780-79-1	5.38	NGS	41	JNT
S16T021063				2,6-Dimethyldecane	13150-81-7	5.45	NGS	140	JNT
S16T021063				Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	16	JNT
S16T021063				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	50	JNT
S16T021063				Benzothiazole	95-16-9	6.63	NGS	71	JNT
S16T021063				Unknown-1	--	6.68	NGS	28	JT
S16T021063				Octane, 2,3,6,7-tetramethyl-	52670-34-5	6.91	NGS	47	JNT
S16T021063				Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	36	JNT
S16T021063				Decane, 2,4,6-trimethyl-	62108-27-4	7.23	NGS	6.1	JNT
S16T021063				Dodecane, 2,7,10-trimethyl-	74645-98-0	7.27	NGS	33	JNT

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T - Tentatively Identified Compound

J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021065			Propanoic acid, 2,2-dimethyl-	75-98-9	3.23	NGS	30	JNT
S16T021065			Cyclotetrasiloxane, octamethyl	556-67-2	4.39	NGS	240	JNT
S16T021065			Phenol	108-95-2	4.44	NGS	46	JNT
S16T021065			Isooctanol	26952-21-6	4.85	NGS	42	JNT
S16T021065			Decane, 2,4,6-trimethyl-	62108-27-4	5.07	NGS	36	JNT
S16T021065			Undecane	1120-21-4	5.45	NGS	110	JNT
S16T021065			Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	14	JNT
S16T021065			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	58	JNT
S16T021065			Benzothiazole	95-16-9	6.63	NGS	94	JNT
S16T021065			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	56	JNT
S16T021065			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	40	JNT
S16T021065			Undecane, 3,7-dimethyl-	17301-29-0	7.27	NGS	39	JNT
S16T021065			2,6-Dimethyldecane	13150-81-7	7.35	NGS	26	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021066			Propanoic acid, 2,2-dimethyl-	75-98-9	3.26	NGS	43	JNT
S16T021066			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	180	JNT
S16T021066			Phenol	108-95-2	4.44	NGS	35	JNT
S16T021066			2,2-Dimethylpropionic acid, de	215667-91-7	4.51	NGS	39	JNT
S16T021066			Isooctanol	26952-21-6	4.86	NGS	58	JNT
S16T021066			2,6-Dimethyldecane	13150-81-7	5.07	NGS	32	JNT
S16T021066			Decane, 2,4,6-trimethyl-	62108-27-4	5.45	NGS	79	JNT
S16T021066			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	57	JNT
S16T021066			Benzothiazole	95-16-9	6.62	NGS	71	JNT
S16T021066			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	37	JNT
S16T021066			Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.08	NGS	31	JNT
S16T021066			2,2,4-Trimethyl-1,3-pentanedio	6846-50-0	9.20	NGS	43	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021067				Formamide	75-12-7	2.67	NGS	94	JNT
S16T021067				Propanoic acid, 2,2-dimethyl-	75-98-9	3.23	NGS	34	JNT
S16T021067				Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	150	JNT
S16T021067				Phenol	108-95-2	4.43	NGS	28	JNT
S16T021067				2-Octyn-1-ol	20739-58-6	4.87	NGS	30	JNT
S16T021067				2,6-Dimethyldecane	13150-81-7	5.45	NGS	59	JNT
S16T021067				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	58	JNT
S16T021067				Benzothiazole	95-16-9	6.61	NGS	73	JNT
S16T021067				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.90	NGS	35	JNT

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021069				Cyclotetrasiloxane, octamethyl	556-67-2	4.39	NGS	140	JNT
S16T021069				Phenol	108-95-2	4.43	NGS	36	JNT
S16T021069				1-Hexene, 3,5-dimethyl-	7423-69-0	4.85	NGS	32	JNT
S16T021069				1-Octene, 3,7-dimethyl-	4984-01-4	4.91	NGS	29	JNT
S16T021069				Decane, 2,4,6-trimethyl-	62108-27-4	5.07	NGS	20	JNT
S16T021069				2,6-Dimethyldecane	13150-81-7	5.45	NGS	50	JNT
S16T021069				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	37	JNT
S16T021069				Benzothiazole	95-16-9	6.62	NGS	43	JNT
S16T021069				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	32	JNT
S16T021069				Undecane, 2-methyl-	7045-71-8	7.27	NGS	21	JNT

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

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

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range
N - Named TIC
B - Blank Contamination
T - Tentatively Identified Compound
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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021072			Butane, 1-(ethenyloxy)-3-methy	39782-38-2	2.65	NGS	32	JNT
S16T021072			Undecanal, 2-methyl-	110-41-8	3.58	NGS	28	JNT
S16T021072			2-Heptanone, 6-methyl-	928-68-7	4.16	NGS	27	JNT
S16T021072			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	180	JNT
S16T021072			Phenol	108-95-2	4.43	NGS	49	JNT
S16T021072			1-Hexene, 3,5-dimethyl-	7423-69-0	4.84	NGS	27	JNT
S16T021072			1-Octene, 3,7-dimethyl-	4984-01-4	4.90	NGS	30	JNT
S16T021072			2,6-Dimethyldecane	13150-81-7	5.06	NGS	26	JNT
S16T021072			Decane, 2,4,6-trimethyl-	62108-27-4	5.45	NGS	66	JNT
S16T021072			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	45	JNT
S16T021072			Benzothiazole	95-16-9	6.61	NGS	51	JNT

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J - Estimated

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021073				Unknown-1		4.36	NGS	99	JT
S16T021073				Acetophenone	98-86-2	5.19	NGS	11	JNT
S16T021073				Undecane	1120-21-4	5.45	NGS	48	JNT
S16T021073				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	56	JNT
S16T021073				Benzothiazole	95-16-9	6.60	NGS	43	JNT
S16T021073				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	16	JNT
S16T021073				Dodecane, 2,6,10-trimethyl-	3891-98-3	7.26	NGS	12	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021203			Propanoic acid, 2,2-dimethyl-	75-98-9	3.22	NGS	38	JNT
S16T021203			2-Butoxyethanol	111-76-2	3.72	NGS	23	JNT
S16T021203			Unknown-1		4.39	NGS	230	JT
S16T021203			Phenol	108-95-2	4.44	NGS	43	JNT
S16T021203			Decane, 2,4,6-trimethyl-	62108-27-4	5.12	NGS	5.9	JNT
S16T021203			Acetophenone	98-86-2	5.20	NGS	14	JNT
S16T021203			Undecane, 3,7-dimethyl-	17301-29-0	5.45	NGS	85	JNT
S16T021203			Undecane, 2,6-dimethyl-	17301-23-4	5.51	NGS	27	JNT
S16T021203			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	62	JNT
S16T021203			Benzothiazole	95-16-9	6.63	NGS	88	JNT
S16T021203			Unknown-2		6.68	NGS	29	JT
S16T021203			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.91	NGS	48	JNT
S16T021203			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	50	JNT
S16T021203			Dodecane, 2,7,10-trimethyl-	74645-98-0	7.27	NGS	36	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021076			3891-98-3	2,6,10-Trimethyldodecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021076			95-48-7	2-Methylphenol	NGS	76	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021076			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021076			92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021076			78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021076			84-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021076			112-40-3	Dodecane	NGS	92	<0.55	96	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021076			544-76-3	Hexadecane-	NGS	110	<3.3	4.2	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021076			629-59-4	Tetradecane	NGS	110	<3.9	9.3	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021076			126-73-8	Tributyl phosphate	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021076			629-50-5	Tridecane	NGS	93	<1.6	32	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021076			629-78-7	Heptadecane	NGS	94	<2.4	3.3	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021076			629-62-9	Pentadecane	NGS	110	<3.0	7.1	n/a	n/a	n/a	n/a	3.0	n/a	J

Jason Luze
8/18/16

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-A2
Customer Sample ID: 16-05983-1-A2

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2														
S16T021077		3891-98-3	2,6,10-Trimethyldodecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021077		95-48-7	2-Methylphenol	NGS	76	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021077		108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021077		92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021077		78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021077		84-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021077		112-40-3	Dodecane	NGS	92	<0.55	54	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021077		544-76-3	Hexadecane-	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021077		629-59-4	Tetradecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021077		126-73-8	Tributyl phosphate	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021077		629-50-5	Tridecane	NGS	93	<1.6	18	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021077		629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021077		629-62-9	Pentadecane	NGS	110	<3.0	4.4	n/a	n/a	n/a	n/a	3.0	n/a	J

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T - Tentatively Identified Compound

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-B1
Customer Sample ID: 16-05983-1-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															
S16T021078			3891-98-3	2,6,10-Trimethyldodecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021078			95-48-7	2-Methylphenol	NGS	76	<4.9	5.6	n/a	n/a	n/a	n/a	4.9	n/a	J
S16T021078			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021078			92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021078			78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021078			84-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021078			112-40-3	Dodecane	NGS	92	<0.55	94	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021078			544-76-3	Hexadecane-	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021078			629-59-4	Tetradecane	NGS	110	<3.9	5.2	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021078			126-73-8	Tributyl phosphate	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021078			629-50-5	Tridecane	NGS	93	<1.6	25	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021078			629-78-7	Heptadecane	NGS	94	<2.4	3.8	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021078			629-62-9	Pentadecane	NGS	110	<3.0	4.9	n/a	n/a	n/a	n/a	3.0	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2															
S16T021079			3891-98-3	2,6,10-Trimethyldodecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021079			95-48-7	2-Methylphenol	NGS	76	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021079			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021079			92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021079			78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021079			84-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021079			112-40-3	Dodecane	NGS	92	<0.55	0.80	n/a	n/a	n/a	n/a	0.55	n/a	J
S16T021079			544-76-3	Hexadecane-	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021079			629-59-4	Tetradecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021079			126-73-8	Tributyl phosphate	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021079			629-50-5	Tridecane	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021079			629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021079			629-62-9	Pentadecane	NGS	110	<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: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-C1
Customer Sample ID: 16-05983-1-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														
S16T021080		3891-98-3	2,6,10-Trimethyldodecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021080		95-48-7	2-Methylphenol	NGS	76	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021080		108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021080		92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021080		78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021080		84-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021080		112-40-3	Dodecane	NGS	92	<0.55	91	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021080		544-76-3	Hexadecane-	NGS	110	<3.3	5.6	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021080		629-59-4	Tetradecane	NGS	110	<3.9	7.3	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021080		126-73-8	Tributyl phosphate	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021080		629-50-5	Tridecane	NGS	93	<1.6	41	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021080		629-78-7	Heptadecane	NGS	94	<2.4	5.6	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021080		629-62-9	Pentadecane	NGS	110	<3.0	9.1	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: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-D1
Customer Sample ID: 16-05983-1-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															
S16T021081			3891-98-3	2,6,10-Trimethyldodecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021081			95-48-7	2-Methylphenol	NGS	76	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021081			108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021081			92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021081			78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021081			84-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021081			112-40-3	Dodecane	NGS	92	<0.55	7.8	n/a	n/a	n/a	n/a	0.55	n/a	J
S16T021081			544-76-3	Hexadecane-	NGS	110	<3.3	5.1	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021081			629-59-4	Tetradecane	NGS	110	<3.9	4.2	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021081			126-73-8	Tributyl phosphate	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021081			629-50-5	Tridecane	NGS	93	<1.6	6.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021081			629-78-7	Heptadecane	NGS	94	<2.4	4.6	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021081			629-62-9	Pentadecane	NGS	110	<3.0	7.0	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: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-E1
Customer Sample ID: 16-05983-1-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														
S16T021082		3891-98-3	2,6,10-Trimethyldodecane	NGS	110	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021082		95-48-7	2-Methylphenol	NGS	76	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021082		108-39-4M	Cresol (m & p)	NGS	77	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021082		92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021082		78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021082		84-66-2	Diethylphthalate	NGS	110	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021082		112-40-3	Dodecane	NGS	92	<0.55	51	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021082		544-76-3	Hexadecane-	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021082		629-59-4	Tetradecane	NGS	110	<3.9	4.6	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021082		126-73-8	Tributyl phosphate	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021082		629-50-5	Tridecane	NGS	93	<1.6	14	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021082		629-78-7	Heptadecane	NGS	94	<2.4	2.8	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021082		629-62-9	Pentadecane	NGS	110	<3.0	5.6	n/a	n/a	n/a	n/a	3.0	n/a	J

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N - Named TIC
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T - Tentatively Identified Compound

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-EFF-BASE
Customer Sample ID: 16-05983-1-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															
S16T021083			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	
S16T021083			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021083			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021083			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021083			78-46-6	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021083			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021083			112-40-3	Dodecane	NGS	98	<0.55	79	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021083			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021083			629-59-4	Tetradecane	NGS	95	<3.9	6.6	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021083			126-73-8	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021083			629-50-5	Tridecane	NGS	90	<1.6	15	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021083			629-78-7	Heptadecane	NGS	94	<2.4	2.8	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021083			629-62-9	Pentadecane	NGS	96	<3.0	6.0	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: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-F1
Customer Sample ID: 16-05983-1-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														
S16T021084		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	
S16T021084		95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021084		108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021084		92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021084		78-46-6	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021084		84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021084		112-40-3	Dodecane	NGS	98	<0.55	48	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021084		544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021084		629-59-4	Tetradecane	NGS	95	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021084		126-73-8	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021084		629-50-5	Tridecane	NGS	90	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021084		629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021084		629-62-9	Pentadecane	NGS	96	<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: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-G1
Customer Sample ID: 16-05983-1-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															
S16T021085			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	
S16T021085			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021085			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021085			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021085			78-46-6	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021085			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021085			112-40-3	Dodecane	NGS	98	<0.55	37	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021085			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021085			629-59-4	Tetradecane	NGS	95	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	
S16T021085			126-73-8	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021085			629-50-5	Tridecane	NGS	90	<1.6	9.9	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021085			629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021085			629-62-9	Pentadecane	NGS	96	<3.0	3.7	n/a	n/a	n/a	n/a	3.0	n/a	J

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-H1
Customer Sample ID: 16-05983-1-H1

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU SVOA #2														
S16T021086		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	
S16T021086		95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021086		108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021086		92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021086		78-46-6	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021086		84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021086		112-40-3	Dodecane	NGS	98	<0.55	64	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021086		544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021086		629-59-4	Tetradecane	NGS	95	<3.9	4.4	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021086		126-73-8	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021086		629-50-5	Tridecane	NGS	90	<1.6	24	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021086		629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021086		629-62-9	Pentadecane	NGS	96	<3.0	4.0	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: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-H2
Customer Sample ID: 16-05983-1-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															
S16T021087			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	
S16T021087			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021087			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021087			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021087			78-46-6	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021087			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021087			112-40-3	Dodecane	NGS	98	<0.55	39	n/a	n/a	n/a	n/a	0.55	n/a	
S16T021087			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021087			629-59-4	Tetradecane	NGS	95	<3.9	4.2	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021087			126-73-8	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	Q
S16T021087			629-50-5	Tridecane	NGS	90	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021087			629-78-7	Heptadecane	NGS	94	<2.4	2.5	n/a	n/a	n/a	n/a	2.4	n/a	JQ
S16T021087			629-62-9	Pentadecane	NGS	96	<3.0	4.6	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: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-IN-BASE
Customer Sample ID: 16-05983-1-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															
S16T021088			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	
S16T021088			95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021088			108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021088			92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021088			78-46-6	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021088			84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021088			112-40-3	Dodecane	NGS	98	<0.55	72	n/a	n/a	n/a	n/a	0.55	n/a	E
S16T021088			544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021088			629-59-4	Tetradecane	NGS	95	<3.9	7.5	n/a	n/a	n/a	n/a	3.9	n/a	J
S16T021088			126-73-8	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021088			629-50-5	Tridecane	NGS	90	<1.6	30	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021088			629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021088			629-62-9	Pentadecane	NGS	96	<3.0	7.2	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: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-A1
Customer Sample ID: 16-05983-1-A1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021076			Ethylene Glycol	107-21-1	2.50	NGS	99	JNT
S16T021076			3,5-Dimethyl-2-octanol	19781-09-0	2.63	NGS	54	JNT
S16T021076			2,4,6,8-Tetramethyl-1-undecene	59920-26-2	2.75	NGS	53	JNT
S16T021076			Octane	111-65-9	2.79	NGS	110	JNT
S16T021076			1-Butanol, 3,3-dimethyl-	624-95-3	3.22	NGS	200	JNT
S16T021076			Hydroperoxide, hexyl	4312-76-9	3.41	NGS	160	JNT
S16T021076			Hydroxylamine, O-decyl-	29812-79-1	3.55	NGS	51	JNT
S16T021076			Pentanal, 2,4-dimethyl-	27944-79-2	3.58	NGS	61	JNT
S16T021076			2-Ethyl-1-dodecanol	19780-33-7	3.67	NGS	230	JNT
S16T021076			1-Octanol, 2-butyl-	3913-02-8	3.99	NGS	130	JNT
S16T021076			2-Heptanone, 6-methyl-	928-68-7	4.16	NGS	140	JNT
S16T021076			2-Dodecanol	10203-28-8	4.25	NGS	110	JNT
S16T021076			1-Octene, 3,7-dimethyl-	4984-01-4	4.31	NGS	190	JNT
S16T021076			Cyclotetrasiloxane, octamethyl	556-67-2	4.38	NGS	1000	JNT
S16T021076			Phenol	108-95-2	4.44	NGS	83	JNT
S16T021076			Unknown-1	--	4.49	NGS	110	JT
S16T021076			Unknown-2	--	4.57	NGS	190	JT
S16T021076			Decane, 2,6,7-trimethyl-	62108-25-2	4.77	NGS	100	JNT
S16T021076			Acetic acid, trifluoro-, 3,7-d	28745-07-5	4.84	NGS	130	JNT
S16T021076			Cyclopentane, 1-methyl-2-(4-me	66553-50-2	4.91	NGS	97	JNT
S16T021076			10-Heneicosene (c,t)	95008-11-0	4.93	NGS	57	JNT
S16T021076			Trimethyl[4-(1,1,3,3,-tetramet	78721-87-6	5.01	NGS	79	JNT
S16T021076			Decane, 2,4,6-trimethyl-	62108-27-4	5.07	NGS	220	JNT
S16T021076			2,6-Dimethyldecane	13150-81-7	5.12	NGS	180	JNT
S16T021076			2-Hexyl-1-octanol	19780-79-1	5.15	NGS	54	JNT
S16T021076			2-Methyl-1-undecanol	10522-26-6	5.22	NGS	240	JNT
S16T021076			1,15-Pentadecanediol	14722-40-8	5.29	NGS	44	JNT

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8/18/16

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021076				1-Pentadecene, 2-methyl-	29833-69-0	5.38	NGS	250	JNT
S16T021076				Undecane	1120-21-4	5.46	NGS	850	JNT
S16T021076				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	54	JNT
S16T021076				Undecane, 2,6-dimethyl-	17301-23-4	6.42	NGS	18	JNT
S16T021076				Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	21	JNT
S16T021076				Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	38	JNT
S16T021076				Propanoic acid, 2-methyl-, 1-(	74381-40-1	9.19	NGS	46	JNT

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

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-A2
Customer Sample ID: 16-05983-1-A2

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021077			Propanoic acid, 2,2-dimethyl-	75-98-9	3.16	NGS	28	JNT
S16T021077			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	340	JNT
S16T021077			?-Ethyl-?-methylbenzyl alcohol	1565-75-9	5.37	NGS	43	JNT
S16T021077			Undecane	1120-21-4	5.45	NGS	100	JNT
S16T021077			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	160	JNT
S16T021077			Benzothiazole	95-16-9	6.61	NGS	75	JNT
S16T021077			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.90	NGS	51	JNT
S16T021077			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	81	JNT
S16T021077			Undecane, 3,7-dimethyl-	17301-29-0	7.27	NGS	38	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-B1
Customer Sample ID: 16-05983-1-B1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021078			Propanoic acid, 2,2-dimethyl-	75-98-9	3.21	NGS	68	JNT
S16T021078			Cyclotetrasiloxane, octamethyl	556-67-2	4.38	NGS	260	JNT
S16T021078			3-Ethylheptanoic acid	14272-47-0	4.55	NGS	31	JNT
S16T021078			Isooctanol	26952-21-6	4.85	NGS	35	JNT
S16T021078			1-Octene, 3,7-dimethyl-	4984-01-4	4.90	NGS	45	JNT
S16T021078			Decane, 2,4,6-trimethyl-	62108-27-4	5.06	NGS	43	JNT
S16T021078			Undecane	1120-21-4	5.11	NGS	19	JNT
S16T021078			Acetophenone	98-86-2	5.19	NGS	25	JNT
S16T021078			Benzenemethanol, ?,?-dimethyl-	617-94-7	5.37	NGS	55	JNT
S16T021078			Undecane, 4-methyl-	2980-69-0	5.45	NGS	130	JNT
S16T021078			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	150	JNT
S16T021078			Undecane, 2,6-dimethyl-	17301-23-4	6.41	NGS	6.2	JNT
S16T021078			Benzothiazole	95-16-9	6.62	NGS	82	JNT
S16T021078			Ethylene diacrylate	2274-11-5	6.68	NGS	33	JNT
S16T021078			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	56	JNT
S16T021078			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	77	JNT
S16T021078			Dodecane,4,6-dimethyl	61141-72-8	7.27	NGS	44	JNT
S16T021078			Undecane, 3,7-dimethyl-	17301-29-0	7.34	NGS	28	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021079				Cyclotrisiloxane, hexamethyl-	541-05-9	2.85	NGS	25	JNT
S16T021079				Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	30	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-C1
Customer Sample ID: 16-05983-1-C1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021080			Propanoic acid, 2,2-dimethyl-	75-98-9	3.23	NGS	77	JNT
S16T021080			Propanedioic acid, propyl-	616-62-6	3.67	NGS	26	JNT
S16T021080			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	280	JNT
S16T021080			Phenol	108-95-2	4.43	NGS	30	JNT
S16T021080			Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	6.1	JNT
S16T021080			3-Isopropyl-2-phenyl-pent-4-en	344332-17-8	5.37	NGS	41	JNT
S16T021080			Undecane	1120-21-4	5.45	NGS	83	JNT
S16T021080			Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	17	JNT
S16T021080			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	170	JNT
S16T021080			Benzothiazole	95-16-9	6.62	NGS	87	JNT
S16T021080			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	59	JNT
S16T021080			Undecane, 3,7-dimethyl-	17301-29-0	7.02	NGS	14	JNT
S16T021080			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	100	JNT
S16T021080			Tetradecane, 1-iodo-	19218-94-1	7.27	NGS	46	JNT
S16T021080			2,6-Dimethyldecane	13150-81-7	7.34	NGS	29	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-D1
Customer Sample ID: 16-05983-1-D1

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021081				Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	390	JNT
S16T021081				Undecane	1120-21-4	5.45	NGS	40	JNT
S16T021081				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	190	JNT
S16T021081				Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	23	JNT
S16T021081				Dodecane,4,6-dimethyl	61141-72-8	7.26	NGS	17	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-E1
Customer Sample ID: 16-05983-1-E1

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021082				Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	250	JNT
S16T021082				Undecane	1120-21-4	5.45	NGS	89	JNT
S16T021082				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	150	JNT
S16T021082				Decane, 2,4,6-trimethyl-	62108-27-4	6.00	NGS	5.8	JNT
S16T021082				Benzothiazole	95-16-9	6.61	NGS	80	JNT
S16T021082				Tetradecane, 1-iodo-	19218-94-1	6.90	NGS	44	JNT
S16T021082				Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	59	JNT
S16T021082				Undecane, 3,7-dimethyl-	17301-29-0	7.26	NGS	31	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021083			Ethylene Glycol	107-21-1	2.65	NGS	1.3E+03	JNT
S16T021083			Heptane, 2-bromo-	1974-04-5	3.27	NGS	180	JNT
S16T021083			2-Heptanone, 6-methyl-	928-68-7	4.16	NGS	150	JNT
S16T021083			2-Nonadecanol	26533-36-8	4.25	NGS	82	JNT
S16T021083			1-Hexanol, 5-methyl-	627-98-5	4.31	NGS	91	JNT
S16T021083			Cyclotetrasiloxane, octamethyl	556-67-2	4.38	NGS	830	JNT
S16T021083			Phenol	108-95-2	4.44	NGS	79	JNT
S16T021083			Oxirane, [(tetradecyloxy)methy	38954-75-5	4.49	NGS	50	JNT
S16T021083			2-Hexyl-1-octanol	19780-79-1	4.58	NGS	30	JNT
S16T021083			1-Octanol, 2-butyl-	3913-02-8	4.60	NGS	50	JNT
S16T021083			Hydroxylamine, O-decyl-	29812-79-1	4.77	NGS	50	JNT
S16T021083			1-Hexanol, 2-ethyl-	104-76-7	4.84	NGS	130	JNT
S16T021083			1-Heptanol, 6-methyl-	1653-40-3	4.90	NGS	49	JNT
S16T021083			Methyltris(trimethylsiloxy)sil	17928-28-8	5.00	NGS	31	JNT
S16T021083			2,6-Dimethyldecane	13150-81-7	5.06	NGS	100	JNT
S16T021083			2,3-Dimethyldecane	17312-44-6	5.11	NGS	60	JNT
S16T021083			Acetophenone	98-86-2	5.20	NGS	44	JNT
S16T021083			2-Methyl-1-undecanol	10522-26-6	5.21	NGS	49	JNT
S16T021083			Cyclopentadecanone, 4-methyl-	34894-60-5	5.38	NGS	78	JNT
S16T021083			Undecane	1120-21-4	5.45	NGS	370	JNT
S16T021083			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	100	JNT
S16T021083			Undecane, 2,6-dimethyl-	17301-23-4	6.41	NGS	7.9	JNT
S16T021083			Benzothiazole	95-16-9	6.62	NGS	62	JNT
S16T021083			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	41	JNT
S16T021083			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.97	NGS	9.6	JNT
S16T021083			Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	9.5	JNT
S16T021083			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	57	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021083				Dodecane,4,6-dimethyl	61141-72-8	7.27	NGS	30	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-F1
Customer Sample ID: 16-05983-1-F1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021084			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	180	JNT
S16T021084			Decane, 2,4,6-trimethyl-	62108-27-4	5.06	NGS	23	JNT
S16T021084			Acetophenone	98-86-2	5.18	NGS	14	JNT
S16T021084			Undecane	1120-21-4	5.45	NGS	69	JNT
S16T021084			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	140	JNT
S16T021084			Benzothiazole	95-16-9	6.61	NGS	76	JNT
S16T021084			Dodecane,4,6-dimethyl	61141-72-8	6.90	NGS	34	JNT
S16T021084			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	39	JNT
S16T021084			Dodecane, 2,6,11-trimethyl-	31295-56-4	7.26	NGS	28	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-G1
Customer Sample ID: 16-05983-1-G1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021085			Propane, 2-methyl-1-nitro-	625-74-1	3.12	NGS	65	JNT
S16T021085			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	310	JNT
S16T021085			2,6-Dimethyldecane	13150-81-7	5.06	NGS	34	JNT
S16T021085			Acetophenone	98-86-2	5.18	NGS	15	JNT
S16T021085			Undecane	1120-21-4	5.45	NGS	100	JNT
S16T021085			Decane, 2,4,6-trimethyl-	62108-27-4	5.50	NGS	15	JNT
S16T021085			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	140	JNT
S16T021085			Benzothiazole	95-16-9	6.60	NGS	40	JNT
S16T021085			Decane, 3,7-dimethyl-	17312-54-8	6.90	NGS	33	JNT
S16T021085			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.97	NGS	7.6	JNT
S16T021085			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	49	JNT
S16T021085			Dodecane, 4,6-dimethyl	61141728	7.26	NGS	24	JNT
S16T021085			Undecane, 3,7-dimethyl-	17301-29-0	7.34	NGS	8.6	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-H1
Customer Sample ID: 16-05983-1-H1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021086			Heptane, 2-bromo-	1974-04-5	3.24	NGS	110	JNT
S16T021086			Hydroperoxide, hexyl	4312-76-9	3.37	NGS	50	JNT
S16T021086			2-Methyl-1-undecanol	10522-26-6	3.98	NGS	48	JNT
S16T021086			2-Heptanone, 6-methyl-	928-68-7	4.16	NGS	64	JNT
S16T021086			1-Octanol, 2-butyl-	3913-02-8	4.25	NGS	36	JNT
S16T021086			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	560	JNT
S16T021086			1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	64	JNT
S16T021086			1-Heptanol, 2,4-dimethyl-, (2S	18450-74-3	4.90	NGS	49	JNT
S16T021086			2,6-Dimethyldecane	13150-81-7	5.06	NGS	57	JNT
S16T021086			2,3-Dimethyldecane	17312-44-6	5.11	NGS	26	JNT
S16T021086			Acetophenone	98-86-2	5.19	NGS	19	JNT
S16T021086			Unknown-1	--	5.37	NGS	26	JT
S16T021086			Undecane	1120-21-4	5.45	NGS	180	JNT
S16T021086			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	180	JNT
S16T021086			Undecane, 2,6-dimethyl-	17301-23-4	6.40	NGS	6.7	JNT
S16T021086			Benzothiazole	95-16-9	6.61	NGS	76	JNT
S16T021086			Decane, 3,7-dimethyl-	17312-54-8	6.90	NGS	43	JNT
S16T021086			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	72	JNT
S16T021086			Dodecane, 4,6-dimethyl-	61141728	7.26	NGS	32	JNT
S16T021086			Undecane, 3,7-dimethyl-	17301-29-0	7.33	NGS	9.3	JNT

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162090
SDG Number:
Customer Sample ID: 16-05983-1-H2
Customer Sample ID: 16-05983-1-H2

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2									
S16T021087				Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	160	JNT
S16T021087				Acetophenone	98-86-2	5.19	NGS	11	JNT
S16T021087				Undecane	1120-21-4	5.45	NGS	57	JNT
S16T021087				Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	120	JNT
S16T021087				Benzothiazole	95-16-9	6.60	NGS	42	JNT
S16T021087				Undecane, 2-methyl-	7045-71-8	6.90	NGS	18	JNT
S16T021087				Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	28	JNT
S16T021087				Dodecane, 4,6-diemthyl-	61141728	7.26	NGS	14	JNT

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Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2								
S16T021088			Propanoic acid, 2,2-dimethyl-	75-98-9	3.21	NGS	36	JNT
S16T021088			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	250	JNT
S16T021088			Isooctanol	26952-21-6	4.84	NGS	30	JNT
S16T021088			2,6-Dimethyldecane	13150-81-7	5.06	NGS	31	JNT
S16T021088			Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	9.9	JNT
S16T021088			Acetophenone	98-86-2	5.19	NGS	19	JNT
S16T021088			Undecane	1120-21-4	5.45	NGS	79	JNT
S16T021088			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	120	JNT
S16T021088			Benzothiazole	95-16-9	6.61	NGS	52	JNT
S16T021088			Decane, 3,7-dimethyl-	17312-54-8	6.90	NGS	43	JNT
S16T021088			Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	9.7	JNT
S16T021088			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	49	JNT
S16T021088			Dodecane,4,6-dimethyl	61141-72-8	7.26	NGS	26	JNT
S16T021088			Undecane, 2-methyl-	7045-71-8	7.34	NGS	19	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021090			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021090			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021090			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021090			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			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	
S16T021090			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021090			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021090			71-36-3	1-Butanol	NGS	93	<8.9	9.1E+03	n/a	n/a	n/a	n/a	8.9	n/a	ELY
S16T021090			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021090			71-23-8	1-Propanol	NGS	89	<3.0	2.0E+03	n/a	n/a	n/a	n/a	3.0	n/a	E
S16T021090			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021090			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021090			78-93-3	2-Butanone	NGS	83	<1.9	1.2E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021090			110-43-0	2-Heptanone	NGS	88	<1.6	160	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			591-78-6	2-Hexanone	NGS	86	<1.2	290	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021090			534-22-5	2-Methylfuran	NGS	89	<1.9	3.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021090			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021090			106-35-4	3-Heptanone	NGS	89	<1.5	120	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021090			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	24	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021090			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	130	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021090			67-64-1	Acetone	NGS	71	<4.3	4.4E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021090			75-05-8	Acetonitrile	NGS	88	<1.8	550	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021090			98-86-2	Acetophenone	NGS	93	<2.6	15	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021090			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021090			107-18-6	Allyl Alcohol	NGS	88	<3.9	7.0	n/a	n/a	n/a	n/a	3.9	n/a	J

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8/14/2016

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E - Outside Calibration Range

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

Cartridge Evaluation
Data Summary Report

Sample Group: 20162091
SDG Number:
Customer Sample ID: 16-05982-2-A1
Customer Sample ID: 16-05982-2-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															
S16T021090			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021090			71-43-2	Benzene	NGS	93	<1.2	34	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021090			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021090			123-72-8	Butanal	NGS	95	<2.1	230	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021090			109-74-0	Butanenitrile	NGS	90	<1.2	110	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021090			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			75-00-3	Chloroethane	NGS	87	<1.9	5.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021090			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			110-82-7	Cyclohexane	NGS	92	<1.8	53	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021090			124-18-5	Decane	NGS	92	<2.8	11	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021090			64-17-5	Ethanol	NGS	85	<7.4	2.6E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021090			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			100-41-4	Ethylbenzene	NGS	93	<1.5	4.2	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021090			110-00-9	Furan	NGS	82	<1.6	51	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			110-54-3	Hexane	NGS	86	<1.7	1.9E+03	n/a	n/a	n/a	n/a	1.7	n/a	E
S16T021090			628-73-9	Hexanenitrile	NGS	92	<1.5	34	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			75-09-2	Methylene Chloride	NGS	85	3.4	6.2	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021090			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021090			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021090			110-59-8	Pentanenitrile	NGS	91	<1.6	44	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			107-12-0	Propanenitrile	NGS	90	<1.4	160	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021090			110-86-1	Pyridine	NGS	110	<3.8	34	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021090			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			127-18-4	Tetrachloroethene	NGS	93	<1.6	20	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021090			108-88-3	Toluene	NGS	92	<1.5	98	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021090			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021090			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	560	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021090			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021090			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021090			142-82-5	n-Heptane	NGS	90	<1.4	1.0E+03	n/a	n/a	n/a	n/a	1.4	n/a	E
S16T021090			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162091
SDG Number:
Customer Sample ID: 16-05982-2-A2
Customer Sample ID: 16-05982-2-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															
S16T021091			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021091			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021091			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021091			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			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	
S16T021091			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021091			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021091			71-36-3	1-Butanol	NGS	93	<8.9	16	n/a	n/a	n/a	n/a	8.9	n/a	JLY
S16T021091			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021091			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021091			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021091			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021091			78-93-3	2-Butanone	NGS	83	<1.9	3.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021091			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021091			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021091			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021091			106-35-4	3-Heptanone	NGS	89	<1.5	1.6	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021091			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021091			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021091			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021091			67-64-1	Acetone	NGS	71	<4.3	27	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021091			75-05-8	Acetonitrile	NGS	88	<1.8	120	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021091			98-86-2	Acetophenone	NGS	93	<2.6	12	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021091			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021091			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021091			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021091			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021091			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021091			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021091			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021091			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021091			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021091			124-18-5	Decane	NGS	92	<2.8	3.2	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021091			64-17-5	Ethanol	NGS	85	<7.4	87	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021091			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			100-41-4	Ethylbenzene	NGS	93	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021091			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021091			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			75-09-2	Methylene Chloride	NGS	85	3.4	8.0	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021091			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021091			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021091			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021091			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021091			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			127-18-4	Tetrachloroethene	NGS	93	<1.6	170	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021091			108-88-3	Toluene	NGS	92	<1.5	4.0	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021091			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021091			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	2.0	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021091			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021091			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021091			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021091			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

NA = Not Analyzed, ND = Not Detected

L - LLS Outside Range
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Y - Comment
T - Tentatively Identified Compound
J - Estimated
E - Outside Calibration Range
N - Named TIC

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021092			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021092			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021092			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021092			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			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	
S16T021092			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021092			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021092			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021092			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021092			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021092			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021092			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021092			78-93-3	2-Butanone	NGS	83	<1.9	3.2	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021092			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021092			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021092			78-94-4	3-Buten-2-one	NGS	87	<1.7	1.7	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021092			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021092			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021092			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021092			67-64-1	Acetone	NGS	71	<4.3	59	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021092			75-05-8	Acetonitrile	NGS	88	<1.8	2.7E+03	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021092			98-86-2	Acetophenone	NGS	93	<2.6	18	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021092			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021092			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021092			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021092			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021092			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021092			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021092			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021092			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			75-00-3	Chloroethane	NGS	87	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021092			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021092			124-18-5	Decane	NGS	92	<2.8	3.9	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021092			64-17-5	Ethanol	NGS	85	<7.4	620	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021092			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021092			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			75-09-2	Methylene Chloride	NGS	85	3.4	4.2	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021092			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021092			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021092			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021092			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021092			100-42-5	Styrene	NGS	94	<1.6	1.9	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021092			127-18-4	Tetrachloroethene	NGS	93	<1.6	160	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			108-88-3	Toluene	NGS	92	<1.5	3.7	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021092			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021092			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	14	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021092			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021092			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021092			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021092			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021093			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021093			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021093			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021093			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			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	
S16T021093			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021093			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021093			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021093			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021093			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021093			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021093			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021093			78-93-3	2-Butanone	NGS	83	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021093			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021093			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021093			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021093			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021093			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021093			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021093			67-64-1	Acetone	NGS	71	<4.3	5.2	n/a	n/a	n/a	n/a	4.3	n/a	J
S16T021093			75-05-8	Acetonitrile	NGS	88	<1.8	73	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021093			98-86-2	Acetophenone	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021093			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021093			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021093			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021093			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021093			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021093			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021093			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021093			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021093			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021093			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021093			64-17-5	Ethanol	NGS	85	<7.4	17	n/a	n/a	n/a	n/a	7.4	n/a	J
S16T021093			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021093			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			75-09-2	Methylene Chloride	NGS	85	3.4	4.1	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021093			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021093			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021093			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021093			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021093			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			127-18-4	Tetrachloroethene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			108-88-3	Toluene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

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

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021093			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021093			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021093			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021093			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021093			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021093			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162091
SDG Number:
Customer Sample ID: 16-05982-2-C1
Customer Sample ID: 16-05982-2-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														
S16T021094		79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021094		79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094		75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021094		75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021094		107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094		542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021094		106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021094		123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021094		71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021094		111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021094		71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021094		108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021094		1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021094		78-93-3	2-Butanone	NGS	83	<1.9	3.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021094		110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094		591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021094		534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021094		78-94-4	3-Buten-2-one	NGS	87	<1.7	1.9	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021094		106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094		106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021094		105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021094		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	
S16T021094		67-64-1	Acetone	NGS	71	<4.3	370	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021094		75-05-8	Acetonitrile	NGS	88	<1.8	450	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021094		98-86-2	Acetophenone	NGS	93	<2.6	14	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021094		107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021094		107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S16T021094		107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021094		71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021094		100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021094		123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021094		109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021094		56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094		108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094		75-00-3	Chloroethane	NGS	87	<1.9	4.9	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021094		67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094		110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021094		124-18-5	Decane	NGS	92	<2.8	4.0	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021094		64-17-5	Ethanol	NGS	85	<7.4	1.8E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021094		141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094		100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094		110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094		110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021094		628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094		126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094		75-09-2	Methylene Chloride	NGS	85	3.4	3.8	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021094		91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021094		98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021094		110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094		107-12-0	Propanenitrile	NGS	90	<1.4	2.7	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021094		110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021094		100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094		127-18-4	Tetrachloroethene	NGS	93	<1.6	130	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094		108-88-3	Toluene	NGS	92	<1.5	3.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021094			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	91	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021094			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021094			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021094			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021095			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021095			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021095			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021095			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			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	
S16T021095			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021095			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021095			71-36-3	1-Butanol	NGS	93	<8.9	16	n/a	n/a	n/a	n/a	8.9	n/a	JLY
S16T021095			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021095			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021095			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021095			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021095			78-93-3	2-Butanone	NGS	83	<1.9	3.0	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021095			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021095			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021095			78-94-4	3-Buten-2-one	NGS	87	<1.7	3.5	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021095			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021095			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021095			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021095			67-64-1	Acetone	NGS	71	<4.3	1.3E+03	n/a	n/a	n/a	n/a	4.3	n/a	E
S16T021095			75-05-8	Acetonitrile	NGS	88	<1.8	680	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021095			98-86-2	Acetophenone	NGS	93	<2.6	10	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021095			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021095			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S16T021095		107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021095		71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021095		100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021095		123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021095		109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021095		56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095		108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095		75-00-3	Chloroethane	NGS	87	<1.9	4.5	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021095		67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095		110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021095		124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021095		64-17-5	Ethanol	NGS	85	<7.4	2.4E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021095		141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095		100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095		110-00-9	Furan	NGS	82	<1.6	2.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021095		110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021095		628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095		126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095		75-09-2	Methylene Chloride	NGS	85	3.4	5.5	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021095		91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021095		98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021095		110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095		107-12-0	Propanenitrile	NGS	90	<1.4	13	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021095		110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021095		100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095		127-18-4	Tetrachloroethene	NGS	93	<1.6	100	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095		108-88-3	Toluene	NGS	92	<1.5	3.1	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021095			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021095			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	250	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021095			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021095			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021095			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021095			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162091
SDG Number:
Customer Sample ID: 16-05982-2-E1
Customer Sample ID: 16-05982-2-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															
S16T021096			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021096			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021096			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021096			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021096			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021096			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021096			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021096			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021096			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021096			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021096			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021096			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021096			78-93-3	2-Butanone	NGS	83	<1.9	2.2	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021096			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021096			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021096			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021096			78-94-4	3-Buten-2-one	NGS	87	<1.7	8.1	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021096			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021096			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021096			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021096			67-64-1	Acetone	NGS	71	<4.3	2.1E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021096			75-05-8	Acetonitrile	NGS	88	<1.8	540	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021096			98-86-2	Acetophenone	NGS	93	<2.6	5.2	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021096			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021096			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021096			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021096			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021096			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021096			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021096			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021096			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021096			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			75-00-3	Chloroethane	NGS	87	<1.9	5.2	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021096			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021096			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021096			64-17-5	Ethanol	NGS	85	<7.4	2.3E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021096			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			110-00-9	Furan	NGS	82	<1.6	5.4	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021096			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021096			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021096			75-09-2	Methylene Chloride	NGS	85	3.4	89	n/a	n/a	n/a	n/a	2.7	n/a	B
S16T021096			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021096			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021096			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021096			107-12-0	Propanenitrile	NGS	90	<1.4	40	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021096			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021096			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021096			127-18-4	Tetrachloroethene	NGS	93	<1.6	82	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021096			108-88-3	Toluene	NGS	92	<1.5	3.0	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021096			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021096			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	590	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021096			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021096			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021096			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021096			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162091
SDG Number:
Customer Sample ID: 16-05982-2-EFF-BASE
Customer Sample ID: 16-05982-2-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															
S16T021097			79-34-5	1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021097			79-00-5	1,1,2-Trichloroethane	NGS	110	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021097			75-34-3	1,1-Dichloroethane	NGS	97	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021097			75-35-4	1,1-Dichloroethene	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021097			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021097			542-75-6	1,3-Dichloropropene (Total)	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097			106-46-7	1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021097			123-91-1	1,4-Dioxane	NGS	100	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021097			71-36-3	1-Butanol	NGS	110	<4.3	4.7	n/a	n/a	n/a	n/a	4.3	n/a	J
S16T021097			111-70-6	1-Heptanol	NGS	110	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021097			71-23-8	1-Propanol	NGS	110	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021097			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021097			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021097			78-93-3	2-Butanone	NGS	95	<3.1	<3.1	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021097			110-43-0	2-Heptanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021097			591-78-6	2-Hexanone	NGS	98	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021097			534-22-5	2-Methylfuran	NGS	97	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021097			78-94-4	3-Buten-2-one	NGS	95	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021097			106-35-4	3-Heptanone	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021097			106-68-3	3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021097			105-42-0	4-Methyl-2-hexanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021097			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021097			67-64-1	Acetone	NGS	88	3.0	14	n/a	n/a	n/a	n/a	2.8	n/a	B
S16T021097			75-05-8	Acetonitrile	NGS	100	<1.6	27	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021097			98-86-2	Acetophenone	NGS	100	<6.2	9.9	n/a	n/a	n/a	n/a	6.2	n/a	J
S16T021097			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021097			107-18-6	Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S16T021097		107-05-1	Allyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021097		71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021097		100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021097		123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021097		109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021097		56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021097		108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021097		75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021097		67-66-3	Chloroform	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097		110-82-7	Cyclohexane	NGS	100	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021097		124-18-5	Decane	NGS	110	<3.3	4.1	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021097		64-17-5	Ethanol	NGS	110	5.4	14	n/a	n/a	n/a	n/a	3.7	n/a	BJ
S16T021097		141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097		100-41-4	Ethylbenzene	NGS	120	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021097		110-00-9	Furan	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021097		110-54-3	Hexane	NGS	96	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021097		628-73-9	Hexanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021097		126-98-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097		75-09-2	Methylene Chloride	NGS	110	5.8	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	L
S16T021097		91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021097		98-95-3	Nitrobenzene	NGS	100	<4.7	5.1	n/a	n/a	n/a	n/a	4.7	n/a	J
S16T021097		110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021097		107-12-0	Propanenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097		110-86-1	Pyridine	NGS	110	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021097		100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021097		127-18-4	Tetrachloroethene	NGS	100	<1.8	250	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021097		108-88-3	Toluene	NGS	120	<2.2	5.3	n/a	n/a	n/a	n/a	2.2	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021097			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021097			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021097			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	
S16T021097			123-86-4	n-Butyl acetate	NGS	97	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021097			142-82-5	n-Heptane	NGS	110	<1.6	3.4	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021097			10061-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162091
SDG Number:
Customer Sample ID: 16-05982-2-G1
Customer Sample ID: 16-05982-2-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															
S16T021099			79-34-5	1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021099			79-00-5	1,1,2-Trichloroethane	NGS	110	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021099			75-34-3	1,1-Dichloroethane	NGS	97	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021099			75-35-4	1,1-Dichloroethene	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021099			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021099			542-75-6	1,3-Dichloropropene (Total)	NGS	110	<1.8	12	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			106-46-7	1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021099			123-91-1	1,4-Dioxane	NGS	100	<2.0	5.8	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021099			71-36-3	1-Butanol	NGS	110	<4.3	<4.3	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021099			111-70-6	1-Heptanol	NGS	110	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021099			71-23-8	1-Propanol	NGS	110	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021099			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021099			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	4.4	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021099			78-93-3	2-Butanone	NGS	95	<3.1	4.2	n/a	n/a	n/a	n/a	3.1	n/a	J
S16T021099			110-43-0	2-Heptanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021099			591-78-6	2-Hexanone	NGS	98	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021099			534-22-5	2-Methylfuran	NGS	97	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021099			78-94-4	3-Buten-2-one	NGS	95	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021099			106-35-4	3-Heptanone	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021099			106-68-3	3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021099			105-42-0	4-Methyl-2-hexanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021099			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021099			67-64-1	Acetone	NGS	88	3.0	4.1E+03	n/a	n/a	n/a	n/a	2.8	n/a	BEY
S16T021099			75-05-8	Acetonitrile	NGS	100	<1.6	1.1E+03	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021099			98-86-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021099			107-13-1	Acrylonitrile	NGS	100	<2.1	30	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021099			107-18-6	Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021099			107-05-1	Allyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021099			71-43-2	Benzene	NGS	110	<1.5	2.2	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021099			100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021099			123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021099			109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021099			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021099			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021099			75-00-3	Chloroethane	NGS	110	<1.6	4.2	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021099			67-66-3	Chloroform	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			110-82-7	Cyclohexane	NGS	100	<1.4	46	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021099			124-18-5	Decane	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021099			64-17-5	Ethanol	NGS	110	5.4	2.2E+03	n/a	n/a	n/a	n/a	3.7	n/a	BE
S16T021099			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			100-41-4	Ethylbenzene	NGS	120	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021099			110-00-9	Furan	NGS	93	<1.6	33	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021099			110-54-3	Hexane	NGS	96	<1.3	10	n/a	n/a	n/a	n/a	1.3	n/a	J
S16T021099			628-73-9	Hexanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021099			126-98-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			75-09-2	Methylene Chloride	NGS	110	5.8	5.2	n/a	n/a	n/a	n/a	4.1	n/a	BJL
S16T021099			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021099			98-95-3	Nitrobenzene	NGS	100	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021099			110-59-8	Pentanenitrile	NGS	110	<2.6	6.1	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021099			107-12-0	Propanenitrile	NGS	100	<1.8	270	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			110-86-1	Pyridine	NGS	110	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021099			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021099			127-18-4	Tetrachloroethene	NGS	100	<1.8	45	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			108-88-3	Toluene	NGS	120	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021099			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021099			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	2.4E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021099			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	12	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021099			123-86-4	n-Butyl acetate	NGS	97	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021099			142-82-5	n-Heptane	NGS	110	<1.6	63	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021099			10061-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162091
SDG Number:
Customer Sample ID: 16-05982-2-H1
Customer Sample ID: 16-05982-2-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															
S16T021100			79-34-5	1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021100			79-00-5	1,1,2-Trichloroethane	NGS	110	<2.3	6.9	n/a	n/a	n/a	n/a	2.3	n/a	J
S16T021100			75-34-3	1,1-Dichloroethane	NGS	97	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021100			75-35-4	1,1-Dichloroethene	NGS	91	<1.7	3.0	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021100			107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021100			542-75-6	1,3-Dichloropropene (Total)	NGS	110	<1.8	4.7	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			106-46-7	1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021100			123-91-1	1,4-Dioxane	NGS	100	<2.0	4.3	n/a	n/a	n/a	n/a	2.0	n/a	J
S16T021100			71-36-3	1-Butanol	NGS	110	<4.3	3.7E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021100			111-70-6	1-Heptanol	NGS	110	<9.1	23	n/a	n/a	n/a	n/a	9.1	n/a	J
S16T021100			71-23-8	1-Propanol	NGS	110	<8.9	2.3E+03	n/a	n/a	n/a	n/a	8.9	n/a	E
S16T021100			108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021100			1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	29	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021100			78-93-3	2-Butanone	NGS	95	<3.1	1.3E+03	n/a	n/a	n/a	n/a	3.1	n/a	E
S16T021100			110-43-0	2-Heptanone	NGS	100	<2.6	130	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021100			591-78-6	2-Hexanone	NGS	98	<2.5	240	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021100			534-22-5	2-Methylfuran	NGS	97	<1.3	4.8	n/a	n/a	n/a	n/a	1.3	n/a	J
S16T021100			78-94-4	3-Buten-2-one	NGS	95	<1.9	490	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021100			106-35-4	3-Heptanone	NGS	110	<2.7	72	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021100			106-68-3	3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021100			105-42-0	4-Methyl-2-hexanone	NGS	100	<2.6	23	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021100			108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	120	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021100			67-64-1	Acetone	NGS	88	3.0	4.0E+03	n/a	n/a	n/a	n/a	2.8	n/a	BEY
S16T021100			75-05-8	Acetonitrile	NGS	100	<1.6	850	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021100			98-86-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021100			107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021100			107-18-6	Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021100			107-05-1	Allyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021100			71-43-2	Benzene	NGS	110	<1.5	47	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021100			100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021100			123-72-8	Butanal	NGS	100	<3.0	360	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021100			109-74-0	Butanenitrile	NGS	110	<2.1	190	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021100			56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021100			108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021100			75-00-3	Chloroethane	NGS	110	<1.6	4.8	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021100			67-66-3	Chloroform	NGS	110	<1.8	2.2	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021100			110-82-7	Cyclohexane	NGS	100	<1.4	150	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021100			124-18-5	Decane	NGS	110	<3.3	15	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021100			64-17-5	Ethanol	NGS	110	5.4	2.3E+03	n/a	n/a	n/a	n/a	3.7	n/a	BE
S16T021100			141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			100-41-4	Ethylbenzene	NGS	120	<2.4	2.7	n/a	n/a	n/a	n/a	2.4	n/a	J
S16T021100			110-00-9	Furan	NGS	93	<1.6	83	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021100			110-54-3	Hexane	NGS	96	<1.3	1.7E+03	n/a	n/a	n/a	n/a	1.3	n/a	E
S16T021100			628-73-9	Hexanenitrile	NGS	110	<2.6	23	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021100			126-98-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			75-09-2	Methylene Chloride	NGS	110	5.8	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	L
S16T021100			91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021100			98-95-3	Nitrobenzene	NGS	100	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021100			110-59-8	Pentanenitrile	NGS	110	<2.6	140	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021100			107-12-0	Propanenitrile	NGS	100	<1.8	190	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			110-86-1	Pyridine	NGS	110	<2.8	32	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021100			100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021100			127-18-4	Tetrachloroethene	NGS	100	<1.8	9.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021100			108-88-3	Toluene	NGS	120	<2.2	81	n/a	n/a	n/a	n/a	2.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021100			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021100			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	710	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021100			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021100			123-86-4	n-Butyl acetate	NGS	97	<2.4	18	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021100			142-82-5	n-Heptane	NGS	110	<1.6	830	n/a	n/a	n/a	n/a	1.6	n/a	EY
S16T021100			10061-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	4.7	n/a	n/a	n/a	n/a	2.1	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S16T021101		79-34-5	1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021101		79-00-5	1,1,2-Trichloroethane	NGS	110	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021101		75-34-3	1,1-Dichloroethane	NGS	97	<1.7	3.8	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021101		75-35-4	1,1-Dichloroethene	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021101		107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021101		542-75-6	1,3-Dichloropropene (Total)	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021101		106-46-7	1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021101		123-91-1	1,4-Dioxane	NGS	100	<2.0	13	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021101		71-36-3	1-Butanol	NGS	110	<4.3	17	n/a	n/a	n/a	n/a	4.3	n/a	J
S16T021101		111-70-6	1-Heptanol	NGS	110	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021101		71-23-8	1-Propanol	NGS	110	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021101		108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021101		1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	40	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021101		78-93-3	2-Butanone	NGS	95	<3.1	18	n/a	n/a	n/a	n/a	3.1	n/a	
S16T021101		110-43-0	2-Heptanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021101		591-78-6	2-Hexanone	NGS	98	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021101		534-22-5	2-Methylfuran	NGS	97	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021101		78-94-4	3-Buten-2-one	NGS	95	<1.9	35	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021101		106-35-4	3-Heptanone	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021101		106-68-3	3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021101		105-42-0	4-Methyl-2-hexanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021101		108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021101		67-64-1	Acetone	NGS	88	3.0	4.2E+03	n/a	n/a	n/a	n/a	2.8	n/a	BEY
S16T021101		75-05-8	Acetonitrile	NGS	100	<1.6	1.4E+03	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021101		98-86-2	Acetophenone	NGS	100	<6.2	<6.2	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021101		107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021101		107-18-6	Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S16T021101		107-05-1	Allyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021101		71-43-2	Benzene	NGS	110	<1.5	2.9	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021101		100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021101		123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021101		109-74-0	Butanenitrile	NGS	110	<2.1	3.4	n/a	n/a	n/a	n/a	2.1	n/a	J
S16T021101		56-23-5	Carbon tetrachloride	NGS	100	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021101		108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021101		75-00-3	Chloroethane	NGS	110	<1.6	5.6	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021101		67-66-3	Chloroform	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021101		110-82-7	Cyclohexane	NGS	100	<1.4	300	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021101		124-18-5	Decane	NGS	110	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021101		64-17-5	Ethanol	NGS	110	5.4	2.1E+03	n/a	n/a	n/a	n/a	3.7	n/a	BE
S16T021101		141-78-6	Ethyl acetate	NGS	98	<1.8	8.0	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021101		100-41-4	Ethylbenzene	NGS	120	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021101		110-00-9	Furan	NGS	93	<1.6	72	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021101		110-54-3	Hexane	NGS	96	<1.3	140	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021101		628-73-9	Hexanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021101		126-98-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021101		75-09-2	Methylene Chloride	NGS	110	5.8	14	n/a	n/a	n/a	n/a	4.1	n/a	BL
S16T021101		91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021101		98-95-3	Nitrobenzene	NGS	100	<4.7	<4.7	n/a	n/a	n/a	n/a	4.7	n/a	
S16T021101		110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021101		107-12-0	Propanenitrile	NGS	100	<1.8	450	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021101		110-86-1	Pyridine	NGS	110	<2.8	15	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021101		100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021101		127-18-4	Tetrachloroethene	NGS	100	<1.8	38	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021101		108-88-3	Toluene	NGS	120	<2.2	2.3	n/a	n/a	n/a	n/a	2.2	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021101			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021101			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	1.1E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021101			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021101			123-86-4	n-Butyl acetate	NGS	97	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021101			142-82-5	n-Heptane	NGS	110	<1.6	83	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021101			10061-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S16T021102		79-34-5	1,1,2,2-Tetrachloroethane	NGS	110	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021102		79-00-5	1,1,2-Trichloroethane	NGS	110	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	
S16T021102		75-34-3	1,1-Dichloroethane	NGS	97	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021102		75-35-4	1,1-Dichloroethene	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021102		107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021102		542-75-6	1,3-Dichloropropene (Total)	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021102		106-46-7	1,4-Dichlorobenzene	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021102		123-91-1	1,4-Dioxane	NGS	100	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021102		71-36-3	1-Butanol	NGS	110	<4.3	56	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021102		111-70-6	1-Heptanol	NGS	110	<9.1	<9.1	n/a	n/a	n/a	n/a	9.1	n/a	
S16T021102		71-23-8	1-Propanol	NGS	110	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	
S16T021102		108-47-4	2,4-Dimethylpyridine	NGS	110	<4.1	<4.1	n/a	n/a	n/a	n/a	4.1	n/a	
S16T021102		1708-29-8	2,5-Dihydrofuran	NGS	110	<2.2	<2.2	n/a	n/a	n/a	n/a	2.2	n/a	
S16T021102		78-93-3	2-Butanone	NGS	95	<3.1	4.6	n/a	n/a	n/a	n/a	3.1	n/a	J
S16T021102		110-43-0	2-Heptanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021102		591-78-6	2-Hexanone	NGS	98	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021102		534-22-5	2-Methylfuran	NGS	97	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021102		78-94-4	3-Buten-2-one	NGS	95	<1.9	2.6	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021102		106-35-4	3-Heptanone	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021102		106-68-3	3-Octanone	NGS	100	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021102		105-42-0	4-Methyl-2-hexanone	NGS	100	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021102		108-10-1	4-Methyl-2-Pentanone	NGS	110	<2.2	2.5	n/a	n/a	n/a	n/a	2.2	n/a	J
S16T021102		67-64-1	Acetone	NGS	88	3.0	53	n/a	n/a	n/a	n/a	2.8	n/a	B
S16T021102		75-05-8	Acetonitrile	NGS	100	<1.6	83	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021102		98-86-2	Acetophenone	NGS	100	<6.2	13	n/a	n/a	n/a	n/a	6.2	n/a	
S16T021102		107-13-1	Acrylonitrile	NGS	100	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021102		107-18-6	Allyl Alcohol	NGS	97	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S16T021102		107-05-1	Allyl Chloride	NGS	97	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021102		71-43-2	Benzene	NGS	110	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021102		100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	n/a	
S16T021102		123-72-8	Butanal	NGS	100	<3.0	3.4	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021102		109-74-0	Butanenitrile	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021102		56-23-5	Carbon tetrachloride	NGS	100	<1.5	1.8	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021102		108-90-7	Chlorobenzene	NGS	110	<2.5	<2.5	n/a	n/a	n/a	n/a	2.5	n/a	
S16T021102		75-00-3	Chloroethane	NGS	110	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021102		67-66-3	Chloroform	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021102		110-82-7	Cyclohexane	NGS	100	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021102		124-18-5	Decane	NGS	110	<3.3	3.8	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021102		64-17-5	Ethanol	NGS	110	5.4	45	n/a	n/a	n/a	n/a	3.7	n/a	B
S16T021102		141-78-6	Ethyl acetate	NGS	98	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021102		100-41-4	Ethylbenzene	NGS	120	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021102		110-00-9	Furan	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021102		110-54-3	Hexane	NGS	96	<1.3	2.8	n/a	n/a	n/a	n/a	1.3	n/a	J
S16T021102		628-73-9	Hexanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021102		126-98-7	Methacrylonitrile	NGS	110	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021102		75-09-2	Methylene Chloride	NGS	110	5.8	24	n/a	n/a	n/a	n/a	4.1	n/a	BL
S16T021102		91-20-3	Naphthalene	NGS	110	<5.3	<5.3	n/a	n/a	n/a	n/a	5.3	n/a	
S16T021102		98-95-3	Nitrobenzene	NGS	100	<4.7	9.6	n/a	n/a	n/a	n/a	4.7	n/a	J
S16T021102		110-59-8	Pentanenitrile	NGS	110	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021102		107-12-0	Propanenitrile	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021102		110-86-1	Pyridine	NGS	110	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	L
S16T021102		100-42-5	Styrene	NGS	110	<2.7	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021102		127-18-4	Tetrachloroethene	NGS	100	<1.8	12	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021102		108-88-3	Toluene	NGS	120	<2.2	8.3	n/a	n/a	n/a	n/a	2.2	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021102			79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021102			75-69-4	Trichlorofluoromethane	NGS	98	<1.9	9.5	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021102			10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021102			123-86-4	n-Butyl acetate	NGS	97	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021102			142-82-5	n-Heptane	NGS	110	<1.6	7.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021102			10061-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021090			1,3-Butadiene	106-99-0	5.05	NGS	8.3	JNT
S16T021090			2-Methyl-1-butene	563-46-2	5.27	NGS	230	JNT
S16T021090			5-Methyloxazolidine	58328-22-6	5.35	NGS	180	JNT
S16T021090			Butane, 2-methyl-	78-78-4	5.61	NGS	750	JNT
S16T021090			Oxirane, trimethyl-	5076-19-7	6.24	NGS	2.0E+03	JNT
S16T021090			2-Pentene	109-68-2	6.55	NGS	130	JNT
S16T021090			2-Pentene, (E)-	646-04-8	6.80	NGS	75	JNT
S16T021090			Cyclobutanone, 2,2,3-trimethyl	1449-49-6	6.92	NGS	300	JNT
S16T021090			1-Pentene	109-67-1	7.00	NGS	35	JNT
S16T021090			2-Propanol, 2-methyl-	75-65-0	7.16	NGS	280	JNT
S16T021090			Butane, 2,2-dimethyl-	75-83-2	7.51	NGS	42	JNT
S16T021090			1-Pentene, 4-methyl-	691-37-2	8.41	NGS	280	JNT
S16T021090			Cyclopentane	287-92-3	8.75	NGS	190	JNT
S16T021090			Pentane, 2-methyl-	107-83-5	8.88	NGS	1.4E+03	JNT
S16T021090			Pentane, 3-methyl-	96-14-0	9.54	NGS	270	JNT
S16T021090			1-Hexene	592-41-6	9.91	NGS	530	JNT
S16T021090			Acetic acid	64-19-7	10.23	NGS	10	JNT
S16T021090			2-Hexene	592-43-8	10.66	NGS	64	JNT
S16T021090			3-Hexen-1-ol	544-12-7	11.09	NGS	38	JNT
S16T021090			3-Hexene, (Z)-	7642-09-3	11.16	NGS	27	JNT
S16T021090			Cyclopropane, 1-ethyl-2-methyl	19781-68-1	11.42	NGS	60	JNT
S16T021090			Isobutanol	78-83-1	11.62	NGS	77	JNT
S16T021090			Hexane, 2,4-dimethyl-	589-43-5	11.71	NGS	80	JNT
S16T021090			Cyclobutane, ethyl-	4806-61-5	11.89	NGS	120	JNT
S16T021090			Tetrahydrofuran	109-99-9	11.94	NGS	860	JNT
S16T021090			3-Buten-1-ol	627-27-0	12.11	NGS	39	JNT
S16T021090			2-Methyl-5-hexen-3-ol	32815-70-6	12.36	NGS	88	JNT

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8/16/2016

Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021090			(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.58	NGS	25	JNT
S16T021090			1-Hexene, 3-methyl-	3404-61-3	12.91	NGS	110	JNT
S16T021090			Hexane, 2-methyl-	591-76-4	13.42	NGS	630	JNT
S16T021090			Pentane, 2,3-dimethyl-	565-59-3	13.54	NGS	42	JNT
S16T021090			Hexane, 3-methyl-	589-34-4	13.73	NGS	980	JNT
S16T021090			1-Heptene	592-76-7	14.19	NGS	590	JNT
S16T021090			Ethylene Glycol	107-21-1	14.62	NGS	2.0E+03	JNT
S16T021090			Formamide	75-12-7	14.81	NGS	140	JNT
S16T021090			Propane, 2-methyl-1-nitro-	625-74-1	14.93	NGS	48	JNT
S16T021090			Cyclopentane, 1,2-dimethyl-, c	1192-18-3	15.04	NGS	63	JNT
S16T021090			2,4-Azetidinedione, 3,3-diethy	69315-91-9	15.19	NGS	450	JNT
S16T021090			Oxirane, 2-(1,1-dimethylethyl)	53897-30-6	15.27	NGS	53	JNT
S16T021090			2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15.32	NGS	120	JNT
S16T021090			Cyclopentane, ethyl-	1640-89-7	15.42	NGS	87	JNT
S16T021090			Carbamic acid, methyl ester	598-55-0	15.52	NGS	29	JNT
S16T021090			Unknown-1	--	15.82	NGS	55	JT
S16T021090			1-Heptene, 6-methyl-	5026-76-6	15.91	NGS	280	JNT
S16T021090			1-Pentanol	71-41-0	15.98	NGS	81	JNT
S16T021090			Heptane, 2-methyl-	592-27-8	16.08	NGS	280	JNT
S16T021090			Heptane, 4-methyl-	589-53-7	16.13	NGS	97	JNT
S16T021090			Heptane, 3,4,5-trimethyl-	20278-89-1	16.25	NGS	99	JNT
S16T021090			2-Hexene, 5,5-dimethyl-, (Z)-	39761-61-0	16.52	NGS	140	JNT
S16T021090			1-Octene	111-66-0	16.60	NGS	62	JNT
S16T021090			1-Octene, 6-methyl-	13151-10-5	16.71	NGS	25	JNT
S16T021090			Octane	111-65-9	16.77	NGS	250	JNT
S16T021090			Cyclohexane, 1,2-dimethyl-, tr	6876-23-9	16.94	NGS	31	JNT
S16T021090			Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	70	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021090			Pyridine, 4-methyl-	108-89-4	17.33	NGS	28	JNT
S16T021090			Octane, 2-methyl-	3221-61-2	17.41	NGS	96	JNT
S16T021090			Cyclohexane, ethyl-	1678-91-7	17.68	NGS	50	JNT
S16T021090			1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	94	JNT
S16T021090			Heptane, 4-propyl-	3178-29-8	18.27	NGS	45	JNT
S16T021090			Nonane	111-84-2	18.83	NGS	59	JNT
S16T021090			Octane, 3,6-dimethyl-	15869-94-0	19.66	NGS	27	JNT
S16T021090			2-Heptanone, 6-methyl-	928-68-7	20.27	NGS	100	JNT
S16T021090			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	260	JNT
S16T021090			Cyclohexane, 1,1,2,3-tetrameth	6783-92-2	20.84	NGS	37	JNT
S16T021090			Cyclohexene, 1-methyl-5-(1-met	1461-27-4	22.61	NGS	31	JNT
S16T021090			3,3-Dimethylhexane	563-16-6	22.71	NGS	37	JNT
S16T021090			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	150	JNT
S16T021090			2,6-Dimethyldecane	13150-81-7	23.14	NGS	66	JNT
S16T021090			Undecane	1120-21-4	23.73	NGS	33	JNT
S16T021090			2,3-Dimethyldecane	17312-44-6	23.79	NGS	28	JNT
S16T021090			Unknown-2	--	23.85	NGS	120	JT
S16T021090			Dodecane	112-40-3	23.95	NGS	57	JNT
S16T021090			Hydroxylamine, O-decyl-	29812-79-1	24.06	NGS	32	JNT
S16T021090			Unknown-3	--	24.26	NGS	250	JT
S16T021090			Undecane, 3-methyl-	1002-43-3	24.90	NGS	15	JNT
S16T021090			Tridecane	629-50-5	25.27	NGS	55	JNT
S16T021090			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	32	JNT
S16T021090			Ethanol, 2-phenoxy-	122-99-6	25.82	NGS	110	JNT
S16T021090			1,2-Benzisothiazole	272-16-2	26.31	NGS	95	JNT
S16T021090			Undecane, 2-methyl-	7045-71-8	26.43	NGS	64	JNT
S16T021090			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.63	NGS	28	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021090				1-Iodo-2-methylundecane	73105-67-6	27.01	NGS	28	JNT
S16T021090			BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021091			Formamide	75-12-7	14.05	NGS	44	JNT
S16T021091			Propane, 2-methyl-1-nitro-	625-74-1	16.50	NGS	31	JNT
S16T021091			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	540	JNT
S16T021091			Heptane, 2,2,4,6,6-pentamethyl	13475-82-6	21.52	NGS	170	JNT
S16T021091			2,2,7,7-Tetramethyloctane	1071-31-4	22.16	NGS	37	JNT
S16T021091			3,3-Dimethylhexane	563-16-6	22.71	NGS	82	JNT
S16T021091			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	76	JNT
S16T021091			Heptane, 5-ethyl-2,2,3-trimeth	62199-06-8	23.15	NGS	69	JNT
S16T021091			Decane, 2,5,9-trimethyl-	62108-22-9	23.22	NGS	37	JNT
S16T021091			Hydroxylamine, O-decyl-	29812-79-1	23.55	NGS	40	JNT
S16T021091			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	32	JNT
S16T021091			2,6-Dimethyldecane	13150-81-7	23.85	NGS	76	JNT
S16T021091			Undecane	1120-21-4	23.94	NGS	50	JNT
S16T021091			Unknown-1	--	24.26	NGS	520	JT
S16T021091			Dodecane	112-40-3	25.27	NGS	47	JNT
S16T021091			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	45	JNT
S16T021091			Unknown-2	--	25.99	NGS	61	JT
S16T021091			Methenamine	100-97-0	26.19	NGS	32	JNT
S16T021091			1,2-Benzisothiazole	272-16-2	26.30	NGS	170	JNT
S16T021091			Unknown-3	--	26.43	NGS	57	JT
S16T021091			Propanoic acid, 2-methyl-, 1-(	74381-40-1	26.55	NGS	47	JNT
S16T021091			Silane, trimethyl-3-penten-2-y	53264-56-5	26.63	NGS	44	JNT
S16T021091			Tetradecane, 1-iodo-	19218-94-1	27.01	NGS	28	JNT
S16T021091		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021092			Formamide	75-12-7	14.07	NGS	74	JNT
S16T021092			Propane, 2-methyl-1-nitro-	625-74-1	16.51	NGS	36	JNT
S16T021092			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	420	JNT
S16T021092			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	100	JNT
S16T021092			2,6-Dimethyldecane	13150-81-7	23.14	NGS	42	JNT
S16T021092			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	41	JNT
S16T021092			3,3-Dimethylhexane	563-16-6	23.85	NGS	98	JNT
S16T021092			Undecane, 5,7-dimethyl-	17312-83-3	23.94	NGS	74	JNT
S16T021092			Unknown-1	--	24.26	NGS	490	JT
S16T021092			1-Octanol, 2-butyl-	3913-02-8	24.85	NGS	44	JNT
S16T021092			Dodecane	112-40-3	25.28	NGS	56	JNT
S16T021092			1-Octene, 3,7-dimethyl-	4984-01-4	25.41	NGS	84	JNT
S16T021092			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.96	NGS	31	JNT
S16T021092			Unknown-2	--	26.01	NGS	100	JT
S16T021092			1,2-Benzisothiazole	272-16-2	26.32	NGS	150	JNT
S16T021092			Unknown-3	--	26.45	NGS	62	JT
S16T021092			Propanoic acid, 2-methyl-, 1-(	74381-40-1	26.57	NGS	52	JNT
S16T021092			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.65	NGS	36	JNT
S16T021092			Undecane, 2-methyl-	7045-71-8	27.03	NGS	28	JNT
S16T021092		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021093			Unknown-1	--	8.28	NGS	77	JT
S16T021093			2,2,7,7-Tetramethyloctane	1071-31-4	21.52	NGS	75	JNT
S16T021093			3,3-Dimethylhexane	563-16-6	22.71	NGS	29	JNT
S16T021093			Undecane, 3-methyl-	1002-43-3	23.54	NGS	9.0	JNT
S16T021093			Propanoic acid, 2-methyl-, 1-(	74381-40-1	26.58	NGS	26	JNT
S16T021093		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021094			Cyclobutylamine	2516-34-9	5.28	NGS	33	JNT
S16T021094			2-Butene	107-01-7	5.35	NGS	27	JNT
S16T021094			Formamide	75-12-7	14.09	NGS	96	JNT
S16T021094			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	400	JNT
S16T021094			2,6-Dimethyldecane	13150-81-7	23.00	NGS	84	JNT
S16T021094			Decane, 2,4,6-trimethyl-	62108-27-4	23.14	NGS	31	JNT
S16T021094			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	50	JNT
S16T021094			Unknown-1	--	23.85	NGS	84	JT
S16T021094			3,3-Dimethylhexane	563-16-6	23.95	NGS	50	JNT
S16T021094			Unknown-2	--	24.26	NGS	530	JT
S16T021094			Dodecane	112-40-3	25.27	NGS	100	JNT
S16T021094			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	50	JNT
S16T021094			Unknown-3	--	26.00	NGS	94	JT
S16T021094			1,2-Benzisothiazole	272-16-2	26.32	NGS	220	JNT
S16T021094			Octane, 2,3,6,7-tetramethyl-	52670-34-5	26.44	NGS	64	JNT
S16T021094			Undecane, 2-methyl-	7045-71-8	26.57	NGS	13	JNT
S16T021094			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.59	NGS	18	JNT
S16T021094			Silane, trimethyl[2-methylene-	97778-15-9	26.65	NGS	44	JNT
S16T021094			Tetradecane, 1-iodo-	19218-94-1	27.03	NGS	31	JNT
S16T021094		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021095			Cyclobutylamine	2516-34-9	5.28	NGS	34	JNT
S16T021095			Hydroxyacetic acid, hydrazide	3530-14-1	8.27	NGS	27	JNT
S16T021095			Formamide	75-12-7	14.09	NGS	110	JNT
S16T021095			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	280	JNT
S16T021095			Dodecane, 2,6,10-trimethyl-	3891-98-3	22.71	NGS	21	JNT
S16T021095			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	58	JNT
S16T021095			2,6-Dimethyldecane	13150-81-7	23.14	NGS	31	JNT
S16T021095			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	27	JNT
S16T021095			3,3-Dimethylhexane	563-16-6	23.85	NGS	62	JNT
S16T021095			Undecane	1120-21-4	23.95	NGS	26	JNT
S16T021095			Unknown-1	--	24.26	NGS	410	JT
S16T021095			Tetradecane, 1-iodo-	19218-94-1	25.27	NGS	41	JNT
S16T021095			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	30	JNT
S16T021095			2-Propenoic acid, octyl ester	2499-59-4	26.00	NGS	46	JNT
S16T021095			Methenamine	100-97-0	26.20	NGS	16	JNT
S16T021095			1,2-Benzisothiazole	272-16-2	26.32	NGS	140	JNT
S16T021095			Undecane, 2-methyl-	7045-71-8	26.45	NGS	50	JNT
S16T021095			Silane, trimethyl[2-methylene-	97778-15-9	26.65	NGS	47	JNT
S16T021095			Decane, 2,6,8-trimethyl-	62108-26-3	27.03	NGS	27	JNT
S16T021095		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021096			1,3-Butadiene	106-99-0	5.05	NGS	11	JNT
S16T021096			2-Butene	107-01-7	5.35	NGS	26	JNT
S16T021096			Formamide	75-12-7	14.12	NGS	150	JNT
S16T021096			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	230	JNT
S16T021096			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	54	JNT
S16T021096			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	25	JNT
S16T021096			2,6-Dimethyldecane	13150-81-7	23.85	NGS	60	JNT
S16T021096			Hexyl octyl ether	17071-54-4	23.94	NGS	39	JNT
S16T021096			Unknown-1	--	24.26	NGS	340	JT
S16T021096			Tetradecane, 1-iodo-	19218-94-1	25.27	NGS	40	JNT
S16T021096			Methenamine	100-97-0	26.19	NGS	39	JNT
S16T021096			1,2-Benzisothiazole	272-16-2	26.32	NGS	96	JNT
S16T021096			Unknown-2	--	26.44	NGS	40	JT
S16T021096			Propanoic acid, 2-methyl-, 1-(	74381-40-1	26.58	NGS	53	JNT
S16T021096			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.64	NGS	28	JNT
S16T021096			Undecane, 2-methyl-	7045-71-8	27.02	NGS	17	JNT
S16T021096		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021097			Cyclotrisiloxane, hexamethyl-	541-05-9	16.88	NGS	34	JNT
S16T021097			Cyclotetrasiloxane, octamethyl	556-67-2	20.20	NGS	530	JNT
S16T021097			Decane, 2,4,6-trimethyl-	62108-27-4	22.78	NGS	93	JNT
S16T021097			2,6-Dimethyldecane	13150-81-7	22.93	NGS	35	JNT
S16T021097			Undecane	1120-21-4	23.55	NGS	28	JNT
S16T021097			3,3-Dimethylhexane	563-16-6	23.66	NGS	66	JNT
S16T021097			Dodecane	112-40-3	23.77	NGS	61	JNT
S16T021097			Unknown-1	--	24.07	NGS	380	JT
S16T021097			Undecane, 2,6-dimethyl-	17301-23-4	25.11	NGS	49	JNT
S16T021097			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.26	NGS	33	JNT
S16T021097			1,2-Benzisothiazole	272-16-2	26.17	NGS	88	JNT
S16T021097			Undecane, 2-methyl-	7045-71-8	26.29	NGS	42	JNT
S16T021097			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.49	NGS	53	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021099			2-Butene, 2-methyl-	513-35-9	5.18	NGS	490	JNT
S16T021099			2-Pentene	109-68-2	5.36	NGS	120	JNT
S16T021099			Butane, 2-methyl-	78-78-4	5.52	NGS	1.1E+03	JNT
S16T021099			2-Pentene, (E)-	646-04-8	6.48	NGS	130	JNT
S16T021099			1,4-Pentadiene	591-93-5	6.61	NGS	38	JNT
S16T021099			2-Methyl-1-butene	563-46-2	6.74	NGS	27	JNT
S16T021099			1-Pentene	109-67-1	6.84	NGS	480	JNT
S16T021099			Hydrogen azide	7782-79-8	7.14	NGS	110	JNT
S16T021099			2,3-Diazabicyclo[2.2.1]-hept-2	2721-32-6	8.33	NGS	59	JNT
S16T021099			Cyclopentane	287-92-3	8.69	NGS	510	JNT
S16T021099			Pentane, 2-methyl-	107-83-5	8.81	NGS	49	JNT
S16T021099			Tetrahydrofuran	109-99-9	11.93	NGS	120	JNT
S16T021099			Cyclotetrasiloxane, octamethyl	556-67-2	20.20	NGS	270	JNT
S16T021099			Decane, 2,4,6-trimethyl-	62108-27-4	22.78	NGS	190	JNT
S16T021099			2,6-Dimethyldecane	13150-81-7	22.92	NGS	67	JNT
S16T021099			Undecane	1120-21-4	23.54	NGS	17	JNT
S16T021099			3,3-Dimethylhexane	563-16-6	23.66	NGS	120	JNT
S16T021099			Dodecane	112-40-3	23.75	NGS	52	JNT
S16T021099			Unknown-1	--	24.05	NGS	270	JT
S16T021099			Undecane, 2,6-dimethyl-	17301-23-4	25.10	NGS	28	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021100			2-Pentene, (E)-	646-04-8	5.19	NGS	130	JNT
S16T021100			Butane, 2-methyl-	78-78-4	5.53	NGS	490	JNT
S16T021100			2-Butene, 2-methyl-	513-35-9	6.49	NGS	87	JNT
S16T021100			Cyclobutanone, 2,2,3-trimethyl	1449-49-6	6.75	NGS	58	JNT
S16T021100			Hydroxylamine, O-(2-methylprop	5618-62-2	7.45	NGS	40	JNT
S16T021100			1-Pentene, 4-methyl-	691-37-2	8.34	NGS	320	JNT
S16T021100			Cyclopentane	287-92-3	8.69	NGS	98	JNT
S16T021100			Pentane, 2-methyl-	107-83-5	8.81	NGS	1.3E+03	JNT
S16T021100			Pentane, 3-methyl-	96-14-0	9.48	NGS	230	JNT
S16T021100			Cyclopropane, 1-ethyl-2-methyl	19781-68-1	10.62	NGS	33	JNT
S16T021100			Cyclobutane, ethyl-	4806-61-5	11.39	NGS	54	JNT
S16T021100			2H-Pyran-2-one, tetrahydro-6,6	2610-95-9	11.61	NGS	53	JNT
S16T021100			Cyclopentane, methyl-	96-37-7	11.84	NGS	100	JNT
S16T021100			Tetrahydrofuran	109-99-9	11.95	NGS	550	JNT
S16T021100			Hydroperoxide, hexyl	4312-76-9	12.34	NGS	130	JNT
S16T021100			(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.86	NGS	50	JNT
S16T021100			Hexane, 3-methyl-	589-34-4	13.66	NGS	590	JNT
S16T021100			Cyclopentane, 1,2-dimethyl-, c	1192-18-3	14.05	NGS	35	JNT
S16T021100			1-Heptene	592-76-7	14.12	NGS	550	JNT
S16T021100			DL-2,3-Butanediol	6982-25-8	14.26	NGS	53	JNT
S16T021100			(Z)-3-Heptene	7642-10-6	14.55	NGS	30	JNT
S16T021100			Ethylene Glycol	107-21-1	14.64	NGS	36	JNT
S16T021100			Formamide	75-12-7	14.74	NGS	61	JNT
S16T021100			2,4-Azetidinedione, 3,3-diethy	69315-91-9	15.10	NGS	240	JNT
S16T021100			2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15.22	NGS	39	JNT
S16T021100			Cyclopentane, ethyl-	1640-89-7	15.34	NGS	33	JNT
S16T021100			1-Heptene, 6-methyl-	5026-76-6	15.80	NGS	100	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021100			1-Pentanol	71-41-0	15.87	NGS	39	JNT
S16T021100			Heptane, 2-methyl-	592-27-8	15.97	NGS	240	JNT
S16T021100			Heptane, 4-methyl-	589-53-7	16.02	NGS	73	JNT
S16T021100			Octane, 4-ethyl-	15869-86-0	16.40	NGS	57	JNT
S16T021100			Octane	111-65-9	16.64	NGS	180	JNT
S16T021100			Cyclotrisiloxane, hexamethyl-	541-05-9	16.89	NGS	30	JNT
S16T021100			Octane, 2-methyl-	3221-61-2	17.25	NGS	52	JNT
S16T021100			Cyclohexane, ethyl-	1678-91-7	17.52	NGS	26	JNT
S16T021100			Cyclooctane, butyl-	16538-93-5	17.66	NGS	56	JNT
S16T021100			Heptane, 3-ethyl-	15869-80-4	18.09	NGS	25	JNT
S16T021100			Nonane	111-84-2	18.63	NGS	25	JNT
S16T021100			Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	260	JNT
S16T021100			Decane, 2,4,6-trimethyl-	62108-27-4	22.78	NGS	100	JNT
S16T021100			2,6-Dimethyldecane	13150-81-7	22.92	NGS	32	JNT
S16T021100			Undecane	1120-21-4	23.54	NGS	33	JNT
S16T021100			Undecane, 5,7-dimethyl-	17312-83-3	23.66	NGS	58	JNT
S16T021100			Hydroxylamine, O-decyl-	29812-79-1	23.75	NGS	38	JNT
S16T021100			Unknown-1	--	24.05	NGS	130	JT
S16T021100			Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	32	JNT
S16T021100			1,2-Benzisothiazole	272-16-2	26.15	NGS	53	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021101			2-Pentene, (E)-	646-04-8	5.16	NGS	440	JNT
S16T021101			2(3H)-Furanone, dihydro-3,5-di	5145-01-7	5.34	NGS	38	JNT
S16T021101			Butane, 2-methyl-	78-78-4	5.50	NGS	1.5E+03	JNT
S16T021101			1,2-Pentadiene	591-95-7	5.68	NGS	30	JNT
S16T021101			Unknown-1	--	6.18	NGS	4.0E+03	JT
S16T021101			2-Pentene	109-68-2	6.48	NGS	410	JNT
S16T021101			Cyclopropane, ethylidene-	18631-83-9	6.60	NGS	56	JNT
S16T021101			2-Butene, 2-methyl-	513-35-9	6.74	NGS	200	JNT
S16T021101			Cyclopropane, 1,2-dimethyl-, c	930-18-7	6.84	NGS	530	JNT
S16T021101			1-Pentene	109-67-1	6.93	NGS	31	JNT
S16T021101			2-Methyl-1-butene	563-46-2	7.02	NGS	43	JNT
S16T021101			1,4-Pentadiene	591-93-5	7.28	NGS	75	JNT
S16T021101			Butane, 2,2-dimethyl-	75-83-2	7.44	NGS	73	JNT
S16T021101			1,3-Pentadiene	504-60-9	7.70	NGS	26	JNT
S16T021101			Cyanic acid, 2-methylpropyl es	1768-25-8	8.35	NGS	370	JNT
S16T021101			Cyclopentane	287-92-3	8.69	NGS	430	JNT
S16T021101			Pentane, 2-methyl-	107-83-5	8.81	NGS	840	JNT
S16T021101			Pentane, 3-methyl-	96-14-0	9.48	NGS	130	JNT
S16T021101			Cyclopentane, methyl-	96-37-7	11.85	NGS	260	JNT
S16T021101			Tetrahydrofuran	109-99-9	11.93	NGS	540	JNT
S16T021101			Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	190	JNT
S16T021101			Undecane, 4-methyl-	2980-69-0	22.49	NGS	47	JNT
S16T021101			Decane, 2,4,6-trimethyl-	62108-27-4	22.79	NGS	67	JNT
S16T021101			2,6-Dimethyldecane	13150-81-7	22.96	NGS	57	JNT
S16T021101			Heptane, 5-ethyl-2,2,3-trimeth	62199-06-8	23.02	NGS	28	JNT
S16T021101			Undecane, 5,7-dimethyl-	17312-83-3	23.66	NGS	48	JNT
S16T021101			Decane, 2,3,5,8-tetramethyl-	192823-15-7	23.76	NGS	32	JNT

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Cartridge Evaluation
Data Summary Report

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

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

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021102			Hexanal	66-25-1	16.70	NGS	34	JNT
S16T021102			Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	390	JNT
S16T021102			Octane, 2,3,6,7-tetramethyl-	52670-34-5	22.49	NGS	35	JNT
S16T021102			Decane, 2,4,6-trimethyl-	62108-27-4	22.79	NGS	130	JNT
S16T021102			2,6-Dimethyldecane	13150-81-7	22.93	NGS	53	JNT
S16T021102			3,3-Dimethylhexane	563-16-6	23.66	NGS	84	JNT
S16T021102			Dodecane	112-40-3	23.75	NGS	63	JNT
S16T021102			Benzaldehyde, 2,5-bis[(trimeth	56114-69-3	24.05	NGS	330	JNT
S16T021102			Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	48	JNT
S16T021102			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.23	NGS	55	JNT
S16T021102			Unknown-1	--	25.83	NGS	37	JT
S16T021102			1,2-Benzisothiazole	272-16-2	26.15	NGS	160	JNT
S16T021102			Undecane, 2-methyl-	7045-71-8	26.25	NGS	58	JNT
S16T021102			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.43	NGS	40	JNT
S16T021102			Hexadecane, 2,6,11,15-tetramet	504-44-9	26.81	NGS	31	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021105			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021105			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021105			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021105			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021105			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021105			123-91-1	1,4-Dioxane	NGS	92	<1.7	5.4	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021105			71-36-3	1-Butanol	NGS	93	<8.9	1.0E+04	n/a	n/a	n/a	n/a	8.9	n/a	ELY
S16T021105			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021105			71-23-8	1-Propanol	NGS	89	<3.0	1.8E+03	n/a	n/a	n/a	n/a	3.0	n/a	E
S16T021105			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	17	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021105			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021105			78-93-3	2-Butanone	NGS	83	<1.9	1.2E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021105			110-43-0	2-Heptanone	NGS	88	<1.6	110	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105			591-78-6	2-Hexanone	NGS	86	<1.2	280	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021105			534-22-5	2-Methylfuran	NGS	89	<1.9	4.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021105			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021105			106-35-4	3-Heptanone	NGS	89	<1.5	94	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021105			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	20	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021105			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	100	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021105			67-64-1	Acetone	NGS	71	<4.3	4.1E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021105			75-05-8	Acetonitrile	NGS	88	<1.8	990	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021105			98-86-2	Acetophenone	NGS	93	<2.6	5.2	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021105			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021105			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

8/16/2016

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S16T021105		107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021105		71-43-2	Benzene	NGS	93	<1.2	53	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021105		100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021105		123-72-8	Butanal	NGS	95	<2.1	240	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021105		109-74-0	Butanenitrile	NGS	90	<1.2	150	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021105		56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105		108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105		75-00-3	Chloroethane	NGS	87	<1.9	4.6	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021105		67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105		110-82-7	Cyclohexane	NGS	92	<1.8	71	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021105		124-18-5	Decane	NGS	92	<2.8	35	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021105		64-17-5	Ethanol	NGS	85	<7.4	2.5E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021105		141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105		100-41-4	Ethylbenzene	NGS	93	<1.5	3.1	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021105		110-00-9	Furan	NGS	82	<1.6	25	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105		110-54-3	Hexane	NGS	86	<1.7	2.1E+03	n/a	n/a	n/a	n/a	1.7	n/a	E
S16T021105		628-73-9	Hexanenitrile	NGS	92	<1.5	42	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105		126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105		75-09-2	Methylene Chloride	NGS	85	3.4	2.9	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021105		91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021105		98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021105		110-59-8	Pentanenitrile	NGS	91	<1.6	83	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105		107-12-0	Propanenitrile	NGS	90	<1.4	160	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021105		110-86-1	Pyridine	NGS	110	<3.8	39	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021105		100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021105		127-18-4	Tetrachloroethene	NGS	93	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021105		108-88-3	Toluene	NGS	92	<1.5	89	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021105			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021105			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	430	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021105			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021105			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021105			142-82-5	n-Heptane	NGS	90	<1.4	910	n/a	n/a	n/a	n/a	1.4	n/a	E
S16T021105			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162092
SDG Number:
Customer Sample ID: 16-05983-2-A2
Customer Sample ID: 16-05983-2-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															
S16T021106			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021106			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021106			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021106			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			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	
S16T021106			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021106			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021106			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021106			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021106			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021106			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021106			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021106			78-93-3	2-Butanone	NGS	83	<1.9	4.2	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021106			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021106			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021106			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021106			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021106			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021106			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021106			67-64-1	Acetone	NGS	71	<4.3	64	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021106			75-05-8	Acetonitrile	NGS	88	<1.8	300	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021106			98-86-2	Acetophenone	NGS	93	<2.6	4.0	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021106			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021106			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021106			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021106			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021106			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021106			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021106			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021106			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021106			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			110-82-7	Cyclohexane	NGS	92	<1.8	5.3	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021106			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021106			64-17-5	Ethanol	NGS	85	<7.4	30	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021106			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			110-54-3	Hexane	NGS	86	<1.7	2.4	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021106			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			75-09-2	Methylene Chloride	NGS	85	3.4	4.6	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021106			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021106			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021106			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			107-12-0	Propanenitrile	NGS	90	<1.4	3.0	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021106			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021106			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			127-18-4	Tetrachloroethene	NGS	93	<1.6	82	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021106			108-88-3	Toluene	NGS	92	<1.5	2.0	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162092
SDG Number:
Customer Sample ID: 16-05983-2-A2
Customer Sample ID: 16-05983-2-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															
S16T021106			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021106			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	6.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021106			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021106			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021106			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021106			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

NA = Not Analyzed, ND = Not Detected

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

Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021107			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021107			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021107			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021107			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021107			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021107			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021107			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021107			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021107			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021107			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021107			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021107			78-93-3	2-Butanone	NGS	83	<1.9	4.5	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021107			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021107			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021107			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021107			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021107			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021107			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	6.5	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021107			67-64-1	Acetone	NGS	71	<4.3	82	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021107			75-05-8	Acetonitrile	NGS	88	<1.8	1.1E+04	n/a	n/a	n/a	n/a	1.8	n/a	EY
S16T021107			98-86-2	Acetophenone	NGS	93	<2.6	16	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021107			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021107			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2														
S16T021107		107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021107		71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021107		100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021107		123-72-8	Butanal	NGS	95	<2.1	2.7	n/a	n/a	n/a	n/a	2.1	n/a	J
S16T021107		109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021107		56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107		108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107		75-00-3	Chloroethane	NGS	87	<1.9	3.7	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021107		67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107		110-82-7	Cyclohexane	NGS	92	<1.8	3.1	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021107		124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021107		64-17-5	Ethanol	NGS	85	<7.4	300	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021107		141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107		100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107		110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107		110-54-3	Hexane	NGS	86	<1.7	2.4	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021107		628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107		126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107		75-09-2	Methylene Chloride	NGS	85	3.4	56	n/a	n/a	n/a	n/a	2.7	n/a	B
S16T021107		91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021107		98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021107		110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107		107-12-0	Propanenitrile	NGS	90	<1.4	3.8	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021107		110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021107		100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107		127-18-4	Tetrachloroethene	NGS	93	<1.6	87	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021107		108-88-3	Toluene	NGS	92	<1.5	4.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021107			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021107			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	8.9	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021107			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021107			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021107			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021107			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021108			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021108			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021108			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021108			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021108			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021108			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021108			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021108			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021108			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021108			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021108			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021108			78-93-3	2-Butanone	NGS	83	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021108			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021108			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021108			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021108			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021108			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021108			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021108			67-64-1	Acetone	NGS	71	<4.3	7.6	n/a	n/a	n/a	n/a	4.3	n/a	J
S16T021108			75-05-8	Acetonitrile	NGS	88	<1.8	56	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021108			98-86-2	Acetophenone	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021108			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021108			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021108			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021108			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021108			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021108			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021108			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021108			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021108			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021108			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021108			64-17-5	Ethanol	NGS	85	<7.4	8.9	n/a	n/a	n/a	n/a	7.4	n/a	J
S16T021108			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021108			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			75-09-2	Methylene Chloride	NGS	85	3.4	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021108			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021108			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021108			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			107-12-0	Propanenitrile	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021108			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021108			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			127-18-4	Tetrachloroethene	NGS	93	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			108-88-3	Toluene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

NA = Not Analyzed, ND = Not Detected

L - LLS Outside Range
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Y - Comment
Q - Qualitative
J - Estimated
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N - Named TIC
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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021108			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021108			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021108			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021108			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021108			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021108			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021109			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021109			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021109			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021109			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021109			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021109			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021109			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021109			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021109			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021109			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021109			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021109			78-93-3	2-Butanone	NGS	83	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021109			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021109			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021109			78-94-4	3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021109			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021109			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021109			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	
S16T021109			67-64-1	Acetone	NGS	71	<4.3	130	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021109			75-05-8	Acetonitrile	NGS	88	<1.8	1.1E+03	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021109			98-86-2	Acetophenone	NGS	93	<2.6	13	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021109			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021109			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162092
SDG Number:
Customer Sample ID: 16-05983-2-C1
Customer Sample ID: 16-05983-2-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															
S16T021109			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021109			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021109			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021109			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021109			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021109			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			75-00-3	Chloroethane	NGS	87	<1.9	4.9	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021109			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			110-82-7	Cyclohexane	NGS	92	<1.8	1.9	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021109			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021109			64-17-5	Ethanol	NGS	85	<7.4	1.2E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021109			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			110-54-3	Hexane	NGS	86	<1.7	1.8	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021109			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			75-09-2	Methylene Chloride	NGS	85	3.4	4.3	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021109			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021109			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021109			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			107-12-0	Propanenitrile	NGS	90	<1.4	2.3	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021109			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021109			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			127-18-4	Tetrachloroethene	NGS	93	<1.6	89	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			108-88-3	Toluene	NGS	92	<1.5	2.9	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021109			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021109			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	43	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021109			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021109			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021109			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021109			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021110			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021110			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021110			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021110			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			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	
S16T021110			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	Q
S16T021110			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021110			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021110			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	Q
S16T021110			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021110			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021110			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021110			78-93-3	2-Butanone	NGS	83	<1.9	5.3	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021110			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021110			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021110			78-94-4	3-Buten-2-one	NGS	87	<1.7	2.3	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021110			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021110			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021110			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021110			67-64-1	Acetone	NGS	71	<4.3	650	n/a	n/a	n/a	n/a	4.3	n/a	E
S16T021110			75-05-8	Acetonitrile	NGS	88	<1.8	1.0E+03	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021110			98-86-2	Acetophenone	NGS	93	<2.6	5.0	n/a	n/a	n/a	n/a	2.6	n/a	JQ
S16T021110			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021110			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021110			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021110			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021110			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Q
S16T021110			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021110			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021110			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			75-00-3	Chloroethane	NGS	87	<1.9	4.7	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021110			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021110			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	Q
S16T021110			64-17-5	Ethanol	NGS	85	<7.4	2.1E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021110			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021110			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			75-09-2	Methylene Chloride	NGS	85	3.4	3.8	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021110			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	Q
S16T021110			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021110			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			107-12-0	Propanenitrile	NGS	90	<1.4	6.0	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021110			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021110			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			127-18-4	Tetrachloroethene	NGS	93	<1.6	87	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			108-88-3	Toluene	NGS	92	<1.5	2.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021110			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021110			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	130	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021110			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021110			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021110			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021110			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021111			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021111			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021111			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021111			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021111			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	Q
S16T021111			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021111			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021111			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	Q
S16T021111			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021111			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021111			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021111			78-93-3	2-Butanone	NGS	83	<1.9	3.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021111			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021111			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021111			78-94-4	3-Buten-2-one	NGS	87	<1.7	2.1	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021111			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021111			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021111			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021111			67-64-1	Acetone	NGS	71	<4.3	1.3E+03	n/a	n/a	n/a	n/a	4.3	n/a	E
S16T021111			75-05-8	Acetonitrile	NGS	88	<1.8	1.7E+03	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021111			98-86-2	Acetophenone	NGS	93	<2.6	5.6	n/a	n/a	n/a	n/a	2.6	n/a	JQ
S16T021111			107-13-1	Acrylonitrile	NGS	89	<1.7	1.9	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021111			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162092
SDG Number:
Customer Sample ID: 16-05983-2-E1
Customer Sample ID: 16-05983-2-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															
S16T021111			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021111			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021111			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Q
S16T021111			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021111			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021111			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			75-00-3	Chloroethane	NGS	87	<1.9	5.4	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021111			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021111			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	Q
S16T021111			64-17-5	Ethanol	NGS	85	<7.4	2.7E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021111			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			110-00-9	Furan	NGS	82	<1.6	3.3	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021111			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021111			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			75-09-2	Methylene Chloride	NGS	85	3.4	4.1	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021111			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	Q
S16T021111			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021111			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			107-12-0	Propanenitrile	NGS	90	<1.4	21	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021111			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021111			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			127-18-4	Tetrachloroethene	NGS	93	<1.6	85	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			108-88-3	Toluene	NGS	92	<1.5	2.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021111			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021111			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	360	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021111			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021111			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021111			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021111			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162092
SDG Number:
Customer Sample ID: 16-05983-2-EFF-BASE
Customer Sample ID: 16-05983-2-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															
S16T021112			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021112			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021112			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021112			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021112			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021112			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021112			71-36-3	1-Butanol	NGS	93	<8.9	1.0E+03	n/a	n/a	n/a	n/a	8.9	n/a	ELY
S16T021112			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021112			71-23-8	1-Propanol	NGS	89	<3.0	14	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021112			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	6.3	n/a	n/a	n/a	n/a	3.3	n/a	J
S16T021112			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021112			78-93-3	2-Butanone	NGS	83	<1.9	32	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021112			110-43-0	2-Heptanone	NGS	88	<1.6	140	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			591-78-6	2-Hexanone	NGS	86	<1.2	68	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021112			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021112			78-94-4	3-Buten-2-one	NGS	87	<1.7	14	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021112			106-35-4	3-Heptanone	NGS	89	<1.5	100	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021112			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	8.6	n/a	n/a	n/a	n/a	1.3	n/a	J
S16T021112			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	11	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021112			67-64-1	Acetone	NGS	71	<4.3	110	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021112			75-05-8	Acetonitrile	NGS	88	<1.8	50	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021112			98-86-2	Acetophenone	NGS	93	<2.6	13	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021112			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021112			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021112			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021112			71-43-2	Benzene	NGS	93	<1.2	4.2	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021112			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021112			123-72-8	Butanal	NGS	95	<2.1	21	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021112			109-74-0	Butanenitrile	NGS	90	<1.2	6.3	n/a	n/a	n/a	n/a	1.2	n/a	J
S16T021112			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021112			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			110-82-7	Cyclohexane	NGS	92	<1.8	9.1	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021112			124-18-5	Decane	NGS	92	<2.8	85	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021112			64-17-5	Ethanol	NGS	85	<7.4	20	n/a	n/a	n/a	n/a	7.4	n/a	J
S16T021112			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			100-41-4	Ethylbenzene	NGS	93	<1.5	3.2	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021112			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			110-54-3	Hexane	NGS	86	<1.7	82	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021112			628-73-9	Hexanenitrile	NGS	92	<1.5	24	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			75-09-2	Methylene Chloride	NGS	85	3.4	<2.7	n/a	n/a	n/a	n/a	2.7	n/a	
S16T021112			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021112			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021112			110-59-8	Pentanenitrile	NGS	91	<1.6	13	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			107-12-0	Propanenitrile	NGS	90	<1.4	2.2	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021112			110-86-1	Pyridine	NGS	110	<3.8	7.0	n/a	n/a	n/a	n/a	3.8	n/a	J
S16T021112			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021112			127-18-4	Tetrachloroethene	NGS	93	<1.6	7.0	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021112			108-88-3	Toluene	NGS	92	<1.5	26	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021112			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021112			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	8.6	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021112			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021112			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021112			142-82-5	n-Heptane	NGS	90	<1.4	180	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021112			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021113			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021113			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021113			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021113			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021113			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	Q
S16T021113			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021113			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021113			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	Q
S16T021113			71-23-8	1-Propanol	NGS	89	<3.0	4.0	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021113			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021113			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021113			78-93-3	2-Butanone	NGS	83	<1.9	3.8	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021113			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021113			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021113			78-94-4	3-Buten-2-one	NGS	87	<1.7	6.2	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021113			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	Q
S16T021113			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021113			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021113			67-64-1	Acetone	NGS	71	<4.3	2.9E+03	n/a	n/a	n/a	n/a	4.3	n/a	E
S16T021113			75-05-8	Acetonitrile	NGS	88	<1.8	3.3E+03	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021113			98-86-2	Acetophenone	NGS	93	<2.6	5.0	n/a	n/a	n/a	n/a	2.6	n/a	JQ
S16T021113			107-13-1	Acrylonitrile	NGS	89	<1.7	2.4	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021113			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021113			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021113			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021113			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	Q
S16T021113			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021113			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021113			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			75-00-3	Chloroethane	NGS	87	<1.9	5.5	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021113			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021113			124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	Q
S16T021113			64-17-5	Ethanol	NGS	85	<7.4	2.4E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021113			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			110-00-9	Furan	NGS	82	<1.6	6.7	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021113			110-54-3	Hexane	NGS	86	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021113			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			75-09-2	Methylene Chloride	NGS	85	3.4	4.4	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021113			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	Q
S16T021113			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	Q
S16T021113			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			107-12-0	Propanenitrile	NGS	90	<1.4	50	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021113			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021113			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			127-18-4	Tetrachloroethene	NGS	93	<1.6	60	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021113			108-88-3	Toluene	NGS	92	<1.5	2.0	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021113			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021113			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	630	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021113			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021113			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021113			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021113			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021114			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021114			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021114			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021114			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			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	
S16T021114			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021114			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021114			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021114			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021114			71-23-8	1-Propanol	NGS	89	<3.0	6.0	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021114			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021114			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021114			78-93-3	2-Butanone	NGS	83	<1.9	4.6	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021114			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021114			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021114			78-94-4	3-Buten-2-one	NGS	87	<1.7	39	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021114			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021114			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021114			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021114			67-64-1	Acetone	NGS	71	<4.3	3.9E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021114			75-05-8	Acetonitrile	NGS	88	<1.8	940	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021114			98-86-2	Acetophenone	NGS	93	<2.6	4.4	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021114			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021114			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162092
SDG Number:
Customer Sample ID: 16-05983-2-G1
Customer Sample ID: 16-05983-2-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															
S16T021114			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021114			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021114			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021114			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021114			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021114			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			75-00-3	Chloroethane	NGS	87	<1.9	4.2	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021114			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			110-82-7	Cyclohexane	NGS	92	<1.8	3.6	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021114			124-18-5	Decane	NGS	92	<2.8	3.1	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021114			64-17-5	Ethanol	NGS	85	<7.4	2.4E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021114			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			110-00-9	Furan	NGS	82	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			110-54-3	Hexane	NGS	86	<1.7	2.6	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021114			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			75-09-2	Methylene Chloride	NGS	85	3.4	4.1	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021114			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021114			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021114			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			107-12-0	Propanenitrile	NGS	90	<1.4	110	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021114			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021114			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			127-18-4	Tetrachloroethene	NGS	93	<1.6	35	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021114			108-88-3	Toluene	NGS	92	<1.5	1.6	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021114			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021114			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	1.3E+03	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021114			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021114			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021114			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021114			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021115			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021115			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021115			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021115			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			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	
S16T021115			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021115			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021115			71-36-3	1-Butanol	NGS	93	<8.9	1.1E+04	n/a	n/a	n/a	n/a	8.9	n/a	ELY
S16T021115			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021115			71-23-8	1-Propanol	NGS	89	<3.0	730	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021115			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021115			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021115			78-93-3	2-Butanone	NGS	83	<1.9	1.3E+03	n/a	n/a	n/a	n/a	1.9	n/a	E
S16T021115			110-43-0	2-Heptanone	NGS	88	<1.6	73	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			591-78-6	2-Hexanone	NGS	86	<1.2	240	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021115			534-22-5	2-Methylfuran	NGS	89	<1.9	3.0	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021115			78-94-4	3-Buten-2-one	NGS	87	<1.7	420	n/a	n/a	n/a	n/a	1.7	n/a	E
S16T021115			106-35-4	3-Heptanone	NGS	89	<1.5	60	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021115			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	17	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021115			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	91	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021115			67-64-1	Acetone	NGS	71	<4.3	4.3E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021115			75-05-8	Acetonitrile	NGS	88	<1.8	610	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021115			98-86-2	Acetophenone	NGS	93	<2.6	4.7	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021115			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021115			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021115			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021115			71-43-2	Benzene	NGS	93	<1.2	37	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021115			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021115			123-72-8	Butanal	NGS	95	<2.1	200	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021115			109-74-0	Butanenitrile	NGS	90	<1.2	110	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021115			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021115			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			110-82-7	Cyclohexane	NGS	92	<1.8	120	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021115			124-18-5	Decane	NGS	92	<2.8	22	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021115			64-17-5	Ethanol	NGS	85	<7.4	1.2E+03	n/a	n/a	n/a	n/a	7.4	n/a	EY
S16T021115			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			100-41-4	Ethylbenzene	NGS	93	<1.5	2.2	n/a	n/a	n/a	n/a	1.5	n/a	J
S16T021115			110-00-9	Furan	NGS	82	<1.6	30	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			110-54-3	Hexane	NGS	86	<1.7	1.9E+03	n/a	n/a	n/a	n/a	1.7	n/a	E
S16T021115			628-73-9	Hexanenitrile	NGS	92	<1.5	27	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			75-09-2	Methylene Chloride	NGS	85	3.4	3.2	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021115			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021115			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021115			110-59-8	Pentanenitrile	NGS	91	<1.6	61	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			107-12-0	Propanenitrile	NGS	90	<1.4	140	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021115			110-86-1	Pyridine	NGS	110	<3.8	24	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021115			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			127-18-4	Tetrachloroethene	NGS	93	<1.6	8.5	n/a	n/a	n/a	n/a	1.6	n/a	J
S16T021115			108-88-3	Toluene	NGS	92	<1.5	68	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021115			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021115			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	280	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021115			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021115			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021115			142-82-5	n-Heptane	NGS	90	<1.4	960	n/a	n/a	n/a	n/a	1.4	n/a	E
S16T021115			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021116			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021116			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021116			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021116			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021116			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021116			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021116			71-23-8	1-Propanol	NGS	89	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	n/a	
S16T021116			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021116			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021116			78-93-3	2-Butanone	NGS	83	<1.9	7.6	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021116			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021116			78-94-4	3-Buten-2-one	NGS	87	<1.7	7.7	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021116			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021116			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021116			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021116			67-64-1	Acetone	NGS	71	<4.3	5.5E+03	n/a	n/a	n/a	n/a	4.3	n/a	EY
S16T021116			75-05-8	Acetonitrile	NGS	88	<1.8	770	n/a	n/a	n/a	n/a	1.8	n/a	E
S16T021116			98-86-2	Acetophenone	NGS	93	<2.6	7.8	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021116			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021116			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021116			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021116			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021116			123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a	
S16T021116			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021116			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021116			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			110-82-7	Cyclohexane	NGS	92	<1.8	11	n/a	n/a	n/a	n/a	1.8	n/a	J
S16T021116			124-18-5	Decane	NGS	92	<2.8	3.4	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021116			64-17-5	Ethanol	NGS	85	<7.4	1.1E+03	n/a	n/a	n/a	n/a	7.4	n/a	E
S16T021116			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			110-00-9	Furan	NGS	82	<1.6	15	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			110-54-3	Hexane	NGS	86	<1.7	7.1	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021116			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			75-09-2	Methylene Chloride	NGS	85	3.4	3.6	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021116			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021116			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021116			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			107-12-0	Propanenitrile	NGS	90	<1.4	260	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021116			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021116			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			127-18-4	Tetrachloroethene	NGS	93	<1.6	30	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021116			108-88-3	Toluene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021116			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021116			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	1000	n/a	n/a	n/a	n/a	1.6	n/a	E
S16T021116			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021116			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021116			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021116			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162092
SDG Number:
Customer Sample ID: 16-05983-2-IN-BASE
Customer Sample ID: 16-05983-2-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															
S16T021117			79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021117			79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021117			75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021117			107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021117			106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a	
S16T021117			123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021117			71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	n/a	n/a	8.9	n/a	LY
S16T021117			111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	n/a	n/a	n/a	5.6	n/a	
S16T021117			71-23-8	1-Propanol	NGS	89	<3.0	8.7	n/a	n/a	n/a	n/a	3.0	n/a	J
S16T021117			108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021117			1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021117			78-93-3	2-Butanone	NGS	83	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a	J
S16T021117			110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021117			534-22-5	2-Methylfuran	NGS	89	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021117			78-94-4	3-Buten-2-one	NGS	87	<1.7	4.3	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021117			106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021117			105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021117			108-10-1	4-Methyl-2-Pentanone	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021117			67-64-1	Acetone	NGS	71	<4.3	120	n/a	n/a	n/a	n/a	4.3	n/a	
S16T021117			75-05-8	Acetonitrile	NGS	88	<1.8	55	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021117			98-86-2	Acetophenone	NGS	93	<2.6	9.3	n/a	n/a	n/a	n/a	2.6	n/a	J
S16T021117			107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021117			107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a	

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Cartridge Evaluation
Data Summary Report

Sample Group: 20162092
SDG Number:
Customer Sample ID: 16-05983-2-IN-BASE
Customer Sample ID: 16-05983-2-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															
S16T021117			107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a	
S16T021117			71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021117			100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021117			123-72-8	Butanal	NGS	95	<2.1	2.6	n/a	n/a	n/a	n/a	2.1	n/a	J
S16T021117			109-74-0	Butanenitrile	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	
S16T021117			56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a	
S16T021117			67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			110-82-7	Cyclohexane	NGS	92	<1.8	16	n/a	n/a	n/a	n/a	1.8	n/a	
S16T021117			124-18-5	Decane	NGS	92	<2.8	3.4	n/a	n/a	n/a	n/a	2.8	n/a	J
S16T021117			64-17-5	Ethanol	NGS	85	<7.4	25	n/a	n/a	n/a	n/a	7.4	n/a	
S16T021117			141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			100-41-4	Ethylbenzene	NGS	93	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			110-00-9	Furan	NGS	82	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			110-54-3	Hexane	NGS	86	<1.7	6.1	n/a	n/a	n/a	n/a	1.7	n/a	J
S16T021117			628-73-9	Hexanenitrile	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			126-98-7	Methacrylonitrile	NGS	90	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			75-09-2	Methylene Chloride	NGS	85	3.4	3.4	n/a	n/a	n/a	n/a	2.7	n/a	BJ
S16T021117			91-20-3	Naphthalene	NGS	95	<3.7	<3.7	n/a	n/a	n/a	n/a	3.7	n/a	
S16T021117			98-95-3	Nitrobenzene	NGS	93	<2.6	<2.6	n/a	n/a	n/a	n/a	2.6	n/a	
S16T021117			110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			107-12-0	Propanenitrile	NGS	90	<1.4	6.4	n/a	n/a	n/a	n/a	1.4	n/a	J
S16T021117			110-86-1	Pyridine	NGS	110	<3.8	<3.8	n/a	n/a	n/a	n/a	3.8	n/a	
S16T021117			100-42-5	Styrene	NGS	94	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			127-18-4	Tetrachloroethene	NGS	93	<1.6	120	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			108-88-3	Toluene	NGS	92	<1.5	2.4	n/a	n/a	n/a	n/a	1.5	n/a	J

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
VAPOR-TDU VOA #2															
S16T021117			79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021117			75-69-4	Trichlorofluoromethane	NGS	84	<1.6	12	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021117			10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
S16T021117			123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021117			142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
S16T021117			10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021105			2-Methyl-1-butene	563-46-2	5.27	NGS	140	JNT
S16T021105			5-Methyloxazolidine	58328-22-6	5.33	NGS	51	JNT
S16T021105			Butane, 2-methyl-	78-78-4	5.61	NGS	720	JNT
S16T021105			Cyclopropane, ethyl-	1191-96-4	6.02	NGS	2.1E+03	JNT
S16T021105			Pentane	109-66-0	6.26	NGS	1.7E+03	JNT
S16T021105			2-Pentene	109-68-2	6.55	NGS	200	JNT
S16T021105			2-Pentene, (E)-	646-04-8	6.81	NGS	110	JNT
S16T021105			Cyclobutanone, 2,2,3-trimethyl	1449-49-6	6.92	NGS	340	JNT
S16T021105			1-Pentene	109-67-1	7.00	NGS	76	JNT
S16T021105			2-Propanol, 2-methyl-	75-65-0	7.16	NGS	290	JNT
S16T021105			1-Pentene, 4-methyl-	691-37-2	8.41	NGS	480	JNT
S16T021105			1-Pentene, 3-methyl-	760-20-3	8.45	NGS	140	JNT
S16T021105			Cyclopentane	287-92-3	8.75	NGS	240	JNT
S16T021105			Pentane, 2-methyl-	107-83-5	8.88	NGS	2.3E+03	JNT
S16T021105			2,4-Hexadiene, (Z,Z)-	6108-61-8	9.17	NGS	37	JNT
S16T021105			Pentane, 3-methyl-	96-14-0	9.54	NGS	520	JNT
S16T021105			1-Hexene	592-41-6	9.92	NGS	930	JNT
S16T021105			2-Hexene	592-43-8	10.66	NGS	79	JNT
S16T021105			4-Penten-1-ol, 3-methyl-	51174-44-8	11.09	NGS	49	JNT
S16T021105			2-Hexene, (E)-	4050-45-7	11.17	NGS	47	JNT
S16T021105			Cyclopropane, 1-ethyl-2-methyl	19781-68-1	11.43	NGS	140	JNT
S16T021105			Isobutanol	78-83-1	11.62	NGS	78	JNT
S16T021105			5-Methyl-5-hexen-3-ol	67760-89-8	11.71	NGS	100	JNT
S16T021105			Cyclopentane, methyl-	96-37-7	11.90	NGS	210	JNT
S16T021105			Tetrahydrofuran	109-99-9	11.94	NGS	980	JNT
S16T021105			3-Buten-1-ol	627-27-0	12.11	NGS	35	JNT
S16T021105			Amylene Hydrate	75-85-4	12.36	NGS	130	JNT

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8/16/2016

Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021105			Cyclopentane, 1,2-dimethyl-, c	1192-18-3	12.58	NGS	22	JNT
S16T021105			(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.91	NGS	110	JNT
S16T021105			Hexane, 2-methyl-	591-76-4	13.42	NGS	480	JNT
S16T021105			Pentane, 2,3-dimethyl-	565-59-3	13.54	NGS	95	JNT
S16T021105			Hexane, 3-methyl-	589-34-4	13.73	NGS	850	JNT
S16T021105			Ethylidenecyclobutane	1528-21-8	13.93	NGS	52	JNT
S16T021105			Ethylene Glycol	107-21-1	14.02	NGS	490	JNT
S16T021105			Cyclopentane, 1,3-dimethyl-	2453-00-1	14.12	NGS	150	JNT
S16T021105			Hydroxylamine, O-(3-methylbuty	19411-65-5	14.19	NGS	1.1E+03	JNT
S16T021105			2-Pentanol	6032-29-7	14.35	NGS	150	JNT
S16T021105			(Z)-3-Heptene	7642-10-6	14.52	NGS	39	JNT
S16T021105			3-Hexene, 2-methyl-, (Z)-	15840-60-5	14.62	NGS	54	JNT
S16T021105			Tetrahydrofuran, 2,2-dimethyl-	1003-17-4	14.80	NGS	75	JNT
S16T021105			1-Hexene, 3,5-dimethyl-	7423-69-0	14.86	NGS	42	JNT
S16T021105			Unknown-1	--	14.92	NGS	51	JT
S16T021105			Butane, 2-cyclopropyl-	5750-02-7	15.04	NGS	52	JNT
S16T021105			2,4-Azetidinedione, 3,3-diethy	69315-91-9	15.19	NGS	470	JNT
S16T021105			Oxirane, 2-(1,1-dimethylethyl)	53897-30-6	15.25	NGS	61	JNT
S16T021105			2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15.31	NGS	180	JNT
S16T021105			Hexane, 2,4-dimethyl-	589-43-5	15.37	NGS	45	JNT
S16T021105			Cyclopropane, 1,1-diethyl-	1003-19-6	15.42	NGS	94	JNT
S16T021105			Unknown-2	--	15.82	NGS	55	JT
S16T021105			1-Heptene, 6-methyl-	5026-76-6	15.91	NGS	210	JNT
S16T021105			1-Pentanol	71-41-0	15.97	NGS	120	JNT
S16T021105			Heptane, 2-methyl-	592-27-8	16.08	NGS	270	JNT
S16T021105			Heptane, 4-methyl-	589-53-7	16.13	NGS	72	JNT
S16T021105			Heptane, 3,4,5-trimethyl-	20278-89-1	16.25	NGS	73	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021105				2-Hexene, 5,5-dimethyl-, (Z)-	39761-61-0	16.51	NGS	180	JNT
S16T021105				Octane	111-65-9	16.77	NGS	170	JNT
S16T021105				Cyclohexane, 1,2-dimethyl-	583-57-3	16.95	NGS	56	JNT
S16T021105				Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	74	JNT
S16T021105				Octane, 2-methyl-	3221-61-2	17.41	NGS	72	JNT
S16T021105				Cyclohexane, ethyl-	1678-91-7	17.68	NGS	82	JNT
S16T021105				1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	120	JNT
S16T021105				Ether, hexyl pentyl	32357-83-8	18.07	NGS	27	JNT
S16T021105				Cyclohexane, 1,2,4-trimethyl-	2234-75-5	18.14	NGS	28	JNT
S16T021105				Heptane, 4-propyl-	3178-29-8	18.27	NGS	29	JNT
S16T021105				Cyclooctane, butyl-	16538-93-5	18.69	NGS	39	JNT
S16T021105				Nonane	111-84-2	18.83	NGS	29	JNT
S16T021105				Cyclohexane, 1-ethyl-2-methyl-	3728-54-9	18.89	NGS	51	JNT
S16T021105				cis-1-Ethyl-3-methyl-cyclohexa	19489-10-2	18.95	NGS	30	JNT
S16T021105				Cyclooctane, methyl-	1502-38-1	19.13	NGS	29	JNT
S16T021105				Cyclohexane, 1-methyl-2-propyl	4291-79-6	19.37	NGS	26	JNT
S16T021105				10-Heneicosene (c,t)	95008-11-0	19.42	NGS	44	JNT
S16T021105				2,6-Dimethyldecane	13150-81-7	19.67	NGS	27	JNT
S16T021105				1-Methylcyclooctene	933-11-9	19.72	NGS	32	JNT
S16T021105				Cyclohexane, propyl-	1678-92-8	19.87	NGS	37	JNT
S16T021105				Heptane, 3-ethyl-2-methyl-	14676-29-0	19.90	NGS	57	JNT
S16T021105				2-Heptanone, 6-methyl-	928-68-7	20.27	NGS	130	JNT
S16T021105				Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	220	JNT
S16T021105				Cyclohexane, 1,1,2,3-tetrameth	6783-92-2	20.84	NGS	75	JNT
S16T021105				1-Cyclohexylnonene	114614-84-5	21.18	NGS	60	JNT
S16T021105				1-Octanol, 2-butyl-	3913-02-8	21.26	NGS	73	JNT
S16T021105				Unknown-3	--	21.38	NGS	28	JT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021105			m-Menthane, (1S,3R)-(+)-	13837-66-6	21.72	NGS	28	JNT
S16T021105			Decane, 2,6,7-trimethyl-	62108-25-2	22.00	NGS	91	JNT
S16T021105			3-Octene, 2,2-dimethyl-	86869-76-3	22.26	NGS	38	JNT
S16T021105			1-Cyclohexylheptene	114614-83-4	22.67	NGS	43	JNT
S16T021105			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	150	JNT
S16T021105			Undecane	1120-21-4	23.14	NGS	75	JNT
S16T021105			2-Methyl-1-undecanol	10522-26-6	23.20	NGS	26	JNT
S16T021105			1-Ethyl-2,2,6-trimethylcyclohe	71186-27-1	23.31	NGS	56	JNT
S16T021105			Decahydro-naphthalene	493-02-7	23.56	NGS	100	JNT
S16T021105			2-Hexyl-1-octanol	19780-79-1	23.74	NGS	91	JNT
S16T021105			Unknown-4	--	23.79	NGS	64	JT
S16T021105			2,3-Dimethyldecane	17312-44-6	23.85	NGS	150	JNT
S16T021105			1-Decanol, 2-hexyl-	2425-77-6	23.94	NGS	110	JNT
S16T021105			Unknown-5	--	24.26	NGS	320	JT
S16T021105			1-Heptadecyne	26186-00-5	24.45	NGS	26	JNT
S16T021105			Unknown-6	--	24.58	NGS	88	JT
S16T021105			Cyclotridecane	295-02-3	24.64	NGS	45	JNT
S16T021105			Unknown-7	--	24.85	NGS	110	JT
S16T021105			Dichloroacetic acid, tetradecy	83005-02-1	24.90	NGS	63	JNT
S16T021105			Unknown-8	--	25.02	NGS	80	JT
S16T021105			7-Octadecyne, 2-methyl-	35354-38-2	25.13	NGS	54	JNT
S16T021105			2-Piperidinone, N-[4-bromo-n-b	195194-80-0	25.28	NGS	45	JNT
S16T021105			4-Chloro-3-n-hexyltetrahydropy	66555-66-6	25.36	NGS	35	JNT
S16T021105			Unknown-9	--	25.41	NGS	29	JT
S16T021105			Undecane, 2,6-dimethyl-	17301-23-4	25.49	NGS	44	JNT
S16T021105			Cyclohexane, 2-butyl-1,1,3-tri	54676-39-0	26.07	NGS	63	JNT
S16T021105			Undecane, 2-methyl-	7045-71-8	26.45	NGS	92	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021105				1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.65	NGS	50	JNT
S16T021105				Dodecane, 2,6,11-trimethyl-	31295-56-4	27.03	NGS	34	JNT
S16T021105			BLNK	Unknown-1	–	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021106			Formamide	75-12-7	14.02	NGS	32	JNT
S16T021106			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	550	JNT
S16T021106			Decane, 2,4,6-trimethyl-	62108-27-4	23.01	NGS	92	JNT
S16T021106			3,3-Dimethylhexane	563-16-6	23.14	NGS	40	JNT
S16T021106			2,3-Dimethyldecane	17312-44-6	23.79	NGS	27	JNT
S16T021106			Undecane	1120-21-4	23.85	NGS	100	JNT
S16T021106			Dodecane	112-40-3	23.95	NGS	54	JNT
S16T021106			1-Octanol, 2-butyl-	3913-02-8	24.06	NGS	28	JNT
S16T021106			Unknown-1	--	24.26	NGS	830	JT
S16T021106			Unknown-2	--	24.85	NGS	25	JT
S16T021106			2,6-Dimethyldecane	13150-81-7	25.28	NGS	28	JNT
S16T021106			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	61	JNT
S16T021106			4-Undecene, 4-methyl-	61142-40-3	26.01	NGS	99	JNT
S16T021106			Methenamine	100-97-0	26.22	NGS	35	JNT
S16T021106			1,2-Benzisothiazole	272-16-2	26.33	NGS	42	JNT
S16T021106			Undecane, 2-methyl-	7045-71-8	26.46	NGS	89	JNT
S16T021106			1-Iodo-2-methylundecane	73105-67-6	26.58	NGS	28	JNT
S16T021106			Silane, trimethyl[2-methylene-	97778-15-9	26.66	NGS	67	JNT
S16T021106			Octane, 2,3,6,7-tetramethyl-	52670-34-5	27.04	NGS	40	JNT
S16T021106		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021107			Formamide	75-12-7	14.05	NGS	57	JNT
S16T021107			Propane, 2-methyl-1-nitro-	625-74-1	16.49	NGS	29	JNT
S16T021107			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	260	JNT
S16T021107			Decane, 2,4,6-trimethyl-	62108-27-4	23.01	NGS	75	JNT
S16T021107			3,3-Dimethylhexane	563-16-6	23.14	NGS	32	JNT
S16T021107			Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	34	JNT
S16T021107			Undecane	1120-21-4	23.85	NGS	85	JNT
S16T021107			Hexyl octyl ether	17071-54-4	23.95	NGS	72	JNT
S16T021107			2,3-Dimethyldecane	17312-44-6	24.07	NGS	28	JNT
S16T021107			Unknown-1	--	24.26	NGS	430	JT
S16T021107			1-Octanol, 2-butyl-	3913-02-8	24.85	NGS	37	JNT
S16T021107			Dodecane	112-40-3	25.28	NGS	61	JNT
S16T021107			1-Octene, 3,7-dimethyl-	4984-01-4	25.41	NGS	71	JNT
S16T021107			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.96	NGS	30	JNT
S16T021107			Unknown-2	--	26.01	NGS	98	JT
S16T021107			1,2-Benzisothiazole	272-16-2	26.33	NGS	130	JNT
S16T021107			Unknown-3	--	26.45	NGS	100	JT
S16T021107			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.57	NGS	37	JNT
S16T021107			Heptadecane, 2,6,10,15-tetrame	54833-48-6	26.66	NGS	47	JNT
S16T021107			Tetradecane, 1-iodo-	19218-94-1	27.04	NGS	65	JNT
S16T021107		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2									
S16T021108				Unknown-1	--	8.24	NGS	57	JT
S16T021108				2,2,7,7-Tetramethyloctane	1071-31-4	21.52	NGS	56	JNT
S16T021108				Dodecane, 2,6,10-trimethyl-	3891-98-3	22.71	NGS	26	JNT
S16T021108				Undecane, 3-methyl-	1002-43-3	23.55	NGS	7.7	JNT
S16T021108			BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021109			Acetic anhydride	108-24-7	5.30	NGS	52	JNT
S16T021109			Pentane	109-66-0	5.35	NGS	110	JNT
S16T021109			Formamide	75-12-7	14.06	NGS	71	JNT
S16T021109			Propane, 2-methyl-1-nitro-	625-74-1	16.52	NGS	39	JNT
S16T021109			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	250	JNT
S16T021109			Decane, 2,4,6-trimethyl-	62108-27-4	23.01	NGS	59	JNT
S16T021109			Undecane	1120-21-4	23.14	NGS	24	JNT
S16T021109			Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	37	JNT
S16T021109			Dodecane	112-40-3	23.85	NGS	67	JNT
S16T021109			Tridecane	629-50-5	23.95	NGS	57	JNT
S16T021109			Unknown-1	--	24.26	NGS	430	JT
S16T021109			Tetradecane, 1-iodo-	19218-94-1	25.28	NGS	92	JNT
S16T021109			Unknown-2	--	26.01	NGS	93	JT
S16T021109			1,2-Benzisothiazole	272-16-2	26.32	NGS	160	JNT
S16T021109			Undecane, 2-methyl-	7045-71-8	26.45	NGS	90	JNT
S16T021109			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.58	NGS	17	JNT
S16T021109			2,6-Dimethyldecane	13150-81-7	26.59	NGS	33	JNT
S16T021109			Silane, trimethyl-3-penten-2-y	53264-56-5	26.65	NGS	62	JNT
S16T021109			Octane, 2,3,6,7-tetramethyl-	52670-34-5	27.03	NGS	52	JNT
S16T021109		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021110			Cyclobutylamine	2516-34-9	5.23	NGS	37	JNT
S16T021110			2-Butene	107-01-7	5.35	NGS	30	JNT
S16T021110			4-Methoxy-1-pentene	98386-09-5	7.15	NGS	49	JNT
S16T021110			Formamide	75-12-7	14.05	NGS	66	JNT
S16T021110			Propane, 2-methyl-1-nitro-	625-74-1	16.49	NGS	53	JNT
S16T021110			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	1.5E+03	JNT
S16T021110			1,1,1,3,5,5,5-Heptamethyltrisi	1873-88-7	22.50	NGS	27	JNT
S16T021110			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	210	JNT
S16T021110			2,6-Dimethyldecane	13150-81-7	23.14	NGS	90	JNT
S16T021110			2-Hexyl-1-octanol	19780-79-1	23.56	NGS	44	JNT
S16T021110			3,3-Dimethylhexane	563-16-6	23.85	NGS	220	JNT
S16T021110			Undecane, 2,6-dimethyl-	17301-23-4	23.94	NGS	100	JNT
S16T021110			1-Bromo-4-bromomethyldecane	61639-11-0	24.07	NGS	110	JNT
S16T021110			Unknown-1	--	24.26	NGS	2.5E+03	JT
S16T021110			(2,2,6-Trimethyl-bicyclo[4.1.0	78996-11-9	24.85	NGS	56	JNT
S16T021110			Benzoic acid, 4-ethoxy-, ethyl	23676-09-7	25.07	NGS	78	JNT
S16T021110			(R)-(-)-14-Methyl-8-hexadecyn-	64566-18-3	25.15	NGS	33	JNT
S16T021110			3,7,11,15-Tetramethyl-2-hexade	102608-53-7	25.28	NGS	33	JNT
S16T021110			2,6-Dimethyl-6-trifluoroacetox	61986-67-2	25.41	NGS	80	JNT
S16T021110			2-Dodecen-1-yl(-)succinic anhy	19780-11-1	25.96	NGS	43	JNT
S16T021110			2-Propenoic acid, octyl ester	2499-59-4	26.00	NGS	75	JNT
S16T021110			1,2-Benzisothiazole	272-16-2	26.32	NGS	50	JNT
S16T021110			Undecane, 2-methyl-	7045-71-8	26.44	NGS	310	JNT
S16T021110			1-Iodo-2-methylundecane	73105-67-6	26.57	NGS	82	JNT
S16T021110			Silane, trimethyl[2-methylene-	97778-15-9	26.65	NGS	260	JNT
S16T021110			Tetracontane, 3,5,24-trimethyl	55162-61-3	26.75	NGS	44	JNT
S16T021110			2-Piperidinone, N-[4-bromo-n-b	195194-80-0	26.82	NGS	60	JNT

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Cartridge Evaluation
Data Summary Report

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

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

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021111			Acetic anhydride	108-24-7	5.35	NGS	370	JNT
S16T021111			Formamide	75-12-7	14.10	NGS	110	JNT
S16T021111			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	460	JNT
S16T021111			Urea	57-13-6	20.86	NGS	76	JNT
S16T021111			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	99	JNT
S16T021111			Undecane	1120-21-4	23.14	NGS	43	JNT
S16T021111			Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	30	JNT
S16T021111			2,6-Dimethyldecane	13150-81-7	23.85	NGS	120	JNT
S16T021111			Octane, 2,3,6,7-tetramethyl-	52670-34-5	23.94	NGS	56	JNT
S16T021111			1-Octanol, 2-butyl-	3913-02-8	24.06	NGS	40	JNT
S16T021111			Unknown-1	--	24.26	NGS	830	JT
S16T021111			Hydroxylamine, O-decyl-	29812-79-1	25.28	NGS	50	JNT
S16T021111			1,2-Benzisothiazole	272-16-2	26.32	NGS	81	JNT
S16T021111			Undecane, 2-methyl-	7045-71-8	26.44	NGS	110	JNT
S16T021111			1-Iodo-2-methylundecane	73105-67-6	26.57	NGS	42	JNT
S16T021111			Silane, trimethyl[2-methylene-	97778-15-9	26.65	NGS	87	JNT
S16T021111			Decane, 2,6,8-trimethyl-	62108-26-3	27.03	NGS	53	JNT
S16T021111		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021112			Unknown-1	--	8.23	NGS	25	JT
S16T021112			Pentane, 2-methyl-	107-83-5	8.88	NGS	32	JNT
S16T021112			Tetrahydrofuran	109-99-9	11.94	NGS	20	JNT
S16T021112			Hexane, 3-methyl-	589-34-4	13.72	NGS	41	JNT
S16T021112			Ethylene Glycol	107-21-1	13.92	NGS	91	JNT
S16T021112			Formamide	75-12-7	14.05	NGS	28	JNT
S16T021112			(Z)-Hex-2-ene, 5-methyl-	13151-17-2	14.17	NGS	72	JNT
S16T021112			2,4-Azetidinedione, 3,3-diethy	69315-91-9	15.19	NGS	30	JNT
S16T021112			Heptane, 2-methyl-	592-27-8	16.08	NGS	72	JNT
S16T021112			Octane	111-65-9	16.77	NGS	110	JNT
S16T021112			Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	44	JNT
S16T021112			1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	36	JNT
S16T021112			Octane, 3-methyl-	2216-33-3	18.28	NGS	38	JNT
S16T021112			Nonane	111-84-2	18.83	NGS	110	JNT
S16T021112			Heptanal	111-71-7	18.97	NGS	47	JNT
S16T021112			Undecanal	112-44-7	19.42	NGS	29	JNT
S16T021112			Octane, 3,6-dimethyl-	15869-94-0	19.67	NGS	49	JNT
S16T021112			2-Heptanone, 6-methyl-	928-68-7	20.27	NGS	210	JNT
S16T021112			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	300	JNT
S16T021112			Cyclohexane, 1,1,2,3-tetrameth	6783-92-2	20.84	NGS	31	JNT
S16T021112			Hexadecanal, 2-methyl-	55019-46-0	21.18	NGS	73	JNT
S16T021112			Decane, 2,6,7-trimethyl-	62108-25-2	22.00	NGS	81	JNT
S16T021112			Cyclohexene, 1-methyl-5-(1-met	1461-27-4	22.62	NGS	36	JNT
S16T021112			1-Cyclohexylheptene	114614-83-4	22.67	NGS	27	JNT
S16T021112			Undecane	1120-21-4	23.01	NGS	130	JNT
S16T021112			2,6-Dimethyldecane	13150-81-7	23.14	NGS	48	JNT
S16T021112			1-Ethyl-2,2,6-trimethylcyclohe	71186-27-1	23.31	NGS	31	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021112			1,14-Tetradecanediol	19812-64-7	23.56	NGS	43	JNT
S16T021112			Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	90	JNT
S16T021112			Decane, 2,4,6-trimethyl-	62108-27-4	23.85	NGS	110	JNT
S16T021112			Hexyl octyl ether	17071-54-4	23.94	NGS	100	JNT
S16T021112			Unknown-2	--	24.26	NGS	340	JT
S16T021112			cis-9,10-Epoxyoctadecan-1-ol	13980-12-6	24.85	NGS	43	JNT
S16T021112			Dodecane	112-40-3	25.28	NGS	73	JNT
S16T021112			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	91	JNT
S16T021112			Octane, 4-ethyl-	15869-86-0	25.49	NGS	25	JNT
S16T021112			Unknown-3	--	25.99	NGS	62	JT
S16T021112			1-Octanol, 2-butyl-	3913-02-8	26.07	NGS	26	JNT
S16T021112			Methenamine	100-97-0	26.19	NGS	53	JNT
S16T021112			1,2-Benzisothiazole	272-16-2	26.31	NGS	180	JNT
S16T021112			Unknown-4	--	26.43	NGS	73	JT
S16T021112			Heptadecane, 2,6,10,15-tetrame	54833-48-6	26.63	NGS	41	JNT
S16T021112			Undecane, 2-methyl-	7045-71-8	27.02	NGS	44	JNT
S16T021112		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021113			1,3-Butadiene	106-99-0	5.04	NGS	12	JNT
S16T021113			Acetic anhydride	108-24-7	5.31	NGS	33	JNT
S16T021113			Acetic acid	64-19-7	9.49	NGS	12	JNT
S16T021113			Formamide	75-12-7	14.10	NGS	140	JNT
S16T021113			Propane, 2-methyl-1-nitro-	625-74-1	16.47	NGS	25	JNT
S16T021113			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	1.2E+03	JNT
S16T021113			2,2,7,7-Tetramethyloctane	1071-31-4	21.51	NGS	76	JNT
S16T021113			Decane, 2,4,6-trimethyl-	62108-27-4	22.71	NGS	52	JNT
S16T021113			2,6-Dimethyldecane	13150-81-7	23.01	NGS	150	JNT
S16T021113			Unknown-1	--	23.14	NGS	77	JT
S16T021113			2-Hexyl-1-octanol	19780-79-1	23.55	NGS	48	JNT
S16T021113			2-Piperidinone, N-[4-bromo-n-b	195194-80-0	23.79	NGS	36	JNT
S16T021113			Octane, 4-ethyl-	15869-86-0	23.85	NGS	110	JNT
S16T021113			1-Octanol, 2-butyl-	3913-02-8	23.95	NGS	44	JNT
S16T021113			Culmorin	18374-83-9	24.05	NGS	61	JNT
S16T021113			Unknown-2	--	24.26	NGS	1.9E+03	JT
S16T021113			(2,2,6-Trimethyl-bicyclo[4.1.0	78996-11-9	24.84	NGS	54	JNT
S16T021113			Unknown-3	--	25.05	NGS	35	JT
S16T021113			Unknown-4	--	25.14	NGS	46	JT
S16T021113			Unknown-5	--	25.25	NGS	25	JT
S16T021113			Unknown-6	--	25.41	NGS	30	JT
S16T021113			2,6,10-Dodecatrienal, 3,7,11-t	4380-32-9	25.80	NGS	30	JNT
S16T021113			Unknown-7	--	25.98	NGS	300	JT
S16T021113			2-Dodecen-1-yl(-)succinic anhy	19780-11-1	26.04	NGS	66	JNT
S16T021113			Methenamine	100-97-0	26.19	NGS	220	JNT
S16T021113			Unknown-8	--	26.30	NGS	68	JT
S16T021113			1-Iodo-2-methylundecane	73105-67-6	26.43	NGS	94	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021113			2-Octylcyclopropene-1-heptanol	54467-85-5	26.48	NGS	38	JNT
S16T021113			9,12,15-Octadecatrienoic acid,	55320-01-9	26.56	NGS	89	JNT
S16T021113			Silane, trimethyl[2-methylene-	97778-15-9	26.64	NGS	140	JNT
S16T021113			1-Bromo-4-bromomethyldecane	61639-11-0	27.01	NGS	34	JNT
S16T021113			Unknown-9	--	27.31	NGS	49	JT
S16T021113			11-Tetradecyn-1-ol	33925-73-4	27.62	NGS	26	JNT
S16T021113		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021114			1,3-Butadiene	106-99-0	5.04	NGS	17	JNT
S16T021114			2-Methyl-1-butene	563-46-2	5.25	NGS	51	JNT
S16T021114			2-Butene	107-01-7	5.34	NGS	32	JNT
S16T021114			2-Pentene, (E)-	646-04-8	5.43	NGS	50	JNT
S16T021114			Butane, 2-methyl-	78-78-4	5.60	NGS	90	JNT
S16T021114			1-Pentene	109-67-1	6.91	NGS	61	JNT
S16T021114			2-Butene, 2-methyl-	513-35-9	7.10	NGS	33	JNT
S16T021114			Cyclopentane	287-92-3	8.74	NGS	86	JNT
S16T021114			Tetrahydrofuran	109-99-9	11.94	NGS	28	JNT
S16T021114			Formamide	75-12-7	14.21	NGS	95	JNT
S16T021114			Acetonitrile, hydroxy-	107-16-4	16.10	NGS	30	JNT
S16T021114			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	170	JNT
S16T021114			2,2,7,7-Tetramethyloctane	1071-31-4	21.52	NGS	73	JNT
S16T021114			Dodecane, 2,6,10-trimethyl-	3891-98-3	22.71	NGS	37	JNT
S16T021114			Undecane, 4,7-dimethyl-	17301-32-5	23.00	NGS	140	JNT
S16T021114			Undecane	1120-21-4	23.14	NGS	69	JNT
S16T021114			Heptanoic acid, 2-ethyl-	3274-29-1	23.68	NGS	45	JNT
S16T021114			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	39	JNT
S16T021114			Dodecane	112-40-3	23.85	NGS	110	JNT
S16T021114			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	63	JNT
S16T021114			2,3-Dimethyldecane	17312-44-6	24.06	NGS	26	JNT
S16T021114			Unknown-1	--	24.26	NGS	230	JT
S16T021114			Undecane, 3-methyl-	1002-43-3	24.90	NGS	13	JNT
S16T021114			Tetradecane, 1-iodo-	19218-94-1	25.27	NGS	42	JNT
S16T021114			Methenamine	100-97-0	26.19	NGS	32	JNT
S16T021114		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021115			2-Butene	107-01-7	4.70	NGS	41	JNT
S16T021115			2-Methyl-1-butene	563-46-2	5.30	NGS	110	JNT
S16T021115			Butane, 2-methyl-	78-78-4	5.64	NGS	400	JNT
S16T021115			1,4-Pentadiene	591-93-5	5.81	NGS	29	JNT
S16T021115			1-Pentene	109-67-1	6.06	NGS	880	JNT
S16T021115			Pentane	109-66-0	6.29	NGS	3.6E+03	JNT
S16T021115			2-Pentene, (Z)-	627-20-3	6.58	NGS	160	JNT
S16T021115			2-Pentene, (E)-	646-04-8	6.83	NGS	98	JNT
S16T021115			Cyclobutanone, 2,2,3-trimethyl	1449-49-6	6.93	NGS	160	JNT
S16T021115			2-Butene, 2-methyl-	513-35-9	7.02	NGS	43	JNT
S16T021115			Oxirane, 2-(1,1-dimethylethyl	53897-30-6	7.12	NGS	81	JNT
S16T021115			4-Methoxy-1-pentene	98386-09-5	7.18	NGS	95	JNT
S16T021115			Heptane, 4-azido-	27126-22-3	7.56	NGS	36	JNT
S16T021115			1-Pentene, 4-methyl-	691-37-2	8.42	NGS	290	JNT
S16T021115			1-Pentene, 3-methyl-	760-20-3	8.46	NGS	69	JNT
S16T021115			Cyclopentane	287-92-3	8.75	NGS	160	JNT
S16T021115			Pentane, 2-methyl-	107-83-5	8.89	NGS	1.5E+03	JNT
S16T021115			Cyclopropane, 1-ethyl-2-methyl	19781-68-1	9.29	NGS	26	JNT
S16T021115			Cyclobutanecarbonitrile, 3,3-d	53783-86-1	9.42	NGS	66	JNT
S16T021115			Pentane, 3-methyl-	96-14-0	9.54	NGS	320	JNT
S16T021115			2-Hexene	592-43-8	10.67	NGS	59	JNT
S16T021115			2-Hexene, (E)-	4050-45-7	11.18	NGS	28	JNT
S16T021115			Cyclopropane, propyl-	2415-72-7	11.43	NGS	73	JNT
S16T021115			Hydroperoxide, hexyl	4312-76-9	11.64	NGS	40	JNT
S16T021115			Butane, 1-methoxy-	628-28-4	11.73	NGS	72	JNT
S16T021115			Cyclopentane, methyl-	96-37-7	11.89	NGS	170	JNT
S16T021115			Tetrahydrofuran	109-99-9	11.97	NGS	640	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021115			2-Methyl-5-hexen-3-ol	32815-70-6	12.38	NGS	79	JNT
S16T021115			(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.92	NGS	110	JNT
S16T021115			4-Penten-2-one	13891-87-7	13.34	NGS	32	JNT
S16T021115			Hexane, 2-methyl-	591-76-4	13.42	NGS	310	JNT
S16T021115			Pentane, 2,3-dimethyl-	565-59-3	13.54	NGS	32	JNT
S16T021115			Hexane, 3-methyl-	589-34-4	13.72	NGS	550	JNT
S16T021115			Cyclopentane, 1,3-dimethyl-	2453-00-1	14.02	NGS	38	JNT
S16T021115			Cyclopentane, 1,2-dimethyl-, c	1192-18-3	14.12	NGS	60	JNT
S16T021115			Hydroxylamine, O-(3-methylbuty	19411-65-5	14.18	NGS	740	JNT
S16T021115			2-Pentanol	6032-29-7	14.32	NGS	88	JNT
S16T021115			Formamide	75-12-7	14.57	NGS	160	JNT
S16T021115			(Z)-3-Heptene	7642-10-6	14.62	NGS	40	JNT
S16T021115			Tetrahydrofuran, 2,2-dimethyl-	1003-17-4	14.79	NGS	46	JNT
S16T021115			1-Hexene, 3,5-dimethyl-	7423-69-0	14.86	NGS	31	JNT
S16T021115			Unknown-1	--	14.91	NGS	33	JT
S16T021115			Butane, 2-cyclopropyl-	5750-02-7	15.03	NGS	43	JNT
S16T021115			2,4-Azetidinedione, 3,3-diethy	69315-91-9	15.18	NGS	260	JNT
S16T021115			Oxirane, 2-(1,1-dimethylethyl)	36099-44-2	15.24	NGS	35	JNT
S16T021115			2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15.31	NGS	110	JNT
S16T021115			Hexane, 2,4-dimethyl-	589-43-5	15.37	NGS	26	JNT
S16T021115			Cyclopropane, 1,1-diethyl-	1003-19-6	15.42	NGS	51	JNT
S16T021115			1-Heptene, 6-methyl-	5026-76-6	15.90	NGS	150	JNT
S16T021115			1-Pentanol	71-41-0	15.96	NGS	74	JNT
S16T021115			Heptane, 2-methyl-	592-27-8	16.08	NGS	230	JNT
S16T021115			Heptane, 4-methyl-	589-53-7	16.13	NGS	69	JNT
S16T021115			Heptane, 3,4,5-trimethyl-	20278-89-1	16.25	NGS	64	JNT
S16T021115			2-Hexene, 5,5-dimethyl-, (Z)-	39761-61-0	16.51	NGS	96	JNT

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021115			Acetic acid, trifluoro-, 3,7-d	28745-07-5	16.60	NGS	34	JNT
S16T021115			Octane	111-65-9	16.77	NGS	160	JNT
S16T021115			Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	77	JNT
S16T021115			Octane, 2-methyl-	3221-61-2	17.41	NGS	58	JNT
S16T021115			Cyclohexane, ethyl-	1678-91-7	17.68	NGS	38	JNT
S16T021115			1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	76	JNT
S16T021115			Heptane, 4-propyl-	3178-29-8	18.27	NGS	31	JNT
S16T021115			Nonane	111-84-2	18.83	NGS	37	JNT
S16T021115			Cyclohexane, 1-ethyl-2-methyl-	3728-54-9	18.88	NGS	36	JNT
S16T021115			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	330	JNT
S16T021115			Undecane	1120-21-4	23.00	NGS	130	JNT
S16T021115			3,3-Dimethylhexane	563-16-6	23.14	NGS	55	JNT
S16T021115			2,6-Dimethyldecane	13150-81-7	23.73	NGS	61	JNT
S16T021115			Dodecane	112-40-3	23.85	NGS	100	JNT
S16T021115			Hexyl octyl ether	17071-54-4	23.94	NGS	63	JNT
S16T021115			1-Octanol, 2-butyl-	3913-02-8	24.06	NGS	32	JNT
S16T021115			Unknown-2	--	24.26	NGS	220	JT
S16T021115			Undecane, 2,6-dimethyl-	17301-23-4	25.27	NGS	64	JNT
S16T021115			1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS	32	JNT
S16T021115			2-Propenoic acid, octyl ester	2499-59-4	25.99	NGS	44	JNT
S16T021115			1,2-Benzisothiazole	272-16-2	26.30	NGS	78	JNT
S16T021115			Undecane, 2-methyl-	7045-71-8	26.43	NGS	19	JNT
S16T021115		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021116			2-Butene	107-01-7	4.73	NGS	57	JNT
S16T021116			2-Methyl-1-butene	563-46-2	5.33	NGS	180	JNT
S16T021116			Cyclopropane, 1,2-dimethyl-, c	930-18-7	5.51	NGS	78	JNT
S16T021116			Butane, 2-methyl-	78-78-4	5.67	NGS	330	JNT
S16T021116			2-Pentene, (E)-	646-04-8	6.61	NGS	43	JNT
S16T021116			2-Pentene	109-68-2	6.86	NGS	26	JNT
S16T021116			1-Pentene	109-67-1	6.96	NGS	280	JNT
S16T021116			Cyclobutane, methyl-	598-61-8	7.03	NGS	93	JNT
S16T021116			2-Pentene, (Z)-	627-20-3	7.13	NGS	87	JNT
S16T021116			Di(1,2,5-oxadiazolo)[3,4-b;3,4	186205-18-5	7.88	NGS	31	JNT
S16T021116			1,4-Pentadiene	591-93-5	8.42	NGS	28	JNT
S16T021116			Cyclopentane	287-92-3	8.78	NGS	310	JNT
S16T021116			Tetrahydrofuran	109-99-9	11.96	NGS	120	JNT
S16T021116			Formamide	75-12-7	14.63	NGS	120	JNT
S16T021116			Cyclotetrasiloxane, octamethyl	556-67-2	20.47	NGS	140	JNT
S16T021116			Urea	57-13-6	20.86	NGS	31	JNT
S16T021116			2,6-Dimethyldecane	13150-81-7	23.00	NGS	62	JNT
S16T021116			Octane, 2,3,6,7-tetramethyl-	52670-34-5	23.14	NGS	27	JNT
S16T021116			Undecane	1120-21-4	23.73	NGS	39	JNT
S16T021116			Dodecane	112-40-3	23.85	NGS	64	JNT
S16T021116			Unknown-1	--	24.26	NGS	200	JT
S16T021116			Undecane, 2,6-dimethyl-	17301-23-4	25.27	NGS	37	JNT
S16T021116			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	33	JNT
S16T021116			Unknown-2	--	25.99	NGS	51	JT
S16T021116			1,2-Benzisothiazole	272-16-2	26.30	NGS	79	JNT
S16T021116			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.43	NGS	22	JNT
S16T021116		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary Report

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

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Cartridge Evaluation
Data Summary Report

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2								
S16T021117			Unknown-1	--	7.15	NGS	27	JT
S16T021117			Tetrahydrofuran	109-99-9	11.95	NGS	18	JNT
S16T021117			Formamide	75-12-7	14.04	NGS	36	JNT
S16T021117			Propane, 2-methyl-1-nitro-	625-74-1	16.50	NGS	32	JNT
S16T021117			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	310	JNT
S16T021117			Undecane	1120-21-4	23.00	NGS	91	JNT
S16T021117			Decane, 2,4,6-trimethyl-	62108-27-4	23.14	NGS	37	JNT
S16T021117			Heptanoic acid, 2-ethyl-	3274-29-1	23.68	NGS	41	JNT
S16T021117			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	37	JNT
S16T021117			Dodecane	112-40-3	23.85	NGS	82	JNT
S16T021117			Hydroxylamine, O-decyl-	29812-79-1	23.95	NGS	62	JNT
S16T021117			Unknown-2	--	24.26	NGS	380	JT
S16T021117			2,6-Dimethyldecane	13150-81-7	25.27	NGS	70	JNT
S16T021117			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	56	JNT
S16T021117			Unknown-3	--	26.00	NGS	77	JT
S16T021117			Methenamine	100-97-0	26.20	NGS	49	JNT
S16T021117			1,2-Benzisothiazole	272-16-2	26.32	NGS	120	JNT
S16T021117			Heptadecane, 2,6,10,15-tetrame	54833-48-6	26.44	NGS	57	JNT
S16T021117			Undecane, 2-methyl-	7045-71-8	27.03	NGS	28	JNT
S16T021117		BLNK	Unknown-1	--	8.24	NGS	30	

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Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162087
SDG Number:
Customer Sample ID: 16-05982-3-A1
Customer Sample ID: 16-05982-3-A1

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021032			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	7.9	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021032			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	2.2	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021032			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021032			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	0.47	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021032			534-22-5	2-Methylfuran	NGS	n/a	n/a	1.3	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021032			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021032			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021032			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021032			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	490	n/a	n/a	n/a	n/a	0.10	n/a	E

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E - Outside Calibration Range

J - Estimated

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021033			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021033			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021033			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021033			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021033			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021033			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021033			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021033			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021033			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021034			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021034			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021034			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021034			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021034			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021034			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.49	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021034			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021034			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021034			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	0.13	n/a	n/a	n/a	n/a	0.10	n/a	J

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J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021035			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021035			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021035			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021035			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021035			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021035			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021035			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021035			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021035			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	

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J - Estimated

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021036			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021036			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021036			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021036			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021036			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021036			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.44	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021036			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021036			110-00-9	Furan	NGS	n/a	n/a	0.10	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021036			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	0.27	n/a	n/a	n/a	n/a	0.10	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021037			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021037			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021037			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021037			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021037			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021037			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021037			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021037			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021037			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	1.3	n/a	n/a	n/a	n/a	0.10	n/a	J

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Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021038			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021038			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021038			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021038			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021038			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021038			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.43	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021038			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021038			110-00-9	Furan	NGS	n/a	n/a	0.13	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021038			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	6.1	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021039			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021039			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021039			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021039			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021039			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021039			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021039			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021039			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021039			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021040			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021040			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	0.34	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021040			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021040			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021040			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021040			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021040			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021040			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021040			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	8.6	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021041			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021041			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021041			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021041			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	0.34	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021041			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021041			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021041			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021041			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021041			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	150	n/a	n/a	n/a	n/a	0.10	n/a	E

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021042			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021042			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021042			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021042			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021042			534-22-5	2-Methylfuran	NGS	n/a	n/a	1.4	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021042			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021042			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021042			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021042			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	450	n/a	n/a	n/a	n/a	0.10	n/a	E

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021043			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021043			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021043			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021043			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021043			534-22-5	2-Methylfuran	NGS	n/a	n/a	0.55	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021043			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.35	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021043			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021043			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021043			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	350	n/a	n/a	n/a	n/a	0.10	n/a	E

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021044			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021044			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021044			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021044			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021044			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021044			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021044			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021044			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021044			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	0.18	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162088
SDG Number:
Customer Sample ID: 16-05983-3-A1
Customer Sample ID: 16-05983-3-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														
S16T021045		1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021045		1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	1.6	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021045		625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021045		3777-71-7	2-Heptylfuran	NGS	n/a	n/a	1.2	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021045		534-22-5	2-Methylfuran	NGS	n/a	n/a	1.2	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021045		3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.79	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021045		4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021045		110-00-9	Furan	NGS	n/a	n/a	0.53	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021045		109-99-9	Tetrahydrofuran	NGS	n/a	n/a	430	n/a	n/a	n/a	n/a	0.10	n/a	E

8/15/16

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample# R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM														
S16T021046		1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021046		1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021046		625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021046		3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021046		534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021046		3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021046		4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021046		110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021046		109-99-9	Tetrahydrofuran	NGS	n/a	n/a	4.5	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162088
SDG Number:
Customer Sample ID: 16-05983-3-B1
Customer Sample ID: 16-05983-3-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															
S16T021047			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021047			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021047			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021047			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021047			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021047			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.46	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021047			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021047			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021047			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	2.4	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162088
SDG Number:
Customer Sample ID: 16-05983-3-BLANK
Customer Sample ID: 16-05983-3-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															
S16T021048			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021048			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021048			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021048			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021048			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021048			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021048			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021048			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021048			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	<0.10	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162088
SDG Number:
Customer Sample ID: 16-05983-3-C1
Customer Sample ID: 16-05983-3-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															
S16T021049			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021049			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021049			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021049			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021049			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021049			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.40	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021049			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021049			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021049			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	1.3	n/a	n/a	n/a	n/a	0.10	n/a	J

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E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162088
SDG Number:
Customer Sample ID: 16-05983-3-D1
Customer Sample ID: 16-05983-3-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															
S16T021050			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021050			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021050			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021050			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021050			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021050			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.50	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021050			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021050			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021050			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	1.9	n/a	n/a	n/a	n/a	0.10	n/a	J

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021051			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021051			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021051			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021051			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021051			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021051			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021051			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021051			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021051			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	4.0	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021052			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021052			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021052			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021052			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021052			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021052			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.43	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021052			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021052			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021052			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	14	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021053			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021053			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021053			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021053			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021053			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021053			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021053			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021053			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021053			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	10	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021055			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021055			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021055			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021055			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	0.33	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021055			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021055			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.35	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021055			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021055			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021055			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	30	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021056			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	7.3	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021056			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	1.7	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021056			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021056			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021056			534-22-5	2-Methylfuran	NGS	n/a	n/a	1.5	n/a	n/a	n/a	n/a	0.23	n/a	J
S16T021056			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021056			4229-91-8	2-Propylfuran	NGS	n/a	n/a	1.8	n/a	n/a	n/a	n/a	0.44	n/a	J
S16T021056			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021056			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	440	n/a	n/a	n/a	n/a	0.10	n/a	E

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

Sample Group: 20162088
SDG Number:
Customer Sample ID: 16-05983-3-H2
Customer Sample ID: 16-05983-3-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															
S16T021057			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021057			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021057			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021057			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27	n/a	
S16T021057			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021057			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	n/a	
S16T021057			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021057			110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021057			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	120	n/a	n/a	n/a	n/a	0.10	n/a	E

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

Cartridge Evaluation
Data Summary of All Results

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

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Furans in Vapor Samples by SIM															
S16T021058			1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021058			1708-29-8	2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021058			625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a	
S16T021058			3777-71-7	2-Heptylfuran	NGS	n/a	n/a	0.45	n/a	n/a	n/a	n/a	0.27	n/a	J
S16T021058			534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021058			3777-69-3	2-Pentylfuran	NGS	n/a	n/a	2.1	n/a	n/a	n/a	n/a	0.34	n/a	J
S16T021058			4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	n/a	
S16T021058			110-00-9	Furan	NGS	n/a	n/a	0.36	n/a	n/a	n/a	n/a	0.090	n/a	J
S16T021058			109-99-9	Tetrahydrofuran	NGS	n/a	n/a	20	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

J - Estimated

C.3.4 Amines

ANALYTICAL REPORT

Report Date: July 26, 2016

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20162094

Workorder: 34-1620245

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

Analytical Results

Sample ID: **S16T021173** Collected: 07/15/2016
Lab ID: 1620245001 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	**0.21**	NA	NA	0.10
Ethylamine	**0.43**	NA	NA	0.10
Methylamine	**3.9**	NA	NA	0.10

Sample ID: **S16T021174** Collected: 07/15/2016
Lab ID: 1620245002 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021175** Collected: 07/15/2016
Lab ID: 1620245003 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

ANALYTICAL REPORT

Workorder: 34-1620245
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021176** Collected: 07/15/2016
Lab ID: 1620245004 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **S16T021177** Collected: 07/15/2016
Lab ID: 1620245005 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **S16T021178** Collected: 07/15/2016
Lab ID: 1620245006 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **S16T021179** Collected: 07/15/2016
Lab ID: 1620245007 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

ANALYTICAL REPORT

Workorder: 34-1620245
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021180** Collected: 07/15/2016
Lab ID: 1620245008 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **S16T021181** Collected: 07/15/2016
Lab ID: 1620245009 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **S16T021182** Collected: 07/15/2016
Lab ID: 1620245010 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/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: **S16T021183** Collected: 07/15/2016
Lab ID: 1620245011 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	**0.20**	NA	NA	0.10
Methylamine	**0.87**	NA	NA	0.10

ANALYTICAL REPORT

Workorder: 34-1620245
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021184** Collected: 07/15/2016
Lab ID: 1620245012 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021185** Collected: 07/15/2016
Lab ID: 1620245013 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021186** Collected: 07/16/2016
Lab ID: 1620245014 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	**0.19**	NA	NA	0.10
Methylamine	**0.48**	NA	NA	0.10

Sample ID: **S16T021187** Collected: 07/16/2016
Lab ID: 1620245015 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	**0.48**	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

ANALYTICAL REPORT

Workorder: 34-1620245
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021188** Collected: 07/16/2016
Lab ID: 1620245016 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

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

Sample ID: **S16T021190** Collected: 07/16/2016
Lab ID: 1620245018 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021191** Collected: 07/16/2016
Lab ID: 1620245019 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

ANALYTICAL REPORT

Workorder: **34-1620245**
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021192** Collected: 07/16/2016
Lab ID: 1620245020 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021193** Collected: 07/16/2016
Lab ID: 1620245021 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021194** Collected: 07/16/2016
Lab ID: 1620245022 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021195** Collected: 07/16/2016
Lab ID: 1620245023 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

ANALYTICAL REPORT

Workorder: **34-1620245**
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021196** Collected: 07/16/2016
Lab ID: 1620245024 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	**0.20**	NA	NA	0.10
Methylamine	**0.30**	NA	NA	0.10

Sample ID: **S16T021197** Collected: 07/16/2016
Lab ID: 1620245025 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021198** Collected: 07/16/2016
Lab ID: 1620245026 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016

Method: **Amines-VOA Aliphatic VAA-1** Media: SKC 226-96, XAD-7 Tube 50/100mg [(NBD) Chloride] Analyzed: 07/25/2016
Sampling Parameter: **Air Volume Not Provided**

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

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

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

Laboratory Contact Information

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

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

ANALYTICAL REPORT

Workorder: 34-1620245
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

General Lab Comments

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

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

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

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

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ACLASS (DoD ELAP)	ADE-1420	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: 1620245

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** IH Aliphatic Amines
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12352 (HBN: 173446)
	Prepared By: NA	**Analyzed By:** David Teynor

Blank

LMB: 509691
Analyzed: 07/25/2016 00:00
Units: ug/sample

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

LMB: 509694
Analyzed: 07/25/2016 00:00
Units: ug/sample

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

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509692
Analyzed: 07/25/2016 00:00
Dilution: 1
Units: ug/sample

LCSD: 509693
Analyzed: 07/25/2016 00:00
Dilution: 1
Units: ug/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Dimethylamine	1.60	2.00	80.0	60.4	134.6	1.63	81.5	1.86	0.0	20.0
Ethylamine	1.08	2.00	54.0	40.0	160.0	1.10	55.0	1.83	0.0	20.0
Methylamine	2.52	2.00	126	40.0	160.0	2.22	111	12.7	0.0	20.0

LCS: 509695
Analyzed: 07/25/2016 00:00
Dilution: 1
Units: ug/sample

LCSD: 509696
Analyzed: 07/25/2016 00:00
Dilution: 1
Units: ug/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Dimethylamine	1.79	2.00	89.5	60.4	134.6	1.77	88.5	1.12	0.0	20.0
Ethylamine	1.45	2.00	72.5	40.0	160.0	1.46	73.0	0.687	0.0	20.0
Methylamine	1.56	2.00	78.0	40.0	160.0	1.54	77.0	1.29	0.0	20.0

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

Analyst	Peer Review
/S/ David Teynor 07/26/2016 12:27	/S/ Thomas Bosch 07/26/2016 13:37

Symbols and Definitions

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

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

1620245

1620245

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162094

Page 1 of 3

Assembler: N/A	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861	MSIN T6-02 FAX 372-1878
Collector: JONES, PARKER L	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20	
SAF No.: N/A	Logbook/ Work Package No.: N/A	Ice Chest No.: WTS-021	Temp.: ON Ice
Project Title: CARTRIDGE EVALUATION	Method of Shipment	Bill of Lading/Air Bill No.: 776790041619	
Shipped To (Lab): ALS	Data Turnaround: 10 DAYS	Parts and Return No.: 41034	
Protocol: N/A			

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021173	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-A1	N/A
	S16T021174	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-A2	N/A
	S16T021175	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-B1	N/A
	S16T021176	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-BLANK	N/A
	S16T021177	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-C1	N/A
	S16T021178	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-D1	N/A
	S16T021179	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-E1	N/A
	S16T021180	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-EFF-BASE	N/A
	S16T021181	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-F1	N/A
	S16T021182	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-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_W_Howald@rl.gov and Gregory_S_Moore@rl.gov See SOW for email

CONTRACT 55502

RELEASE 9

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holder Sharon L Holder	7-19-16 830	Julie Gradoh Julie Gradoh	7/19/16 0830
Julie Gradoh Julie Gradoh	7/19/16 1400	FEDEX	
		Tami VanTassell Tami VanTassell	07-20-16 (0)

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): DSJ — Disposed By: CONSUMED — Date/Time: 07/27/16 1200

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.
N/A		20162094
		Page 2 of 3

Collector: JONES, PARKER L	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-021	Temp.: ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 7767 9004 1619	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41034	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021183	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-H1	N/A
	S16T021184	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-H2	N/A
	S16T021185	VA	7/15/16		XAD-7-NBD	AMINES 16-05982-4-IN-BASE	N/A
	S16T021186	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-A1	N/A
	S16T021187	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-A2	N/A
	S16T021188	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-B1	N/A
	S16T021189	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-BLANK	N/A
	S16T021190	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-C1	N/A
	S16T021191	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-D1	N/A
	S16T021192	VA	7/16/16		XAD-7-NBD	AMINES 16-05983-4-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 See SOW for email

CONTRACT 55502

RELEASE 9

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon Holder / Sharon Holder	7/19/16 830	Julie Gadsby / Julie Gadsby	7/19/16 930
Julie Gadsby / Julie Gadsby	7/19/16 1400	FEDEX	
FEDEX		Tami Van Tassell / Tami Van Tassell	07/20/16 10:04

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; 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
	DOT	CONSUMED	07/25/16 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)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162094
N/A		Page 3 of 3

Collector: JONES, PARKER L	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-021	Temp.: ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 7767 9004 1619	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41034	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis		Preservative
	S16T021193	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-EFF-BASE	N/A
	S16T021194	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-F1	N/A
	S16T021195	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-G1	N/A
	S16T021196	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-H1	N/A
	S16T021197	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-H2	N/A
	S16T021198	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-IN-BASE	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 See SOW for email
CONTRACT 55502

RELEASE 9

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holden Sharon L Holden	7-19-16 830	Julie Graham Julie Graham	7/19/16 830
Julie Graham Julie Graham	7-19-16 1400	FEDEX	
FedEx		Tami VanTassell Tami VanTassell	07/20/16 10:00

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): BJJ — Disposed By: CONSUMED — Date/Time: 07/20/16 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 25, 2016

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

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162096

Workorder: **34-1620244**

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

Analytical Results

Sample ID: **S16T021258** Collected: 07/15/2016
Lab ID: 1620244001 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021259** Collected: 07/15/2016
Lab ID: 1620244002 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

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

Sample ID: **S16T021260** Collected: 07/15/2016
Lab ID: 1620244003 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1606** Media: SKC 226-09, Charcoal Tube 400/200mg Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

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

ANALYTICAL REPORT

Workorder: 34-1620244
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021261				Collected: 07/15/2016
Lab ID: 1620244004	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021262				Collected: 07/15/2016
Lab ID: 1620244005	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021263				Collected: 07/15/2016
Lab ID: 1620244006	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021264				Collected: 07/15/2016
Lab ID: 1620244007	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021265				Collected: 07/15/2016
Lab ID: 1620244008	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

Workorder: 34-1620244
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021266				Collected: 07/15/2016
Lab ID: 1620244009	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021267				Collected: 07/15/2016
Lab ID: 1620244010	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021268				Collected: 07/15/2016
Lab ID: 1620244011	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021269				Collected: 07/15/2016
Lab ID: 1620244012	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021270				Collected: 07/15/2016
Lab ID: 1620244013	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg			Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

Workorder: **34-1620244**
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021271**				Collected: 07/16/2016
Lab ID: 1620244014	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021272**				Collected: 07/16/2016
Lab ID: 1620244015	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021273**				Collected: 07/16/2016
Lab ID: 1620244016	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021274**				Collected: 07/16/2016
Lab ID: 1620244017	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021275**				Collected: 07/16/2016
Lab ID: 1620244018	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

Workorder: 34-1620244
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021276				Collected: 07/16/2016
Lab ID: 1620244019	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021277				Collected: 07/16/2016
Lab ID: 1620244020	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021278				Collected: 07/16/2016
Lab ID: 1620244021	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021279				Collected: 07/16/2016
Lab ID: 1620244022	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: S16T021280				Collected: 07/16/2016
Lab ID: 1620244023	Sampling Location: CARTRIDGE EVALUATION			Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg Sampling Parameter: **Air Volume Not Provided**			Analyzed: 07/21/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
Acetonitrile	<0.010	NA	NA	0.010

ANALYTICAL REPORT

Workorder: **34-1620244**
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021281**			Collected: 07/16/2016
Lab ID: 1620244024	Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**		

Analyte	Result (mg/sample)	Result (mg/m^3)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021282**			Collected: 07/16/2016
Lab ID: 1620244025	Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**		

Analyte	Result (mg/sample)	Result (mg/m^3)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

Sample ID: **S16T021283**			Collected: 07/16/2016
Lab ID: 1620244026	Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: **NIOSH 1606**	Media: SKC 226-09, Charcoal Tube 400/200mg		Analyzed: 07/21/2016
	Sampling Parameter: **Air Volume Not Provided**		

Analyte	Result (mg/sample)	Result (mg/m^3)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010

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

Method	Analyst	Peer Review
NIOSH 1606	*/S/* Young Hee Yoon 07/25/2016 13:37	*/S/* Lyle Edwards 07/25/2016 16:08

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: 34-1620244
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

General Lab Comments

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

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

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

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

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ACLASS (DoD ELAP)	ADE-1420	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: 1620244

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** IH GC-FID QC
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** IFID/7608 (HBN: 173232)
	Prepared By: NA	**Analyzed By:** Young Hee Yoon

Blank

MB: 509146
Analyzed: 07/21/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100

MB: 509149
Analyzed: 07/21/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509147
Analyzed: 07/21/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 509148
Analyzed: 07/21/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Acetonitrile	0.242	0.250	97.0	86.6	115.3	0.259	104	6.79	0.0	20.0

LCS: 509150
Analyzed: 07/21/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 509151
Analyzed: 07/21/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Acetonitrile	0.230	0.218	105	86.6	115.3	0.207	94.8	10.5	0.0	20.0

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

Analyst	Peer Review
/S/ Young Hee Yoon 07/25/2016 13:37	/S/ Lyle Edwards 07/25/2016 16:08

Symbols and Definitions

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

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

1620244

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Assembler: N/A		C.O.C. No. 20162096 — 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-021 — Temp. ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7767 9004 1619
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41034

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021258	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-A1	N/A
	S16T021259	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-A2	N/A
	S16T021260	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-B1	N/A
	S16T021261	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-BLANK	N/A
	S16T021262	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-C1	N/A
	S16T021263	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-D1	N/A
	S16T021264	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-E1	N/A
	S16T021265	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-EFF-BASE	N/A
	S16T021266	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-F1	N/A
	S16T021267	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-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 FoF email

RELEASE 9
Reference Contract # 55502

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holden / [signature]	7·19·16 0830	Julie Gradisher / Julie Gradisher	7/19/16 0830
JA Gradisher WRPS / Julie Gradisher	7/19/16 1400	FEDEX	
fedex		Tami Van Tassell / Tami Van Tassell	07-20-16
			0808

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: Young Hu / YH — Date/Time: July 22, 2016 10:00 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. 20162096
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.: WIS-021 Temp.: ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 7767 9004 1619
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41034

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021268	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-H1	N/A
	S16T021269	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-H2	N/A
	S16T021270	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-IN-BASE	N/A
	S16T021271	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-A1	N/A
	S16T021272	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-A2	N/A
	S16T021273	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-B1	N/A
	S16T021274	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-BLANK	N/A
	S16T021275	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-C1	N/A
	S16T021276	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-D1	N/A
	S16T021277	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-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 Lloyd Sharon Lloyd	7-19-16 0830	Julie Gradisher Julie Gradisher	7/19/16 0830
JA Gradisher WRPS Julie Gradisher	7/19/16 1400	FEDEX	
		Tamika Tassell Tamika Tassell	07-20-16 10:03

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: July 22, 2016 10:00 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)

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Assembler: N/A			C.O.C. No. 20162096 — 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-021	Temp. ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 7767 9004 1619	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41034	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021278	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-EFF-BASE	N/A
	S16T021279	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-F1	N/A
	S16T021280	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-G1	N/A
	S16T021281	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-H1	N/A
	S16T021282	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-H2	N/A
	S16T021283	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-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 for email

RELEASE 9
Reference Contract # 55502

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Shannon Holder / [signature]	7-19-16 0830	Julie Gradisher / [signature]	7/19/16 0830
JA Gradisher WRPS / [signature]	7/19/16 1400	FEDEX	
[signature]		[signature] Tami Vu Tassell	8-20-16
			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: [signature]	Date/Time: July 22, 2016 10:00 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)

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

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Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

C.3.6 Mercury

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

Document No.: 20162086 Rev. 0

Michael A. Purcell
WAI Hanford Laboratory

Date Published
August 2, 2016

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

NARRATIVE

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

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

DISCLAIMERS

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

PROCEDURES

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

ANALYTICAL SUMMARY

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

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

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

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

For the mercury analysis, the blank results for tube lot numbers 9473 and 10187 were below the detection limit; therefore, no blank correction was required. All mercury results for this sample group were below the reporting limit of 0.05 µg/sample, except for samples 16-05982-6-A1, 16-05982-6-H1, 16-05983-6-A1, 16-05983-6-H1, and 16-05983-6-H2. For these samples, the total result includes the contribution from the glass wool portion even though the glass wool portion result is lower than the reporting limit (see Attachment 1).

Attachment 1

DATA SUMMARY REPORT

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162086

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

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162086

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

Attachment 2

ANALYSIS DATE REPORT

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162086

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

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162086

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

Attachment 3

RECEIPT PAPERWORK

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

Date Samples Received: 7-18-16 Total Number of Samples: 260 Group #: 20162086-H9

Sample Custodian: Sharon L Holder IH Technician: Brett Garner/Brett Garner

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSR provided?			✓	
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	1°c			☐ 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 SLH Date 7-18-16

If No, comment on communication and resolution: CWJ 7/18/16

WRPS - Ship - 130
Run - 78
WHL - NH3 - 26
Hg - 26

Number of IH Samples Received: acetronitrile 26

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

A-6005-302 (REV 4)

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/15/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05982 - Respirator Cartridge Testing BY Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
	16-05982-3-EFF-BASE / TDU (Tenax)	Furans
	16-05982-3-F1 / TDU (Tenax)	Furans
	16-05982-3-G1 / TDU (Tenax)	Furans
	16-05982-3-H1 / TDU (Tenax)	Furans
	16-05982-3-H2 / TDU (Tenax)	Furans
	16-05982-3-IN-BASE / TDU (Tenax)	Furans
S16T021154	16-05982-6-A1 / Hydrar (SKC 226-17-1A) S16T021157 1158	Hg-Elemental
S16T021159	16-05982-6-A2 / Hydrar (SKC 226-17-1A) S16T021160 1161	Hg-Elemental

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Valerie Hendricks	2704HV Rm H107	7/16/16	1600
Retrieved from Storage:		BRETT GARNER		7-18-16	0728

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

Additional Comments:

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/15/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05982 - Respirator Cartridge Testing BY Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**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
S16T021164	16-05982-6-B1 / Hydrar (SKC 226-17-1A) S16T021166 1167	Hg-Elemental
S16T021168	16-05982-6-BLANK / Hydrar (SKC 226-17-1A) S16T021169 1202	Hg-Elemental
S16T021204	16-05982-6-C1 / Hydrar (SKC 226-17-1A) S16T021206 1207	Hg-Elemental
S16T021229	16-05982-6-D1 / Hydrar (SKC 226-17-1A) S16T021234 1235	Hg-Elemental
S16T021237	16-05982-6-E1 / Hydrar (SKC 226-17-1A) S16T021238 1239	Hg-Elemental
S16T021248	16-05982-6-EFF-BASE / Hydrar (SKC 226-17-1A) S16T021243 1244	Hg-Elemental
S16T021245	16-05982-6-F1 / Hydrar (SKC 226-17-1A) S16T021246 1247	Hg-Elemental
S16T021248	16-05982-6-G1 / Hydrar (SKC 226-17-1A) S16T021249 1250	Hg-Elemental

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Valerie Hendricks	2704HV Rm H107	7/16/16	1600
Retrieved from Storage:		BRETT GARNER		7-18-16	0728

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

Additional Comments:

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/15/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05982 - Respirator Cartridge Testing BY Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**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
S16T021251	16-05982-6-H1 / Hydrar (SKC 226-17-1A) S16T021252 1253	Hg-Elemental
S16T021254	16-05982-6-H2 / Hydrar (SKC 226-17-1A) S16T021256 1257	Hg-Elemental
S16T021543	16-05982-6-IN-BASE / Hydrar (SKC 226-17-1A) S16T021544 21545	Hg-Elemental
	16-05982-7-A1 / CISA (SKC 226-29)	NH3
	16-05982-7-A2 / CISA (SKC 226-29)	NH3
	16-05982-7-B1 / CISA (SKC 226-29)	NH3
	16-05982-7-BLANK / CISA (SKC 226-29)	NH3
	16-05982-7-C1 / CISA (SKC 226-29)	NH3

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Valerie Hendricks	2704HV Rm H107	7/16/16	1600
Retrieved from Storage:	Brett Garner	BRETT GARNER		7-18-16	0728

	Signature	Printed Name	Date	Time
Relinquished By:	Brett Garner	BRETT GARNER	7-18-16	1100
Received By:	Sharon L Hall	Sharon L Hall	7-18-16	1100
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions		**Date Sampled:** 07/16/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05983 - Respirator Cartridge Testing BY Farm
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
S16T021322	16-05983-6-H1 / Hydrar (SKC 226-17-1A) S16T021324 1325	Hg-Elemental
S16T021328	16-05983-6-H2 / Hydrar (SKC 226-17-1A) S16T021329 1330	Hg-Elemental
S16T021360	16-05983-6-IN-BASE / Hydrar (SKC 226-17-1A) S16T021361 1362	Hg-Elemental
	~~16-05983-7-A1 / CISA (SKC 226-29)~~	~~NH3~~
	~~16-05983-7-A2 / CISA (SKC 226-29)~~	~~NH3~~
	~~16-05983-7-B1 / CISA (SKC 226-29)~~ QE 7/16/16	~~NH3~~
	~~16-05983-7-BLANK / CISA (SKC 226-29)~~	~~NH3~~
	~~16-05983-7-C1 / CISA (SKC 226-29)~~	~~NH3~~

Special Instructions:

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

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

Additional Comments:

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/16/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05983 - Respirator Cartridge Testing BY Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
S16T021292	16-05983-6-B1 / Hydrar (SKC 226-17-1A) S16T021293 1294	Hg-Elemental
S16T021295	16-05983-6-BLANK / Hydrar (SKC 226-17-1A) ~~S16T021296~~ S16T021296 1297 (XX 7/21/16)	Hg-Elemental
S16T021298	16-05983-6-C1 / Hydrar (SKC 226-17-1A) S16T021299 1300	Hg-Elemental
S16T021301	16-05983-6-D1 / Hydrar (SKC 226-17-1A) S16T021302 1303	Hg-Elemental
S16T021304	16-05983-6-E1 / Hydrar (SKC 226-17-1A) S16T021305 1306	Hg-Elemental
S16T021307	16-05983-6-EFF-BASE / Hydrar (SKC 226-17-1A) S16T021311 1312	Hg-Elemental
S16T021313	16-05983-6-F1 / Hydrar (SKC 226-17-1A) S16T021314 1315	Hg-Elemental
S16T021317	16-05983-6-G1 / Hydrar (SKC 226-17-1A) S16T021319 1321	Hg-Elemental

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Gerardo Saenz	2704HV/14107	07-16-16	0000
Retrieved from Storage:		BRETT GARNER		7-18-16	0824

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

Additional Comments:

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/16/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05983 - Respirator Cartridge Testing BY Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
	16-05983-3-EFF-BASE / TDU (Tenax)	Furans
	16-05983-3-F1 / TDU (Tenax)	Furans
	16-05983-3-G1 / TDU (Tenax)	Furans
	16-05983-3-H1 / TDU (Tenax)	Furans
	16-05983-3-H2 / TDU (Tenax)	Furans
	16-05983-3-IN-BASE / TDU (Tenax)	Furans
S16T021286	16-05983-6-A1 / Hydrar (SKC 226-17-1A) S16T021287 1288	Hg-Elemental
S16T021289	16-05983-6-A2 / Hydrar (SKC 226-17-1A) S16T021290 1291	Hg-Elemental

Special Instructions:

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

	Signature	Printed Name	Date	Time
Relinquished By:		BRETT GARNER	7-18-16	1100
Received By:		TERESA FORRESTER	7-18-16	1100
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 15 – 16, 2016

Document No.: 20162085 Rev. 0

Michael A. Purcell
WAI Hanford Laboratory

Date Published
August 10, 2016

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

NARRATIVE

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

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

DISCLAIMERS

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

PROCEDURES

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

ANALYTICAL SUMMARY

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

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

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

laboratory's opinion that including the media contribution, which is well below the client's requested reporting limit, provides results that are more conservative than when blank subtractions are performed. Twenty-two of the twenty-six ammonia results for sample group 20162085 were above the reporting limit of 10 µg per sample. For these samples, the total result includes the contribution from the back resin portion even though the back resin portion result is lower than the reporting limit (see Attachment 1).

Attachment 1

DATA SUMMARY REPORT

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162085

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-05982-7-A1	Total	S16T021002	Ammonia	µg/sample	n/a	<10.0	6.55E+03	1000
16-05982-7-A1	Front Resin	S16T021003	Ammonia	µg/sample	99.6	<10.0	6.55E+03	1000
16-05982-7-A1	Back Resin	S16T021004	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-A2	Total	S16T021005	Ammonia	µg/sample	n/a	<10.0	925	500
16-05982-7-A2	Front Resin	S16T021006	Ammonia	µg/sample	99.6	<10.0	924	500
16-05982-7-A2	Back Resin	S16T021007	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-B1	Total	S16T021008	Ammonia	µg/sample	n/a	<10.0	5.35E+03	1000
16-05982-7-B1	Front Resin	S16T021009	Ammonia	µg/sample	99.6	<10.0	5.33E+03	1000
16-05982-7-B1	Back Resin	S16T021010	Ammonia	µg/sample	99.6	<10.0	26.7	10.0
16-05982-7-BLANK	Total	S16T021011	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-05982-7-BLANK	Front Resin	S16T021012	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-BLANK	Back Resin	S16T021013	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-C1	Total	S16T021014	Ammonia	µg/sample	n/a	<10.0	6.29E+03	1000
16-05982-7-C1	Front Resin	S16T021015	Ammonia	µg/sample	99.6	<10.0	6.28E+03	1000
16-05982-7-C1	Back Resin	S16T021016	Ammonia	µg/sample	99.6	<10.0	18.6	10.0
16-05982-7-D1	Total	S16T021017	Ammonia	µg/sample	n/a	<10.0	2.16E+03	500
16-05982-7-D1	Front Resin	S16T021018	Ammonia	µg/sample	99.6	<10.0	2.16E+03	500
16-05982-7-D1	Back Resin	S16T021019	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-E1	Total	S16T021020	Ammonia	µg/sample	n/a	<10.0	5.75E+03	1000
16-05982-7-E1	Front Resin	S16T021021	Ammonia	µg/sample	99.6	<10.0	5.74E+03	1000
16-05982-7-E1	Back Resin	S16T021022	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-EFF-BASE	Total	S16T021023	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-05982-7-EFF-BASE	Front Resin	S16T021024	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-EFF-BASE	Back Resin	S16T021025	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-F1	Total	S16T021026	Ammonia	µg/sample	n/a	<10.0	2.14E+03	500
16-05982-7-F1	Front Resin	S16T021027	Ammonia	µg/sample	99.6	<10.0	2.14E+03	500
16-05982-7-F1	Back Resin	S16T021028	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-G1	Total	S16T021029	Ammonia	µg/sample	n/a	<10.0	5.94E+03	1000
16-05982-7-G1	Front Resin	S16T021030	Ammonia	µg/sample	99.6	<10.0	5.94E+03	1000
16-05982-7-G1	Back Resin	S16T021031	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-H1	Total	S16T021054	Ammonia	µg/sample	n/a	<10.0	6.95E+03	1000
16-05982-7-H1	Front Resin	S16T021059	Ammonia	µg/sample	100	<10.0	6.92E+03	1000
16-05982-7-H1	Back Resin	S16T021060	Ammonia	µg/sample	100	<10.0	32.9	10.0
16-05982-7-H2	Total	S16T021068	Ammonia	µg/sample	n/a	<10.0	6.30E+03	1000
16-05982-7-H2	Front Resin	S16T021074	Ammonia	µg/sample	100	<10.0	6.28E+03	1000
16-05982-7-H2	Back Resin	S16T021075	Ammonia	µg/sample	100	<10.0	17.0	10.0
16-05982-7-IN-BASE	Total	S16T021089	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-05982-7-IN-BASE	Front Resin	S16T021103	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05982-7-IN-BASE	Back Resin	S16T021104	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-A1	Total	S16T021118	Ammonia	µg/sample	n/a	<10.0	6.32E+03	1000
16-05983-7-A1	Front Resin	S16T021119	Ammonia	µg/sample	100	<10.0	6.31E+03	1000
16-05983-7-A1	Back Resin	S16T021120	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-A2	Total	S16T021141	Ammonia	µg/sample	n/a	<10.0	884	500
16-05983-7-A2	Front Resin	S16T021148	Ammonia	µg/sample	100	<10.0	883	500
16-05983-7-A2	Back Resin	S16T021149	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-B1	Total	S16T021150	Ammonia	µg/sample	n/a	<10.0	4.68E+03	500
16-05983-7-B1	Front Resin	S16T021151	Ammonia	µg/sample	100	<10.0	4.68E+03	500
16-05983-7-B1	Back Resin	S16T021152	Ammonia	µg/sample	100	<10.0	<10.0	10.0

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162085

Customer Sample ID	Vapor Tube Portion	Laboratory Sample ID	Analyte	Result Unit	Standard % Recovery	Blank	Result	Reporting Limit
16-05983-7-BLANK	Total	S16T021153	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-05983-7-BLANK	Front Resin	S16T021155	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-BLANK	Back Resin	S16T021156	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-C1	Total	S16T021162	Ammonia	µg/sample	n/a	<10.0	6.18E+03	1000
16-05983-7-C1	Front Resin	S16T021163	Ammonia	µg/sample	100	<10.0	6.16E+03	1000
16-05983-7-C1	Back Resin	S16T021165	Ammonia	µg/sample	100	<10.0	20.2	10.0
16-05983-7-D1	Total	S16T021170	Ammonia	µg/sample	n/a	<10.0	4.39E+03	500
16-05983-7-D1	Front Resin	S16T021171	Ammonia	µg/sample	100	<10.0	4.39E+03	500
16-05983-7-D1	Back Resin	S16T021172	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-E1	Total	S16T021199	Ammonia	µg/sample	n/a	<10.0	7.35E+03	1.50E+03
16-05983-7-E1	Front Resin	S16T021200	Ammonia	µg/sample	93.0	<10.0	7.34E+03	1.50E+03
16-05983-7-E1	Back Resin	S16T021201	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-EFF-BASE	Total	S16T021236	Ammonia	µg/sample	n/a	<10.0	13.8	10.0
16-05983-7-EFF-BASE	Front Resin	S16T021240	Ammonia	µg/sample	93.0	<10.0	13.2	10.0
16-05983-7-EFF-BASE	Back Resin	S16T021241	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-F1	Total	S16T021255	Ammonia	µg/sample	n/a	<10.0	6.84E+03	1.50E+03
16-05983-7-F1	Front Resin	S16T021284	Ammonia	µg/sample	93.0	<10.0	6.84E+03	1.50E+03
16-05983-7-F1	Back Resin	S16T021285	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-G1	Total	S16T021308	Ammonia	µg/sample	n/a	<10.0	6.46E+03	1.50E+03
16-05983-7-G1	Front Resin	S16T021309	Ammonia	µg/sample	93.0	<10.0	6.46E+03	1.50E+03
16-05983-7-G1	Back Resin	S16T021310	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-H1	Total	S16T021316	Ammonia	µg/sample	n/a	<10.0	7.52E+03	1.50E+03
16-05983-7-H1	Front Resin	S16T021318	Ammonia	µg/sample	93.0	<10.0	7.36E+03	1.50E+03
16-05983-7-H1	Back Resin	S16T021320	Ammonia	µg/sample	93.0	<10.0	160	50.0
16-05983-7-H2	Total	S16T021323	Ammonia	µg/sample	n/a	<10.0	7.36E+03	1.50E+03
16-05983-7-H2	Front Resin	S16T021326	Ammonia	µg/sample	93.0	<10.0	7.35E+03	1.50E+03
16-05983-7-H2	Back Resin	S16T021327	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0
16-05983-7-IN-BASE	Total	S16T021331	Ammonia	µg/sample	n/a	<10.0	18.6	10.0
16-05983-7-IN-BASE	Front Resin	S16T021358	Ammonia	µg/sample	93.0	<10.0	18.1	10.0
16-05983-7-IN-BASE	Back Resin	S16T021359	Ammonia	µg/sample	93.0	<10.0	<10.0	10.0

Attachment 2

ANALYSIS DATE REPORT

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162085

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

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162085

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

Attachment 3

RECEIPT PAPERWORK

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

Date Samples Received: 7-18-16 Total Number of Samples: 260 Group #: 20162085-NH3

Sample Custodian: Sharon L Holder IH Technician: Brett Garner/Ruth Ja...

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSR provided?			✓	
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	1°c			☐ 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 SLH Date 7-18-16

If No, comment on communication and resolution: CWH 7/18/16

WRPS - Shiff - 130
Rust - 78
WHL - NH_3 - 26
Hg - 26

Number of IH Samples Received: acetronitrile 26

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

A-6005-302 (REV 4)

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/15/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05982 - Respirator Cartridge Testing BY Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
	16-05982-6-H1 / Hydrar (SKC 226-17-1A)	Hg-Elemental
	16-05982-6-H2 / Hydrar (SKC 226-17-1A)	Hg-Elemental
	16-05982-6-IN-BASE / Hydrar (SKC 226-17-1A)	Hg-Elemental
S16T02 1002	16-05982-7-A1 / CISA (SKC 226-29) S16T02 1003 1004	NH3
S16T02 1005	16-05982-7-A2 / CISA (SKC 226-29) S16T02 1006 1007	NH3
S16T02 1008	16-05982-7-B1 / CISA (SKC 226-29) S16T02 1009 1010	NH3
S16T02 1011	16-05982-7-BLANK / CISA (SKC 226-29) S16T0,21012 1013	NH3
S16T02 1014	16-05982-7-C1 / CISA (SKC 226-29) S16T02 1015 1016	NH3

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Valerie Hendricks	2704 HV Rm H107	7/16/16	1600
Retrieved from Storage:		BRETT GARNER		7-18-16	0801

	Signature	Printed Name	Date	Time
Relinquished By:		BRETT GARNER	7/18/16	11:00
Received By:		Leslie Matz	7/18/16	11:00
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/15/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05982 - Respirator Cartridge Testing BY Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
S16T021017	16-05982-7-D1 / CISA (SKC 226-29) S16T021018 1019	NH3
S16T021020	16-05982-7-E1 / CISA (SKC 226-29) S16T021021 1022	NH3
S16T021023	16-05982-7-EFF-BASE / CISA (SKC 226-29) S16T021024 1025	NH3
S16T021026	16-05982-7-F1 / CISA (SKC 226-29) S16T021027 1028	NH3
S16T021029	16-05982-7-G1 / CISA (SKC 226-29) S16Tp21030 1031	NH3
S16T021054	16-05982-7-H1 / CISA (SKC 226-29) S16T021059 1060	NH3
S16T021068	16-05982-7-H2 / CISA (SKC 226-29) S16T021074 1075	NH3
S16T021089	16-05982-7-IN-BASE / CISA (SKC 226-29) S16T021103 1104	NH3

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Valerie Hendricks	2704HV Rm H107	7/16/16	1600
Retrieved from Storage:		BRETT GARNER		7-18-16	0801

	Signature	Printed Name	Date	Time
Relinquished By:		BRETT GARNER	7/18/16	11:00
Received By:		Leslie DIAZ	7/18/16	11:00
Relinquished By:				
Received By:				
Relinquished By:				
Received By:				

Additional Comments:

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/16/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05983 - Respirator Cartridge Testing BY Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966		**Turnaround:** N/A
Return Report To: Caldwell, Joyce A		**MSIN:** R1-06	**Phone:** (509)376-0737

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
S16T021170	16-05983-7-D1 / CISA (SKC 226-29) S16T021171 1172	NH3
S16T021199	16-05983-7-E1 / CISA (SKC 226-29) S16T021200 1201	NH3
S16T021236	16-05983-7-EFF-BASE / CISA (SKC 226-29) S16T021240 1241	NH3
S16T021255	16-05983-7-F1 / CISA (SKC 226-29) S16T021284 1285	NH3
S16T021308	16-05983-7-G1 / CISA (SKC 226-29) S16T021309 1310	NH3
S16T021316	16-05983-7-H1 / CISA (SKC 226-29) S16T021318 1320	NH3
S16T021323	16-05983-7-H2 / CISA (SKC 226-29) S16T021326 1327	NH3
S16T021331	16-05983-7-IN-BASE / CISA (SKC 226-29) S16T021358 1359	NH3

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Gerardo Saenz	2704HV | H107	07-16-16	0006
Retrieved from Storage:		BRETT GARNER		7-18-16	0830

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

Additional Comments:

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Washington River Protection Solutions			**Date Sampled:** 07/16/2016
CACN: 202003	**COA:** CB20	**Survey No.:** 16-05983 - Respirator Cartridge Testing BY Farm	
Contact Name: Jones, Parker L	**Phone:** (509)373-4966	**Turnaround:** N/A	
Return Report To: Caldwell, Joyce A	**MSIN:** R1-06	**Phone:** (509)376-0737	

Laboratory Log No.	Sample ID/Type/Description	Required Analysis
	16-05983-6-H1 / Hydrar (SKC 226-17-1A)	Hg-Elemental
	16-05983-6-H2 / Hydrar (SKC 226-17-1A) QE 7/16/16	Hg-Elemental
	16-05983-6-IN-BASE / Hydrar (SKC 226-17-1A)	Hg-Elemental
S16T021118	16-05983-7-A1 / CISA (SKC 226-29) S16T021119 1120	NH3
S16T021141	16-05983-7-A2 / CISA (SKC 226-29) S16T021148 1149	NH3
S16T021150	16-05983-7-B1 / CISA (SKC 226-29) S16T021151 1152	NH3
S16T021153	16-05983-7-BLANK / CISA (SKC 226-29) S16T021155 1156	NH3
S16T021162	16-05983-7-C1 / CISA (SKC 226-29) S16T021163 1165	NH3

Special Instructions:

	Signature	Printed Name	Location	Date	Time
Delivered to Storage:		Gerardo Saenz	2704HV/H107	07-16-16	0000
Retrieved from Storage:		BRETT GARNER		7-18-16	0810

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

Additional Comments:

C.3.8 Aldehydes

ANALYTICAL REPORT

Report Date: July 27, 2016

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

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162095
Workorder: 34-1620241
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021205** Collected: 07/15/2016
Lab ID: 1620241001 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.69**	NA	NA	0.050
Acetaldehyde	**11**	NA	NA	0.050
Acetone	**73**	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**5.6**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	**7.1**	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	**1.3**	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	**1.1**	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021208** Collected: 07/15/2016
Lab ID: 1620241002 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**3.5**	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021208** Collected: 07/15/2016
Lab ID: 1620241002 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Acetone	<0.050	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021209** Collected: 07/15/2016
Lab ID: 1620241003 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**4.4**	NA	NA	0.050
Acetone	**0.20**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

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

Analytical Results

Sample ID: **S16T021210** Collected: 07/15/2016
Lab ID: 1620241004 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	<0.050	NA	NA	0.050
Acetone	<0.050	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021211** Collected: 07/15/2016
Lab ID: 1620241005 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**6.3**	NA	NA	0.050
Acetone	**3.0**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050

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Workorder: 34-1620241
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Purchase Order: 55502 Rel9
Project Manager: Rand Potter

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Sample ID: **S16T021211** Collected: 07/15/2016
Lab ID: 1620241005 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021212** Collected: 07/15/2016
Lab ID: 1620241006 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**7.3**	NA	NA	0.050
Acetone	**12**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021213** Collected: 07/15/2016
Lab ID: 1620241007 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**7.2**	NA	NA	0.050
Acetone	**19**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.11**	NA	NA	0.050

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

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Sample ID: **S16T021213** Collected: 07/15/2016
Lab ID: 1620241007 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021214** Collected: 07/15/2016
Lab ID: 1620241008 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.056**	NA	NA	0.050
Acetaldehyde	**0.051**	NA	NA	0.050
Acetone	<0.050	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

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Workorder: **34-1620241**
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Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021215** Collected: 07/15/2016
Lab ID: 1620241009 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**2.1**	NA	NA	0.050
Acetone	**14**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.070**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021216** Collected: 07/15/2016
Lab ID: 1620241010 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**7.7**	NA	NA	0.050
Acetone	**61**	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.82**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050

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Workorder: 34-1620241
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Sample ID: **S16T021216** Collected: 07/15/2016
Lab ID: 1620241010 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/21/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021217** Collected: 07/15/2016
Lab ID: 1620241011 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.22**	NA	NA	0.050
Acetaldehyde	**11**	NA	NA	0.050
Acetone	**60**	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**5.6**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	**8.7**	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	**1.2**	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	**0.33**	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021218** Collected: 07/15/2016
Lab ID: 1620241012 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**7.1**	NA	NA	0.050
Acetone	**82**	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**1.0**	NA	NA	0.050

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

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Sample ID: **S16T021218** Collected: 07/15/2016
Lab ID: 1620241012 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m^3)	Result (ppm)	RL (ug/sample)
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021219** Collected: 07/15/2016
Lab ID: 1620241013 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m^3)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.12**	NA	NA	0.050
Acetaldehyde	**0.074**	NA	NA	0.050
Acetone	<0.050	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	**0.12**	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021220** Collected: 07/16/2016
Lab ID: 1620241014 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.54**	NA	NA	0.050
Acetaldehyde	**11**	NA	NA	0.050
Acetone	**75**	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**5.4**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	**8.2**	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	**1.2**	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	**1.2**	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021221** Collected: 07/16/2016
Lab ID: 1620241015 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016

Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**2.6**	NA	NA	0.050
Acetone	<0.050	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050

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Sample ID: **S16T021221** Collected: 07/16/2016
Lab ID: 1620241015 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021222** Collected: 07/16/2016
Lab ID: 1620241016 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.069**	NA	NA	0.050
Acetaldehyde	**3.0**	NA	NA	0.050
Acetone	**0.39**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021223** Collected: 07/16/2016
Lab ID: 1620241017 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	<0.050	NA	NA	0.050
Acetone	**0.17**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050

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Workorder: **34-1620241**
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Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021223** Collected: 07/16/2016
Lab ID: 1620241017 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021224** Collected: 07/16/2016
Lab ID: 1620241018 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.052**	NA	NA	0.050
Acetaldehyde	**4.9**	NA	NA	0.050
Acetone	**1.1**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

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Workorder: **34-1620241**
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Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021225** Collected: 07/16/2016
Lab ID: 1620241019 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.061**	NA	NA	0.050
Acetaldehyde	**6.0**	NA	NA	0.050
Acetone	**6.1**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021226** Collected: 07/16/2016
Lab ID: 1620241020 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.052**	NA	NA	0.050
Acetaldehyde	**7.2**	NA	NA	0.050
Acetone	**16**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021226**			Collected: 07/16/2016
Lab ID: 1620241020	Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: **EPA TO-11A**	Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/22/2016
	Sampling Parameter: **Air Volume Not Provided**		

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021227**			Collected: 07/16/2016
Lab ID: 1620241021	Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: **EPA TO-11A**	Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/22/2016
	Sampling Parameter: **Air Volume Not Provided**		

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.061**	NA	NA	0.050
Acetaldehyde	**0.085**	NA	NA	0.050
Acetone	**0.089**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021228**			Collected: 07/16/2016
Lab ID: 1620241022	Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: **EPA TO-11A**	Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/22/2016
	Sampling Parameter: **Air Volume Not Provided**		

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**7.8**	NA	NA	0.050
Acetone	**25**	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.095**	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021228** Collected: 07/16/2016
Lab ID: 1620241022 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021230** Collected: 07/16/2016
Lab ID: 1620241023 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**7.2**	NA	NA	0.050
Acetone	**42**	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.32**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021231** Collected: 07/16/2016
Lab ID: 1620241024 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.32**	NA	NA	0.050
Acetaldehyde	**11**	NA	NA	0.050
Acetone	**57**	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**5.4**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	**8.3**	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	**1.2**	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	**0.44**	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021232** Collected: 07/16/2016
Lab ID: 1620241025 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **EPA TO-11A** Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine) Analyzed: 07/22/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	**7.4**	NA	NA	0.050
Acetone	**61**	NA	NA	0.50
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	**0.59**	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	<0.050	NA	NA	0.050

Results Continued on Next Page

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021232**			Collected: 07/16/2016
Lab ID: 1620241025	Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: **EPA TO-11A**	Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/22/2016
	Sampling Parameter: **Air Volume Not Provided**		

Analyte	Result (ug/sample)	Result (mg/m^3)	Result (ppm)	RL (ug/sample)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Sample ID: **S16T021233**			Collected: 07/16/2016
Lab ID: 1620241026	Sampling Location: CARTRIDGE EVALUATION		Received: 07/20/2016
Method: **EPA TO-11A**	Media: SKC 226-119, Silica Gel (2,4-Dinitrophenylhydrazine)		Analyzed: 07/22/2016
	Sampling Parameter: **Air Volume Not Provided**		

Analyte	Result (ug/sample)	Result (mg/m^3)	Result (ppm)	RL (ug/sample)
Formaldehyde	**0.11**	NA	NA	0.050
Acetaldehyde	**0.12**	NA	NA	0.050
Acetone	**0.089**	NA	NA	0.050
Acrolein	<0.050	NA	NA	0.050
Propionaldehyde	<0.050	NA	NA	0.050
Crotonaldehyde	<0.050	NA	NA	0.050
Butyraldehyde	<0.050	NA	NA	0.050
Benzaldehyde	<0.050	NA	NA	0.050
Isovaleraldehyde	<0.050	NA	NA	0.050
Valeraldehyde	<0.050	NA	NA	0.050
m-Tolualdehyde	<0.050	NA	NA	0.050
p-Tolualdehyde	<0.050	NA	NA	0.050
o-Tolualdehyde	<0.050	NA	NA	0.050
Hexanal	**0.11**	NA	NA	0.050
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.050

Comments

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

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

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

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

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

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

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

ANALYTICAL REPORT

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

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

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

Laboratory Contact Information

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

Definitions

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

ALS 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: 1620241

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** EPA TO-11A
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12332 (HBN: 173313)
	Prepared By: NA	**Analyzed By:** David Teynor

Blank

LMB: 509340
Analyzed: 07/21/2016 00:00
Units: ug/sample

Analyte	Result	MDL	RL
Formaldehyde	ND	NA	0.0500
Acetaldehyde	ND	NA	0.0500
Acetone	0.216	NA	0.0500
Acrolein	ND	NA	0.0500
Propionaldehyde	ND	NA	0.0500
Crotonaldehyde	ND	NA	0.0500
Butyraldehyde	ND	NA	0.0500
Benzaldehyde	ND	NA	0.0500
Isovaleraldehyde	ND	NA	0.0500
Valeraldehyde	ND	NA	0.0500
m-Tolualdehyde	ND	NA	0.0500
p-Tolualdehyde	ND	NA	0.0500
o-Tolualdehyde	ND	NA	0.0500
Hexanal	ND	NA	0.0500
2,5-Dimethylbenzaldehyde	ND	NA	0.0500

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509341
Analyzed: 07/21/2016 00:00
Dilution: 1
Units: ug/sample

LCSD: 509342
Analyzed: 07/21/2016 00:00
Dilution: 1
Units: ug/sample

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

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620241

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** EPA TO-11A
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12332 (HBN: 173313)
	Prepared By: NA	**Analyzed By:** David Teynor

Comments

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

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

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

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

Symbols and Definitions

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

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

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620241

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** EPA TO-11A
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12338 (HBN: 173364)
	Prepared By: NA	**Analyzed By:** David Teynor

Blank

LMB: 509471
Analyzed: 07/22/2016 00:00
Units: ug/sample

Analyte	Result	MDL	RL
Formaldehyde	ND	NA	0.0500
Acetaldehyde	ND	NA	0.0500
Acetone	0.237	NA	0.0500
Acrolein	ND	NA	0.0500
Propionaldehyde	ND	NA	0.0500
Crotonaldehyde	ND	NA	0.0500
Butyraldehyde	ND	NA	0.0500
Benzaldehyde	ND	NA	0.0500
Isovaleraldehyde	ND	NA	0.0500
Valeraldehyde	ND	NA	0.0500
m-Tolualdehyde	ND	NA	0.0500
p-Tolualdehyde	ND	NA	0.0500
o-Tolualdehyde	ND	NA	0.0500
Hexanal	ND	NA	0.0500
2,5-Dimethylbenzaldehyde	ND	NA	0.0500

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509472
Analyzed: 07/22/2016 00:00
Dilution: 1
Units: ug/sample

LCSD: 509473
Analyzed: 07/22/2016 00:00
Dilution: 1
Units: ug/sample

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

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620241

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** EPA TO-11A
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ILC/12338 (HBN: 173364)
	Prepared By: NA	**Analyzed By:** David Teynor

Comments

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

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

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

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

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

Symbols and Definitions

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

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

1620241

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No.
N/A		20162095
		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-021	Temp.: ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 7767 9004 1619	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41034	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021205	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-A1	25C or low
	S16T021208	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-A2	25C or low
	S16T021209	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-B1	25C or low
	S16T021210	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-BLANK	25C or low
	S16T021211	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-C1	25C or low
	S16T021212	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-D1	25C or low
	S16T021213	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-E1	25C or low
	S16T021214	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-EFF-BASE	25C or low
	S16T021215	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-F1	25C or low
	S16T021216	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-G1	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 @ 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 Hobbs	7-19-16 0830	Julie Gradish	7/19/16 0830
JA Gradisher WRPS	7/19/16 1400	FEDEX	
		Tami Vallassell	07/20/16 0900

Matrix*
S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, 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: 07/21/16 16:00

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

A-6003-962 (03/05)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No.
N/A		20162095
		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-021 Temp.: ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 776790041619
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41034

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021217	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-H1	25C or low
	S16T021218	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-H2	25C or low
	S16T021219	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-IN-BASE	25C or low
	S16T021220	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-A1	25C or low
	S16T021221	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-A2	25C or low
	S16T021222	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-B1	25C or low
	S16T021223	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-BLANK	25C or low
	S16T021224	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-C1	25C or low
	S16T021225	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-D1	25C or low
	S16T021226	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-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 @ 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 Wolden	7-9-16 0830	Julie Gadsher	7/9/16 0830
JA Gadsher WRPS Julie Gadsher	7/19/16 1400	FEDEX	
		Tami VanTassell	07-20-16

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): DOT — Disposed By: CONSUMED — Date/Time: 07/27/16 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)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162095
N/A		Page 3 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 MSIN 26-05 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-021 Temp.: ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 7716 7900 4 1619
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41034

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021227	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-EFF-BASE	25C or low
	S16T021228	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-F1	25C or low
	S16T021230	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-G1	25C or low
	S16T021231	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-H1	25C or low
	S16T021232	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-H2	25C or low
	S16T021233	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-IN-BASE	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 @ 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
Shannon Holden	7-19-16 0830	Julie Gradisher	7/19/16 0830
JA Gradisher WRPS	7/19/16 1400	FEDEX	
		Tami VanTassell	07-20-16 1020

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): DOT — Disposed By: CONSUMED — Date/Time: 07/22/16 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.3.9 1, 3 Butadiene

ANALYTICAL REPORT

Report Date: August 01, 2016

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

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162100
Workorder: 34-1620493
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021368				Collected: 07/15/2016
Lab ID: 1620493001				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.050	NA	NA	0.010

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

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

ANALYTICAL REPORT

Workorder: **34-1620493**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021371**				Collected: 07/15/2016
Lab ID: 1620493004				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		Analyzed: 07/30/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

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

Sample ID: **S16T021373**				Collected: 07/15/2016
Lab ID: 1620493006				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		Analyzed: 07/30/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	**0.042**	NA	NA	0.010

Sample ID: **S16T021374**				Collected: 07/15/2016
Lab ID: 1620493007				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		Analyzed: 07/30/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	**0.089**	NA	NA	0.010

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

ANALYTICAL REPORT

Workorder: 34-1620493
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021376				Collected: 07/15/2016
Lab ID: 1620493009				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.13	NA	NA	0.010

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

Sample ID: S16T021378				Collected: 07/15/2016
Lab ID: 1620493011				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.066	NA	NA	0.010

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

Sample ID: S16T021380				Collected: 07/15/2016
Lab ID: 1620493013				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620493
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021381** Collected: 07/15/2016
Lab ID: 1620493014 Received: 07/22/2016

Method: NIOSH 1024 Media: SKC 226-37 Sorbent Tube Analyzed: 07/30/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021382** Collected: 07/15/2016
Lab ID: 1620493015 Received: 07/22/2016

Method: NIOSH 1024 Media: SKC 226-37 Sorbent Tube Analyzed: 07/30/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021383** Collected: 07/15/2016
Lab ID: 1620493016 Received: 07/22/2016

Method: NIOSH 1024 Media: SKC 226-37 Sorbent Tube Analyzed: 07/30/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021384** Collected: 07/15/2016
Lab ID: 1620493017 Received: 07/22/2016

Method: NIOSH 1024 Media: SKC 226-37 Sorbent Tube Analyzed: 07/30/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021385** Collected: 07/15/2016
Lab ID: 1620493018 Received: 07/22/2016

Method: NIOSH 1024 Media: SKC 226-37 Sorbent Tube Analyzed: 07/30/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: **34-1620493**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021386**				Collected: 07/15/2016
Lab ID: 1620493019				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		Analyzed: 07/30/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021387**				Collected: 07/15/2016
Lab ID: 1620493020				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		Analyzed: 07/30/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	**0.0034**	NA	NA	0.0010

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

Sample ID: **S16T021389**				Collected: 07/15/2016
Lab ID: 1620493022				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		Analyzed: 07/30/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	**0.010**	NA	NA	0.0010

Sample ID: **S16T021390**				Collected: 07/15/2016
Lab ID: 1620493023				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		Analyzed: 07/30/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620493
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021391				Collected: 07/15/2016
Lab ID: 1620493024				Received: 07/22/2016
Method: NIOSH 1024	**Media: SKC 226-37 Sorbent Tube**			**Analyzed: 07/30/2016**
	Sampling Parameter: Air Volume Not Provided			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

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

Sample ID: S16T021393				Collected: 07/15/2016
Lab ID: 1620493026				Received: 07/22/2016
Method: NIOSH 1024	**Media: SKC 226-37 Sorbent Tube**			**Analyzed: 07/30/2016**
	Sampling Parameter: Air Volume Not Provided			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: S16T021394				Collected: 07/16/2016
Lab ID: 1620493027				Received: 07/22/2016
Method: NIOSH 1024	**Media: SKC 226-37 Sorbent Tube**			**Analyzed: 07/30/2016**
	Sampling Parameter: Air Volume Not Provided			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	**0.071**	NA	NA	0.0010

Sample ID: S16T021395				Collected: 07/16/2016
Lab ID: 1620493028				Received: 07/22/2016
Method: NIOSH 1024	**Media: SKC 226-37 Sorbent Tube**			**Analyzed: 07/30/2016**
	Sampling Parameter: Air Volume Not Provided			
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: **34-1620493**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021396**				Collected: 07/16/2016
Lab ID: 1620493029				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		Analyzed: 07/30/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	<0.0010	NA	NA	0.0010

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

Sample ID: **S16T021398**				Collected: 07/16/2016
Lab ID: 1620493031				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC 226-37 Sorbent Tube Sampling Parameter: **Air Volume Not Provided**		Analyzed: 07/30/2016
Analyte	**Result (mg/sample)**	**Result (mg/m³)**	**Result (ppm)**	**RL (mg/sample)**
1,3-Butadiene	**0.017**	NA	NA	0.0010

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

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

ANALYTICAL REPORT

Workorder: 34-1620493
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021401				Collected: 07/16/2016
Lab ID: 1620493034				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.086	NA	NA	0.010

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

Sample ID: S16T021403				Collected: 07/16/2016
Lab ID: 1620493036				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.061	NA	NA	0.010

Sample ID: S16T021404				Collected: 07/16/2016
Lab ID: 1620493037				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.032	NA	NA	0.010

Sample ID: S16T021405				Collected: 07/16/2016
Lab ID: 1620493038				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620493
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021406				Collected: 07/16/2016
Lab ID: 1620493039				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

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

Sample ID: S16T021408				Collected: 07/16/2016
Lab ID: 1620493041				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

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

Sample ID: S16T021410				Collected: 07/16/2016
Lab ID: 1620493043				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

ANALYTICAL REPORT

Workorder: 34-1620493
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021411				Collected: 07/16/2016
Lab ID: 1620493044				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.059	NA	NA	0.010

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

Sample ID: S16T021413				Collected: 07/16/2016
Lab ID: 1620493046				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.097	NA	NA	0.010

Sample ID: S16T021414				Collected: 07/16/2016
Lab ID: 1620493047				Received: 07/22/2016
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.0016	NA	NA	0.0010

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

ANALYTICAL REPORT

Workorder: **34-1620493**
Client Project ID: Washington River Protection So
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021416** Collected: 07/16/2016
Lab ID: 1620493049 Received: 07/22/2016

Method: **NIOSH 1024** Media: SKC 226-37 Sorbent Tube Analyzed: 07/30/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021417** Collected: 07/16/2016
Lab ID: 1620493050 Received: 07/22/2016

Method: **NIOSH 1024** Media: SKC 226-37 Sorbent Tube Analyzed: 07/30/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021418** Collected: 07/16/2016
Lab ID: 1620493051 Received: 07/22/2016

Method: **NIOSH 1024** Media: SKC 226-37 Sorbent Tube Analyzed: 07/30/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Sample ID: **S16T021419** Collected: 07/16/2016
Lab ID: 1620493052 Received: 07/22/2016

Method: **NIOSH 1024** Media: SKC 226-37 Sorbent Tube Analyzed: 07/30/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (mg/sample)	Result (mg/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 08/01/2016 15:08	/S/ Thomas J. Masoian 08/01/2016 16:37

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: **34-1620493**
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: 1620493

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** NIOSH 1024
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** IFID/7623 (HBN: 173681)
	Prepared By: NA	**Analyzed By:** Fred Rejali

Blank

MB: 510262
Analyzed: 07/30/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

MB: 510265
Analyzed: 07/30/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

MB: 510268
Analyzed: 07/30/2016 00:00
Units: mg/sample

Analyte	Result	MDL	RL
1,3-Butadiene	ND	NA	0.00100

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510263
Analyzed: 07/30/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 510264
Analyzed: 07/30/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0305	0.0308	99.1	78.0	117.6	0.0304	98.7	0.361	0.0	20.0

LCS: 510266
Analyzed: 07/30/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 510267
Analyzed: 07/30/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0244	0.0274	89.2	78.0	117.6	0.0270	98.7	10.1	0.0	20.0

LCS: 510269
Analyzed: 07/30/2016 00:00
Dilution: 1
Units: mg/sample

LCSD: 510270
Analyzed: 07/30/2016 00:00
Dilution: 1
Units: mg/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
1,3-Butadiene	0.0286	0.0274	105	78.0	117.6	0.0294	107	2.76	0.0	20.0

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1620493

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** NIOSH 1024
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** IFID/7623 (HBN: 173681)
	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
08/01/2016 15:08	08/01/2016 16:37

Symbols and Definitions

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

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

1620493

Assem N/A | 1620493

C.O.C No. 20162100 | Page 1 of 6

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

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-055	Temp. ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No. 776799846583	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No. 41035	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021368	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-A1 ✓	CHILL -4C
	S16T021369	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-A2 ✓	CHILL -4C
	S16T021370	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-B1 ✓	CHILL -4C
	S16T021371	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-BLANK ✓	CHILL -4C
	S16T021372	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-C1 ✓	CHILL -4C
	S16T021373	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-D1 ✓	CHILL -4C
	S16T021374	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-E1 ✓	CHILL -4C
	S16T021375	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-F1 ✓	CHILL -4C
	S16T021376	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-G1 ✓	CHILL -4C
	S16T021377	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-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 Wolder / [signature]	7.20.16 830	Julie Gradishar / Julie Gradishar	7/20/16 830
Julie Gradishar / Julie Gradishar	7.20.16 1400	FEDEX	
Fedex		Delsuree Hill / Desiree Hill	07/22/16 9:30

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 Rejsek 07/30/16 — 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)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162100
N/A		Page 2 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-055 Temp.: ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 776799846583
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41035

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021378	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-H2 ✓	CHILL -4C
	S16T021379	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-A1 ✓	CHILL -4C
	S16T021380	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-A2 ✓	CHILL -4C
	S16T021381	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-B1 ✓	CHILL -4C
	S16T021382	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-BLANK ✓	CHILL -4C
	S16T021383	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-C1 ✓	CHILL -4C
	S16T021384	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-D1 ✓	CHILL -4C
	S16T021385	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-E1 ✓	CHILL -4C
	S16T021386	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-F1 ✓	CHILL -4C
	S16T021387	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-G1 ✓	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 Wolden	7.20.16 0830	Julie Gadson	7/20/16 0830
Julie Gadson	7.20.16 1400	FEDEX	
Fedex		Debra Hall	07/22/2016 9:36

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 — Disposed By: Fred Rejal 07/30/16 — 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

Assembler: N/A

C.O.C. No. 20162100 — 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-055	Temp.: ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 776799846583	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41035	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021388	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-H1 ✓	CHILL -4C
	S16T021389	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-H2 ✓	CHILL -4C
	S16T021390	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-EFF-A-BASE ✓	CHILL -4C
	S16T021391	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-EFF-B-BASE ✓	CHILL -4C
	S16T021392	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-IN-A-BASE ✓	CHILL -4C
	S16T021393	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-IN-B-BASE ✓	CHILL -4C
	S16T021394	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-A1 ✓	CHILL -4C
	S16T021395	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-A2 ✓	CHILL -4C
	S16T021396	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-B1 ✓	CHILL -4C
	S16T021397	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-BLANK ✓	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 Widden / [signature]	7-20-16 0830	Julie Gadish / Julie Gadish	7/20/16 0830
Julie Gadish / Julie Gadish	7/20/16 1400	FEDEX	
FedEx		Desiree Hill / Desiree Hill	07/21/16 9:36

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 Rejal. 07/30/16 — 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)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No.
N/A		20162100
		Page 4 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-055 Temp.: ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 776799846583
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41035

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021398	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-C1	CHILL -4C
	S16T021399	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-D1	CHILL -4C
	S16T021400	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-E1	CHILL -4C
	S16T021401	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-F1	CHILL -4C
	S16T021402	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-G1	CHILL -4C
	S16T021403	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-H1	CHILL -4C
	S16T021404	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-H2	CHILL -4C
	S16T021405	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-A1	CHILL -4C
	S16T021406	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-A2	CHILL -4C
	S16T021407	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-B1	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 Wolden	7/20/16 0830	Julie Gradisher	7/20/16 0830
Julie Gradisher	7/20/16 1400	FEDEX	
Fedex		Jessica Hall	07/21/16 9:30

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
		Fred Rajski	07/30/16 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.
N/A		20162100
		Page 5 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-055	Temp.: ON Ice
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 776799846583	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41035	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021408	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-BLANK ✓	CHILL -4C
	S16T021409	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-C1 ✓	CHILL -4C
	S16T021410	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-D1 ✓	CHILL -4C
	S16T021411	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-E1 ✓	CHILL -4C
	S16T021412	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-F1 ✓	CHILL -4C
	S16T021413	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-G1 ✓	CHILL -4C
	S16T021414	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-H1 ✓	CHILL -4C
	S16T021415	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-H2 ✓	CHILL -4C
	S16T021416	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-EFF-A-BASE ✓	CHILL -4C
	S16T021417	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-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
Sharon Holder Sharon Holder	7/20/16 0830	Julie Gadsen Julie Gadsen	7/20/16 0830
Julie Gadsen Julie Gadsen	7/20/16 1400	FEDEX	
Fedex		Desree Hill Desree Hill	01/27/16 9:36

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 Rejish 07/30/16 — 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)

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No.
N/A		20162100
		Page 6 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-055	Temp.: ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 776799846583	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41035	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021418	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-IN-A-BASE ✓	CHILL -4C
	S16T021419	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-IN-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
	Sharon L Udda	S L Udda	7-2016 0830		Julie Gadson	Julie Gadson	7/20/16 0830
Relinquished By	Julie Gadson	Julie Gadson	7/20/16 1400	Received By	FEDEX		Date/Time
Relinquished By	Fedex		Date/Time	Received By	Desiree Hill	Desiree Hill	07/22/16 0936
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 Rejal	07/30/16 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: July 28, 2016

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

Phone: (509) 373-1262

E-mail: robert_w_sosa@rl.gov

20162093
Workorder: 34-1620246
Client Project ID: CARTRIDGE EVALUATION
Purchase Order: 55502 Rel9
Project Manager: Rand Potter

Analytical Results

Sample ID: **S16T021121** Collected: 07/15/2016
Lab ID: 1620246001 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	**0.91**	NA	NA	0.50
2,4-Dimethylpyridine	**1.3**	NA	NA	0.50

Sample ID: **S16T021122** Collected: 07/15/2016
Lab ID: 1620246002 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021123** Collected: 07/15/2016
Lab ID: 1620246003 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021124** Collected: 07/15/2016
Lab ID: 1620246004 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021125** Collected: 07/15/2016
Lab ID: 1620246005 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021126** Collected: 07/15/2016
Lab ID: 1620246006 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021127** Collected: 07/15/2016
Lab ID: 1620246007 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021128** Collected: 07/15/2016
Lab ID: 1620246008 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021129** Collected: 07/15/2016
Lab ID: 1620246009 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021130** Collected: 07/15/2016
Lab ID: 1620246010 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021131** Collected: 07/15/2016
Lab ID: 1620246011 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/26/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	**1.0**	NA	NA	0.50
2,4-Dimethylpyridine	**1.3**	NA	NA	0.50

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021132** Collected: 07/15/2016
Lab ID: 1620246012 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021133** Collected: 07/15/2016
Lab ID: 1620246013 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021134** Collected: 07/16/2016
Lab ID: 1620246014 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	**0.73**	NA	NA	0.50
2,4-Dimethylpyridine	**1.1**	NA	NA	0.50

Sample ID: **S16T021135** Collected: 07/16/2016
Lab ID: 1620246015 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021136** Collected: 07/16/2016
Lab ID: 1620246016 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021137** Collected: 07/16/2016
Lab ID: 1620246017 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021138** Collected: 07/16/2016
Lab ID: 1620246018 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021139** Collected: 07/16/2016
Lab ID: 1620246019 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021140** Collected: 07/16/2016
Lab ID: 1620246020 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021142** Collected: 07/16/2016
Lab ID: 1620246021 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021143** Collected: 07/16/2016
Lab ID: 1620246022 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021144** Collected: 07/16/2016
Lab ID: 1620246023 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

ANALYTICAL REPORT

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

Analytical Results

Sample ID: **S16T021145** Collected: 07/16/2016
Lab ID: 1620246024 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	**0.69**	NA	NA	0.50
2,4-Dimethylpyridine	**1.1**	NA	NA	0.50

Sample ID: **S16T021146** Collected: 07/16/2016
Lab ID: 1620246025 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: **S16T021147** Collected: 07/16/2016
Lab ID: 1620246026 Sampling Location: CARTRIDGE EVALUATION Received: 07/20/2016
Method: **NIOSH 1613 Mod.** Media: SKC 226-01, Charcoal Tube 100/50mg Analyzed: 07/27/2016
Sampling Parameter: **Air Volume Not Provided**

Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Comments

Quality Control: **NIOSH 1613 Mod. - (HBN: 173466)**

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

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

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

Laboratory Contact Information

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

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

ANALYTICAL REPORT

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

General Lab Comments

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

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

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

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

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ACLASS (DoD ELAP)	ADE-1420	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: 1620246

Limits: Historical/Performance	**Preparation:** NA	**Analysis:** NIOSH 1613 Mod.
Basis: ALS Laboratory Group	**Batch:** NA	**Batch:** ISVO/3072 (HBN: 173466)
	Prepared By: NA	**Analyzed By:** Emilie Pratt

Blank

LMB: 509729
Analyzed: 07/26/2016 19:36
Units: ug/sample

Analyte	Result	MDL	RL
Pyridine	ND	NA	0.200
2,4-Dimethylpyridine	ND	NA	0.200

LMB: 509732
Analyzed: 07/27/2016 05:01
Units: ug/sample

Analyte	Result	MDL	RL
Pyridine	ND	NA	0.200
2,4-Dimethylpyridine	ND	NA	0.200

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509730
Analyzed: 07/26/2016 19:56
Dilution: 1
Units: ug/sample

LCSD: 509731
Analyzed: 07/26/2016 20:15
Dilution: 1
Units: ug/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Pyridine	1.26	2.00	62.9	61.8	141.1	1.41	70.8	11.9	0.0	22.1
2,4-Dimethylpyridine	1.11	1.98	56.3	51.7	130.6	1.18	59.3	5.33	0.0	22.2

LCS: 509733
Analyzed: 07/27/2016 05:21
Dilution: 1
Units: ug/sample

LCSD: 509734
Analyzed: 07/27/2016 05:40
Dilution: 1
Units: ug/sample

Analyte	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Pyridine	1.86	2.00	93.1	61.8	141.1	1.34	67.2 *	32.3	0.0	22.1
2,4-Dimethylpyridine	1.31	1.98	66.3	51.7	130.6	1.09	55.0	18.6	0.0	22.2

Comments

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

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

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

Symbols and Definitions

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

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

1620246

1620246

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 20162093 | Page 1 of 3

Assembler: N/A	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861 / MSIN T6-05 / FAX 372-1878
Collector: JONES	Sample Origin: CARTRIDGE EVALUATION	Purchase Order/Charge Code: 202003/CB20
SAF No.: N/A	Logbook/ Work Package No.: N/A	Ice Chest No.: WTS-021 / Temp.: ON Ice
Project Title: CARTRIDGE EVALUATION	Method of Shipment	Bill of Lading/Air Bill No.: 771079004161 9
Shipped To (Lab): ALS	Data Turnaround: 10 DAYS	Parts and Return No.: 41034
Protocol: N/A		

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021121	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-A1	N/A
	S16T021122	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-A2	N/A
	S16T021123	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-B1	N/A
	S16T021124	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-BLANK	N/A
	S16T021125	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-C1	N/A
	S16T021126	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-D1	N/A
	S16T021127	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-E1	N/A
	S16T021128	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-EFF-BASE	N/A
	S16T021129	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-F1	N/A
	S16T021130	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-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

RELEASE 9
Reference Contract # 55502

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon Wolden / [signature]	7-19-16 0830	Julie Gadish / Julie Gadish	7/19/16 830
Julie Gadish / Julie Gadish	7-19-16 1400	FEDEX	
fedex		Dawn Van Tassell / Tawn Van Tassell	07-20-16 1004

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: Julie Woodin for Emilie Pratt — Date/Time: 7/27/16 1126

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. 20162093
N/A		Page 2 of 3

Collector: JONES	Contact/Requestor: CARL HOWALD IV	Telephone No. 373-6861	MSIN 26-05 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-021	Temp.: ON ICE
Shipped To (Lab): ALS	Method of Shipment	Bill of Lading/Air Bill No.: 7767 9004 1619	
Protocol: N/A	Data Turnaround: 10 DAYS	Parts and Return No.: 41034	

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021131	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-H1	N/A
	S16T021132	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-H2	N/A
	S16T021133	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-IN-BASE	N/A
	S16T021134	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-A1	N/A
	S16T021135	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-A2	N/A
	S16T021136	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-B1	N/A
	S16T021137	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-BLANK	N/A
	S16T021138	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-C1	N/A
	S16T021239	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-D1	N/A
	S16T021240	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-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 see SOW for email

RELEASE 9
Reference Contract # 55502

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holder / Sharon L Holder	7-19-16 0830	Julie Gradoni / Julie Gradoni	7/19/16 0830
Julie Gradoni / Julie Gradoni	7/19/16 1400	FEDEX	
		Tawter Tassell / Tawter Tassell	07-20-16 1009

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: Julie Waugh for Emilie Pratt — Date/Time: 7/27/16 1126

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. 20162093 — 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-021 — Temp. ON Ice
Shipped To (Lab) ALS	Method of Shipment	Bill of Lading/Air Bill No. 7767 9004 1619
Protocol N/A	Data Turnaround 10 DAYS	Parts and Return No. 41034

Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis	Preservative
	S16T021142	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-EFF-BASE	N/A
	S16T021143	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-F1	N/A
	S16T021144	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-G1	N/A
	S16T021145	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-H1	N/A
	S16T021146	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-H2	N/A
	S16T021147	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-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

RELEASE 9
Reference Contract # 55502

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon Walden / [signature]	7-19-16 0830	Julie Gadish / Julie Gadish	7/19/16 0830
Julie Gadish / Julie Gadish	7-19-16 1400	FEDEX	
[signature]		Dennis Yossel / Tam Vair / ASSELL	07-20-16 [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) — Disposed By: [signature] for Emilie Ratt — Date/Time: 7/27/16 1126

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 20162097

Enclosed is the final report for group 20162097 number analyzed for Nitrosamines using NIOSH 2522-Modified. This group number 20162097 has been assigned a Columbia Basin Analytical Laboratories login order number of W607059. This report consists of a summary report of the samples, a laboratory report of each nitrosamine, a single quality control report for the analysis batch, and a copy of the chain of custody.

General Set Comments

Columbia Basin Analytical Laboratories received 26 samples on 07/19/16 to be tested for Nitrosamines. The samples were analyzed in accordance with NIOSH 2522-Modified for N-Nitrosodimethylamine, N-Nitrosomethylethylamine, N-Nitrosodiethylamine, N-Nitrosodi-n-propylamine, N-Nitrosodi-n-butylamine, N-Nitrosopiperidine, N-Nitrosopyrrolidine,and N-Nitrosomorpholine. All results have been corrected for desorption efficiency and measurable levels in the blanks.

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

Positive Results

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

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

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

Recovery Failures in the ICV, CCV's, LCS, RL and MRL

There were no recovery failures in the: ICV, CCV, LCS, LCSD, There were recovery failures in the MRL.

RSD Failures in the LCS and LCSD's

There were no RSD failures between the laboratory control samples.

Measurable Blank Values

There were no measurable analytes in the blank samples.

Calibration Curves

The calibration curves for the Nitrosamines had an R-value that was 0.997 or better, over a range of 5.0 ng/mL to 200 ng/mL.

General Lab Comments

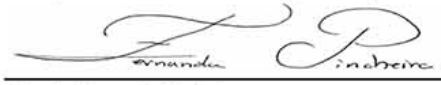
The results provided in this report relate only to the items tested. Samples were received in acceptable conditions unless otherwise noted in the comments above. Samples have not been field blank corrected unless otherwise noted in the general set comments above. This test report shall not be reproduced, except in full, without written approval of Columbia Basin Analytical Laboratories.

I certify that this analytical report is in compliance with the Hanford SOW, both technically and for completeness. Release of the data contained in this hard copy report has been authorized by the Laboratory Director or a designee as verified by the following signature.

08/16/16

Scientist II DeNomy Dage

This report has been reviewed and approved by the following individual:



08/18/16

Scientist I Fernanda Pincheira

If you have any questions, please feel free to contact DeNomy Dage at ddage@rjlg.com or at 509-545-4989.

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

Sample Identification		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
Client Sample ID	RJLG ID						
16-05982-11-A1 | S16T021332	| W607059-01	07/15/16	07/27/16	N-Nitrosodimethylamine	0.264	0.023	
		07/15/16	07/29/16	N-Nitrosodimethylamine	<0.020	0.020	
		07/15/16	07/29/16	N-Nitrosomethylethylamine	<0.020	0.020	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	0.309	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	0.024	0.022	
		07/15/16	07/29/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	0.155	0.021	
		07/15/16	07/29/16	N-Nitrosodi-n-propylamine	<0.019	0.019	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/29/16	N-Nitrosodi-n-butylamine	<0.020	0.020	
		07/15/16	07/29/16	N-Nitrosopiperidine	<0.019	0.019	
		07/15/16	07/27/16	N-Nitrosopiperidine	0.212	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	0.179	0.022	
		07/15/16	07/29/16	N-Nitrosopyrrolidine	<0.019	0.019	
		07/15/16	07/27/16	N-Nitrosomorpholine	0.113	0.022	
		07/15/16	07/29/16	N-Nitrosomorpholine	<0.019	0.019	
16-05982-11-A2 | S16T021333	| W607059-02	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	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
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 Client Sample ID	RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-05982-11-B1	S16T021334	W607059-03	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
			07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
			07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
			07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-BLANK	S16T021335	W607059-04	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
			07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
			07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
			07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-C1	S16T021336	W607059-05	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
			07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
			07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
			07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-D1	S16T021337	W607059-06	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
			07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
			07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
			07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
			07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	

Report Qualifiers:
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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 Client Sample ID	RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-05982-11-E1 | S16T021338	| W607059-07	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-EFF-BASE | S16T021339	| W607059-08	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-F1 | S16T021340	| W607059-09	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-G1 | S16T021341	| W607059-10	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	

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RJ LEE GROUP

Sample Identification Client Sample ID	RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-05982-11-H1 | S16T021342	| W607059-11	07/15/16	07/27/16	N-Nitrosodimethylamine	0.060	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	0.025	0.023	C
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	0.024	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	0.022	0.022	
16-05982-11-H2 | S16T021343	| W607059-12	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05982-11-IN-BASE | S16T021344	| W607059-13	07/15/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-A1 | S16T021345	| W607059-14	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.020	0.020	
		07/16/16	07/27/16	N-Nitrosodimethylamine	0.126	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.020	0.020	
		07/16/16	07/27/16	N-Nitrosomethylethylamine	0.249	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/16/16	07/27/16	N-Nitrosodiethylamine	0.033	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.019	0.019	
		07/16/16	07/27/16	N-Nitrosodi-n-propylamine	0.115	0.021	

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Sample Identification Client Sample ID	RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-05983-11-A1 | S16T021345	| W607059-14	07/16/16	07/27/16	N-Nitrosodi-n-butylamine	0.166	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.020	0.020	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.019	0.019	
		07/16/16	07/27/16	N-Nitrosopiperidine	0.110	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.019	0.019	
		07/16/16	07/27/16	N-Nitrosopyrrolidine	0.116	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.019	0.019	
		07/16/16	07/27/16	N-Nitrosomorpholine	0.057	0.022	
16-05983-11-A2 | S16T021346	| W607059-15	07/16/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/16/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-B1 | S16T021347	| W607059-16	07/16/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/16/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-BLANK | S16T021348	| W607059-17	07/16/16	07/27/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/27/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/16/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/27/16	N-Nitrosomorpholine	<0.022	0.022	

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Sample Identification Client Sample ID	RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-05983-11-C1 | S16T021349	| W607059-18	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-D1 | S16T021350	| W607059-19	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-E1 | S16T021351	| W607059-20	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-EFF-BASE | S16T021352	| W607059-21	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	

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

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

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Sample Identification Client Sample ID	RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-05983-11-IN-BASE | S16T021357	| W607059-26	07/16/16	07/29/16	N-Nitrosodimethylamine	0.040	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	0.052	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	0.024	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	

Report Qualifiers:
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 >30% 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

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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

Quality Control

NIOSH 2522

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

Client Project:
Cartridge Evaluation

Analyte	CAS No.	Sample ID	Analyzed Date	Expected µg/tube	Result µg/tube	DE	DE Corrected	REC %	RSD %	Qualifier
N-Nitrosodiethylamine	55-18-5	LCS-1	07/27/16	0.200	0.183	0.91	0.202	101	2.24	
N-Nitrosodiethylamine	55-18-5	LCS-1	07/28/16	0.200	0.174	0.90	0.193	96.2	4.21	
N-Nitrosodiethylamine	55-18-5	LCS-1	07/28/16	0.200	0.204	1.02	0.200	99.6	3.12	
N-Nitrosodimethylamine	62-75-9	LCS-1	07/27/16	0.200	0.175	0.88	0.199	99.7	0.721	
N-Nitrosodimethylamine	62-75-9	LCS-1	07/28/16	0.200	0.164	0.85	0.192	96.1	3.38	
N-Nitrosodimethylamine	62-75-9	LCS-1	07/28/16	0.200	0.201	1.00	0.201	100	1.16	
N-Nitrosodi-n-butylamine	924-16-3	LCS-1	07/27/16	0.200	0.183	0.91	0.201	100	1.20	
N-Nitrosodi-n-butylamine	924-16-3	LCS-1	07/28/16	0.200	0.182	0.93	0.195	97.4	2.82	
N-Nitrosodi-n-butylamine	924-16-3	LCS-1	07/28/16	0.200	0.198	1.01	0.197	98.2	1.55	
N-Nitrosodi-n-propylamine	621-64-7	LCS-1	07/27/16	0.200	0.182	0.93	0.195	97.5	2.32	
N-Nitrosodi-n-propylamine	621-64-7	LCS-1	07/28/16	0.200	0.179	0.93	0.193	96.6	3.20	
N-Nitrosodi-n-propylamine	621-64-7	LCS-1	07/28/16	0.200	0.208	1.04	0.199	99.5	2.94	
N-Nitrosomethylethylamine	10595-95-6	LCS-1	07/27/16	0.200	0.176	0.89	0.198	98.8	1.13	
N-Nitrosomethylethylamine	10595-95-6	LCS-1	07/28/16	0.200	0.167	0.87	0.192	95.5	4.17	
N-Nitrosomethylethylamine	10595-95-6	LCS-1	07/28/16	0.200	0.202	1.01	0.199	99.5	2.26	
N-Nitrosomorpholine	59-89-2	LCS-1	07/27/16	0.200	0.186	0.92	0.201	100	1.32	
N-Nitrosomorpholine	59-89-2	LCS-1	07/28/16	0.200	0.180	0.93	0.194	96.8	2.87	
N-Nitrosomorpholine	59-89-2	LCS-1	07/28/16	0.200	0.215	1.06	0.202	101	1.48	
N-Nitrosopiperidine	100-75-4	LCS-1	07/27/16	0.200	0.182	0.92	0.198	99.0	0.906	
N-Nitrosopiperidine	100-75-4	LCS-1	07/28/16	0.200	0.179	0.92	0.195	97.2	2.46	
N-Nitrosopiperidine	100-75-4	LCS-1	07/28/16	0.200	0.205	1.03	0.199	99.4	0.774	
N-Nitrosopyrrolidine	930-55-2	LCS-1	07/27/16	0.200	0.181	0.91	0.198	99.2	2.35	
N-Nitrosopyrrolidine	930-55-2	LCS-1	07/28/16	0.200	0.179	0.90	0.198	98.8	1.19	
N-Nitrosopyrrolidine	930-55-2	LCS-1	07/28/16	0.200	0.209	1.04	0.201	100	0.357	
N-Nitrosodiethylamine	55-18-5	LCS-2	07/27/16	0.200	0.177	0.91	0.195	97.5	2.24	
N-Nitrosodiethylamine	55-18-5	LCS-2	07/28/16	0.200	0.179	0.90	0.198	99.2	4.21	
N-Nitrosodiethylamine	55-18-5	LCS-2	07/28/16	0.200	0.211	1.02	0.207	103	3.12	
N-Nitrosodimethylamine	62-75-9	LCS-2	07/27/16	0.200	0.175	0.88	0.199	99.5	0.721	
N-Nitrosodimethylamine	62-75-9	LCS-2	07/28/16	0.200	0.174	0.85	0.204	101	3.38	
N-Nitrosodimethylamine	62-75-9	LCS-2	07/28/16	0.200	0.202	1.00	0.202	101	1.16	
N-Nitrosodi-n-butylamine	924-16-3	LCS-2	07/27/16	0.200	0.180	0.91	0.198	98.7	1.20	
N-Nitrosodi-n-butylamine	924-16-3	LCS-2	07/28/16	0.200	0.186	0.93	0.199	99.6	2.82	
N-Nitrosodi-n-butylamine	924-16-3	LCS-2	07/28/16	0.200	0.203	1.01	0.202	101	1.55	
N-Nitrosodi-n-propylamine	621-64-7	LCS-2	07/27/16	0.200	0.187	0.93	0.201	100	2.32	
N-Nitrosodi-n-propylamine	621-64-7	LCS-2	07/28/16	0.200	0.186	0.93	0.201	100	3.20	

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

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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	07/28/16		0.00	1.00	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	07/27/16		0.00	0.91	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	07/28/16		0.00	0.93	0.00			
N-Nitrosodi-n-butylamine	924-16-3	MB	07/28/16		0.00	1.01	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	07/27/16		0.00	0.93	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	07/28/16		0.00	0.93	0.00			
N-Nitrosodi-n-propylamine	621-64-7	MB	07/28/16		0.00	1.04	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	07/27/16		0.00	0.89	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	07/28/16		0.00	0.87	0.00			
N-Nitrosomethylethylamine	10595-95-6	MB	07/28/16		0.00	1.01	0.00			
N-Nitrosomorpholine	59-89-2	MB	07/27/16		0.00	0.92	0.00			
N-Nitrosomorpholine	59-89-2	MB	07/28/16		0.00	0.93	0.00			
N-Nitrosomorpholine	59-89-2	MB	07/28/16		0.00	1.06	0.00			
N-Nitrosopiperidine	100-75-4	MB	07/27/16		0.00	0.92	0.00			
N-Nitrosopiperidine	100-75-4	MB	07/28/16		0.00	0.92	0.00			
N-Nitrosopiperidine	100-75-4	MB	07/28/16		0.00	1.03	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	07/27/16		0.00	0.91	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	07/28/16		0.00	0.90	0.00			
N-Nitrosopyrrolidine	930-55-2	MB	07/28/16		0.00	1.04	0.00			
N-Nitrosodiethylamine	55-18-5	MRL	07/27/16	0.020	0.022	0.91	0.024	119		
N-Nitrosodiethylamine	55-18-5	MRL	07/28/16	0.020	0.023	0.90	0.025	125		
N-Nitrosodiethylamine	55-18-5	MRL	07/28/16	0.020	0.027	1.02	0.026	129		
N-Nitrosodimethylamine	62-75-9	MRL	07/27/16	0.020	0.023	0.88	0.026	128		
N-Nitrosodimethylamine	62-75-9	MRL	07/28/16	0.020	0.021	0.85	0.025	123		
N-Nitrosodimethylamine	62-75-9	MRL	07/28/16	0.020	0.028	1.00	0.028	139		
N-Nitrosodi-n-butylamine	924-16-3	MRL	07/27/16	0.020	0.022	0.91	0.024	120		
N-Nitrosodi-n-butylamine	924-16-3	MRL	07/28/16	0.020	0.021	0.93	0.022	109		
N-Nitrosodi-n-butylamine	924-16-3	MRL	07/28/16	0.020	0.025	1.01	0.025	123		
N-Nitrosodi-n-propylamine	621-64-7	MRL	07/27/16	0.020	0.021	0.93	0.023	113		
N-Nitrosodi-n-propylamine	621-64-7	MRL	07/28/16	0.020	0.021	0.93	0.023	114		
N-Nitrosodi-n-propylamine	621-64-7	MRL	07/28/16	0.020	0.024	1.04	0.023	113		
N-Nitrosomethylethylamine	10595-95-6	MRL	07/27/16	0.020	0.024	0.89	0.027	133		
N-Nitrosomethylethylamine	10595-95-6	MRL	07/28/16	0.020	0.024	0.87	0.027	136		
N-Nitrosomethylethylamine	10595-95-6	MRL	07/28/16	0.020	0.024	1.01	0.024	119		
N-Nitrosomorpholine	59-89-2	MRL	07/27/16	0.020	0.022	0.92	0.024	122		
N-Nitrosomorpholine	59-89-2	MRL	07/28/16	0.020	0.021	0.93	0.023	115		
N-Nitrosomorpholine	59-89-2	MRL	07/28/16	0.020	0.026	1.06	0.024	118		
N-Nitrosopiperidine	100-75-4	MRL	07/27/16	0.020	0.023	0.92	0.025	127		
N-Nitrosopiperidine	100-75-4	MRL	07/28/16	0.020	0.022	0.92	0.024	118		
N-Nitrosopiperidine	100-75-4	MRL	07/28/16	0.020	0.026	1.03	0.025	125		
N-Nitrosopyrrolidine	930-55-2	MRL	07/27/16	0.020	0.023	0.91	0.025	127		
N-Nitrosopyrrolidine	930-55-2	MRL	07/28/16	0.020	0.021	0.90	0.023	116		

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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	07/28/16	0.020	0.026	1.04	0.025	123		

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 >90% 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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W607059

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162097
N/A		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
	S16T021332	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-A1	N/A
	S16T021333	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-A2	N/A
	S16T021334	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-B1	N/A
	S16T021335	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-BLANK	N/A
	S16T021336	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-C1	N/A
	S16T021337	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-D1	N/A
	S16T021338	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-E1	N/A
	S16T021339	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-EFF-BASE	N/A
	S16T021340	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-F1	N/A
	S16T021341	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-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 55503

RELEASE 5

Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Holder	7-19-16 0830	R E Rogers	7-19-16 0830
R E Rogers	7-19-16 11:18	T. RICE RJ LEE GROUP	7/19/16 11:18

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	I Pmith	08/08/16 14:45

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)

W607059

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162097
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
	S16T021342	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-H1	N/A
	S16T021343	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-H2	N/A
	S16T021344	VA	7/15/16		Thermosorb-N	Nitrosamines 16-05982-11-IN-BASE	N/A
	S16T021345	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-A1	N/A
	S16T021346	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-A2	N/A
	S16T021347	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-B1	N/A
	S16T021348	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-BLANK	N/A
	S16T021349	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-C1	N/A
	S16T021350	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-D1	N/A
	S16T021351	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-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
Carl_W_Howald@rl.gov and
Gregory_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 / Sharon L Holder	7-19-16 0830	LE Rogers	7-19-16 0830
RE Rogers	7-19-16 ~~1118~~ 1118	C.LOPEZ RJLB	7-19-16 1118

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	J P Mills	08/08/16 14:45

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)

W607059

Assembler	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. No. 20162097
N/A		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
	S16T021352	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-EFF-BASE	N/A
	S16T021353	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-F1	N/A
	S16T021354	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-G1	N/A
	S16T021355	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-H1	N/A
	S16T021356	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-H2	N/A
	S16T021357	VA	7/16/16		Thermosorb-N	Nitrosamines 16-05983-11-IN-BASE	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 see SOW for email

CONTRACT 55503

RELEASE 5

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
Sharon L Hobbs	7 19 16 0830	RE Rogers	7-19-16 0830
RE Rogers	7-19-16 11:18	L LOPEZ RJLee	7/19/16 11:18

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	J Smith	08/08/16 14:45

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 (ppm) using their molecular weights and corresponding flow rates after volume correction[1] 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 expressed as g/mol. When the ratio between concentration and the corresponding Occupational Exposure Limit (OEL) is larger than 10%, the fraction is shown in red.

4. The reported volume measurements in Appendix C were made via DryCal devices placed downstream of each sample media tube. This allowed for precise volume measurements through each of the tubes. However, to perform the concentration conversion to ppm, the "actual" volumetric values required conversion to standard temperature and pressure conditions.

   Ideal gas behavior was assumed for these volume corrections, and standard temperatures and pressures were assumed to be 298 K ($T_{standard}$) 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 expressed as inches of WC).

   The average pressure drops were then used in a pressure correction factor for the reported volumes. Note that all pressure values were first converted to units of Torr. For measurements made at the inlet of the respirator cartridge the pressure correction factor is $(P_{upstream} - P_{tube}) \div P_{standard}$.

[1] 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 calculation of the correction factors follows. For a given time period, assume that the reported upstream pressure ($P_{upstream}$) was 734 Torr and the corresponding temperature ($T_{upstream}$) was 85.9ºF (or 302.9 K). Here, for tube location 'A' and upstream of the respirator cartridge, the corresponding temperature correction factor would be 0.984, and the pressure correction factor for the respirator cartridge outlet would be 0.944. When multiplied, these two factors equal 0.929, which would be the overall correction to the reported volume measurement.

5. The analytical detection limit—or reporting limit in some cases—for every COPC was obtained from the raw analytical data. Here, the average flow rate was used to calculate the approximate analytical detection limit as the percentage of 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 the furan tube instead of volatile organic compound (VOC) (or volatile organic analyte) were used. For acetonitrile, results from the VOC tube were used. For butanal, the results from the VOC tube instead of the aldehydes tube were used. For pyridine and 2,4-dimethylpyridine, the results from the VOC 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 measurements. This same rule applies to 1,3-Butadiene. The results in the plots and tables reflect the sum of results.

The following tables show the calculated concentrations for each of the COPC measurements conducted in this study. Red highlighted values reflect measurements that were above 10% of the respective OEL values. COPCs with these highlights are plotted and shown in Section 5.0. Orange highlighted values reflect measurements in the 2 to 10% of the OEL range. COPCs with these highlights (only) are plotted and shown in Appendix E.

A re-evaluation of the furan, 2,5-dihydrofuran, and 2-methylfuran results was performed using the Carbotrap 300 TDU measurement after the original issue (Rev. 0) of this report. The re-evaluation is discussed in Freeman et.al. [20]. The detailed furan, 2,5-dihydrofuran, and 2-methylfuran results from the

Carbotrap 300 TDU method are in Appendix G. The furan, 2,5-dihydrofuran, and 2-methylfuran results shown in Table starting on the next page are the results from the TDU Tenax TA method.

The position numbers that start with 5982 are for the SCOTT 7422-SC1 cartridges, and the position numbers that start with 5983 are for the SCOTT 7422-SD1 cartridges.

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
1	Ammonia	2	5982-A1	416	25	1663%		2.35%
1	Ammonia	16	5982-H1	433	25	1733%		2.35%
1	Ammonia	2	5982-A2	61	25	243%		2.35%
1	Ammonia	4	5982-B1	345	25	1379%		2.35%
1	Ammonia	6	5982-C1	405	25	1619%		2.35%
1	Ammonia	8	5982-D1	141	25	563%		2.35%
1	Ammonia	10	5982-E1	366	25	1466%		2.35%
1	Ammonia	12	5982-F1	130	25	521%		2.35%
1	Ammonia	14	5982-G1	375	25	1501%		2.35%
1	Ammonia	16	5982-H2	400	25	1599%		2.35%
1	Ammonia	2	5983-A1	403	25	1611%		2.35%
1	Ammonia	16	5983-H1	479	25	1915%		2.35%
1	Ammonia	2	5983-A2	53	25	212%		2.35%
1	Ammonia	4	5983-B1	296	25	1185%		2.35%
1	Ammonia	6	5983-C1	402	25	1608%		2.35%
1	Ammonia	8	5983-D1	284	25	1137%		2.35%
1	Ammonia	10	5983-E1	478	25	1912%		2.35%
1	Ammonia	12	5983-F1	442	25	1767%		2.35%
1	Ammonia	14	5983-G1	410	25	1640%		2.35%
1	Ammonia	16	5983-H2	465	25	1859%		2.35%
3	Mercury	2	5982-A1	0.00159	0.003	52.0%		7.43%
3	Mercury	16	5982-H1	0.00128	0.003	42.0%		7.43%
3	Mercury	2	5982-A2	0.00022	0.003	7.15%	YES	7.43%
3	Mercury	4	5982-B1	0.00022	0.003	7.24%	YES	7.43%
3	Mercury	6	5982-C1	0.00022	0.003	7.10%	YES	7.43%
3	Mercury	8	5982-D1	0.00023	0.003	7.43%	YES	7.43%
3	Mercury	10	5982-E1	0.00022	0.003	7.22%	YES	7.43%
3	Mercury	12	5982-F1	0.00021	0.003	6.94%	YES	7.43%
3	Mercury	14	5982-G1	0.00022	0.003	7.08%	YES	7.43%
3	Mercury	16	5982-H2	0.00022	0.003	7.22%	YES	7.43%
3	Mercury	2	5983-A1	0.00153	0.003	50.2%		7.43%
3	Mercury	16	5983-H1	0.00156	0.003	51.2%		7.43%
3	Mercury	2	5983-A2	0.00021	0.003	6.96%	YES	7.43%
3	Mercury	4	5983-B1	0.00022	0.003	7.16%	YES	7.43%
3	Mercury	6	5983-C1	0.00022	0.003	7.26%	YES	7.43%
3	Mercury	8	5983-D1	0.00022	0.003	7.19%	YES	7.43%
3	Mercury	10	5983-E1	0.00022	0.003	7.26%	YES	7.43%
3	Mercury	12	5983-F1	0.00022	0.003	7.21%	YES	7.43%
3	Mercury	14	5983-G1	0.00022	0.003	7.12%	YES	7.43%
3	Mercury	16	5983-H2	0.00041	0.003	13.5%		7.43%
4	1,3-Butadiene	2	5982-A1	1.0	1.0	102%		2.02%
4	1,3-Butadiene	16	5982-H1	1.1	1.0	112%		2.02%
4	1,3-Butadiene	2	5982-A2	0.020	1.0	2.02%	YES	2.02%
4	1,3-Butadiene	4	5982-B1	0.12	1.0	12.2%		2.02%
4	1,3-Butadiene	6	5982-C1	0.37	1.0	37.2%		2.02%
4	1,3-Butadiene	8	5982-D1	0.90	1.0	89.7%		2.02%
4	1,3-Butadiene	10	5982-E1	1.8	1.0	184%		2.02%
4	1,3-Butadiene	12	5982-F1	1.0	1.0	100%		2.02%
4	1,3-Butadiene	14	5982-G1	2.7	1.0	268%		2.02%
4	1,3-Butadiene	16	5982-H2	1.5	1.0	153%		2.02%
4	1,3-Butadiene	2	5983-A1	1.4	1.0	138%		2.02%
4	1,3-Butadiene	16	5983-H1	1.2	1.0	125%		2.02%
4	1,3-Butadiene	2	5983-A2	0.019	1.0	1.87%	YES	2.02%
4	1,3-Butadiene	4	5983-B1	0.020	1.0	2.00%	YES	2.02%
4	1,3-Butadiene	6	5983-C1	0.35	1.0	34.6%		2.02%
4	1,3-Butadiene	8	5983-D1	0.75	1.0	74.7%		2.02%
4	1,3-Butadiene	10	5983-E1	1.2	1.0	123%		2.02%
4	1,3-Butadiene	12	5983-F1	1.8	1.0	181%		2.02%
4	1,3-Butadiene	14	5983-G1	2.4	1.0	241%		2.02%
4	1,3-Butadiene	16	5983-H2	2.1	1.0	214%		2.02%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
5	Benzene	2	5982-A1	0.00276	0.50	0.551%		0.024%
5	Benzene	16	5982-H1	0.00404	0.50	0.808%		0.024%
5	Benzene	2	5982-A2	0.00011	0.50	0.022%	YES	0.024%
5	Benzene	4	5982-B1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	6	5982-C1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	8	5982-D1	0.00011	0.50	0.022%	YES	0.024%
5	Benzene	10	5982-E1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	14	5982-G1	0.00019	0.50	0.037%		0.024%
5	Benzene	16	5982-H2	0.00025	0.50	0.050%		0.024%
5	Benzene	2	5983-A1	0.00431	0.50	0.863%		0.024%
5	Benzene	16	5983-H1	0.00320	0.50	0.640%		0.024%
5	Benzene	2	5983-A2	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	4	5983-B1	0.00011	0.50	0.022%	YES	0.024%
5	Benzene	6	5983-C1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	8	5983-D1	0.00011	0.50	0.023%	YES	0.024%
5	Benzene	10	5983-E1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	12	5983-F1	0.00011	0.50	0.021%	YES	0.024%
5	Benzene	14	5983-G1	0.00010	0.50	0.021%	YES	0.024%
5	Benzene	16	5983-H2	0.00012	0.50	0.024%	YES	0.024%
6	Biphenyl	2	5982-A1	0.00009	0.20	0.047%	YES	0.048%
6	Biphenyl	16	5982-H1	0.00008	0.20	0.040%	YES	0.048%
6	Biphenyl	2	5982-A2	0.00008	0.20	0.042%	YES	0.048%
6	Biphenyl	4	5982-B1	0.00009	0.20	0.043%	YES	0.048%
6	Biphenyl	6	5982-C1	0.00009	0.20	0.046%	YES	0.048%
6	Biphenyl	8	5982-D1	0.00010	0.20	0.048%	YES	0.048%
6	Biphenyl	10	5982-E1	0.00009	0.20	0.044%	YES	0.048%
6	Biphenyl	12	5982-F1	0.00008	0.20	0.042%	YES	0.048%
6	Biphenyl	16	5982-H2	0.00009	0.20	0.045%	YES	0.048%
6	Biphenyl	2	5983-A1	0.00018	0.20	0.088%	YES	0.092%
6	Biphenyl	16	5983-H1	0.00018	0.20	0.088%	YES	0.092%
6	Biphenyl	2	5983-A2	0.00016	0.20	0.082%	YES	0.092%
6	Biphenyl	4	5983-B1	0.00017	0.20	0.085%	YES	0.092%
6	Biphenyl	6	5983-C1	0.00017	0.20	0.086%	YES	0.092%
6	Biphenyl	8	5983-D1	0.00018	0.20	0.092%	YES	0.092%
6	Biphenyl	10	5983-E1	0.00018	0.20	0.092%	YES	0.092%
6	Biphenyl	12	5983-F1	0.00018	0.20	0.090%	YES	0.092%
6	Biphenyl	14	5983-G1	0.00018	0.20	0.090%	YES	0.092%
6	Biphenyl	16	5983-H2	0.00018	0.20	0.088%	YES	0.092%
7	1-Butanol	2	5982-A1	0.78	20	3.89%		0.005%
7	1-Butanol	16	5982-H1	0.34	20	1.68%		0.005%
7	1-Butanol	2	5982-A2	0.00154	20	0.008%		0.005%
7	1-Butanol	4	5982-B1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	6	5982-C1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	8	5982-D1	0.00153	20	0.008%		0.005%
7	1-Butanol	10	5982-E1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	14	5982-G1	0.00038	20	0.002%	YES	0.005%
7	1-Butanol	16	5982-H2	0.00151	20	0.008%		0.005%
7	1-Butanol	2	5983-A1	0.86	20	4.29%		0.005%
7	1-Butanol	16	5983-H1	1.0	20	5.02%		0.005%
7	1-Butanol	2	5983-A2	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	4	5983-B1	0.00085	20	0.004%	YES	0.005%
7	1-Butanol	6	5983-C1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	8	5983-D1	0.00088	20	0.004%	YES	0.005%
7	1-Butanol	10	5983-E1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	12	5983-F1	0.00083	20	0.004%	YES	0.005%
7	1-Butanol	14	5983-G1	0.00080	20	0.004%	YES	0.005%
7	1-Butanol	16	5983-H2	0.00097	20	0.005%	YES	0.005%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
9	2-Hexanone	2	5982-A1	0.018	5.0	0.367%		0.003%
9	2-Hexanone	16	5982-H1	0.016	5.0	0.322%		0.003%
9	2-Hexanone	2	5982-A2	0.00009	5.0	0.002%	YES	0.003%
9	2-Hexanone	4	5982-B1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	6	5982-C1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	8	5982-D1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	10	5982-E1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	14	5982-G1	0.00016	5.0	0.003%	YES	0.003%
9	2-Hexanone	16	5982-H2	0.00016	5.0	0.003%	YES	0.003%
9	2-Hexanone	2	5983-A1	0.018	5.0	0.355%		0.003%
9	2-Hexanone	16	5983-H1	0.016	5.0	0.324%		0.003%
9	2-Hexanone	2	5983-A2	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	4	5983-B1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	6	5983-C1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	8	5983-D1	0.00009	5.0	0.002%	YES	0.003%
9	2-Hexanone	10	5983-E1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	12	5983-F1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	14	5983-G1	0.00008	5.0	0.002%	YES	0.003%
9	2-Hexanone	16	5983-H2	0.00010	5.0	0.002%	YES	0.003%
11	4-Methyl-2-hexanone	2	5982-A1	0.00133	0.50	0.266%		0.030%
11	4-Methyl-2-hexanone	16	5982-H1	0.00135	0.50	0.270%		0.030%
11	4-Methyl-2-hexanone	2	5982-A2	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	4	5982-B1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	6	5982-C1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	8	5982-D1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	10	5982-E1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	14	5982-G1	0.00015	0.50	0.030%	YES	0.030%
11	4-Methyl-2-hexanone	16	5982-H2	0.00015	0.50	0.030%	YES	0.030%
11	4-Methyl-2-hexanone	2	5983-A1	0.00111	0.50	0.223%		0.030%
11	4-Methyl-2-hexanone	16	5983-H1	0.00101	0.50	0.201%		0.030%
11	4-Methyl-2-hexanone	2	5983-A2	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	4	5983-B1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	6	5983-C1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	8	5983-D1	0.00008	0.50	0.017%	YES	0.030%
11	4-Methyl-2-hexanone	10	5983-E1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	12	5983-F1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	14	5983-G1	0.00008	0.50	0.015%	YES	0.030%
11	4-Methyl-2-hexanone	16	5983-H2	0.00009	0.50	0.018%	YES	0.030%
13	3-Buten-2-one	2	5982-A1	0.00015	0.20	0.077%	YES	0.090%
13	3-Buten-2-one	16	5982-H1	0.047	0.20	**23.5%**		0.090%
13	3-Buten-2-one	2	5982-A2	0.00017	0.20	0.087%		0.090%
13	3-Buten-2-one	4	5982-B1	0.00017	0.20	0.084%	YES	0.090%
13	3-Buten-2-one	6	5982-C1	0.00019	0.20	0.094%		0.090%
13	3-Buten-2-one	8	5982-D1	0.00035	0.20	0.177%		0.090%
13	3-Buten-2-one	10	5982-E1	0.00080	0.20	0.399%		0.090%
13	3-Buten-2-one	14	5982-G1	0.00018	0.20	0.090%	YES	0.090%
13	3-Buten-2-one	16	5982-H2	0.00330	0.20	1.65%		0.090%
13	3-Buten-2-one	2	5983-A1	0.00015	0.20	0.077%	YES	0.090%
13	3-Buten-2-one	16	5983-H1	0.041	0.20	**20.3%**		0.090%
13	3-Buten-2-one	2	5983-A2	0.00017	0.20	0.084%	YES	0.090%
13	3-Buten-2-one	4	5983-B1	0.00017	0.20	0.086%	YES	0.090%
13	3-Buten-2-one	6	5983-C1	0.00017	0.20	0.083%	YES	0.090%
13	3-Buten-2-one	8	5983-D1	0.00024	0.20	0.120%		0.090%
13	3-Buten-2-one	10	5983-E1	0.00021	0.20	0.104%		0.090%
13	3-Buten-2-one	12	5983-F1	0.00061	0.20	0.306%		0.090%
13	3-Buten-2-one	14	5983-G1	0.00373	0.20	1.86%		0.090%
13	3-Buten-2-one	16	5983-H2	0.00088	0.20	0.442%		0.090%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
14	Formaldehyde	2	5982-A1	0.026	0.30	8.56%		0.631%
14	Formaldehyde	16	5982-H1	0.00799	0.30	2.66%		0.631%
14	Formaldehyde	2	5982-A2	0.00189	0.30	0.631%	YES	0.631%
14	Formaldehyde	4	5982-B1	0.00183	0.30	0.611%	YES	0.631%
14	Formaldehyde	6	5982-C1	0.00180	0.30	0.602%	YES	0.631%
14	Formaldehyde	8	5982-D1	0.00184	0.30	0.612%	YES	0.631%
14	Formaldehyde	10	5982-E1	0.00184	0.30	0.613%	YES	0.631%
14	Formaldehyde	12	5982-F1	0.00179	0.30	0.597%	YES	0.631%
14	Formaldehyde	14	5982-G1	0.00180	0.30	0.602%	YES	0.631%
14	Formaldehyde	16	5982-H2	0.00181	0.30	0.602%	YES	0.631%
14	Formaldehyde	2	5983-A1	0.018	0.30	6.00%		0.631%
14	Formaldehyde	16	5983-H1	0.012	0.30	3.94%		0.631%
14	Formaldehyde	2	5983-A2	0.00175	0.30	0.583%	YES	0.631%
14	Formaldehyde	4	5983-B1	0.00256	0.30	0.853%		0.631%
14	Formaldehyde	6	5983-C1	0.00198	0.30	0.660%		0.631%
14	Formaldehyde	8	5983-D1	0.00231	0.30	0.770%		0.631%
14	Formaldehyde	10	5983-E1	0.00196	0.30	0.654%		0.631%
14	Formaldehyde	12	5983-F1	0.00184	0.30	0.613%	YES	0.631%
14	Formaldehyde	14	5983-G1	0.00184	0.30	0.615%	YES	0.631%
14	Formaldehyde	16	5983-H2	0.00186	0.30	0.619%	YES	0.631%
15	Acetaldehyde	2	5982-A1	0.28	25	1.12%		0.005%
15	Acetaldehyde	16	5982-H1	0.27	25	1.09%		0.005%
15	Acetaldehyde	2	5982-A2	0.090	25	0.361%		0.005%
15	Acetaldehyde	4	5982-B1	0.11	25	0.440%		0.005%
15	Acetaldehyde	6	5982-C1	0.16	25	0.620%		0.005%
15	Acetaldehyde	8	5982-D1	0.18	25	0.732%		0.005%
15	Acetaldehyde	10	5982-E1	0.18	25	0.723%		0.005%
15	Acetaldehyde	12	5982-F1	0.051	25	0.205%		0.005%
15	Acetaldehyde	14	5982-G1	0.19	25	0.758%		0.005%
15	Acetaldehyde	16	5982-H2	0.17	25	0.699%		0.005%
15	Acetaldehyde	2	5983-A1	0.25	25	1.000%		0.005%
15	Acetaldehyde	16	5983-H1	0.28	25	1.11%		0.005%
15	Acetaldehyde	2	5983-A2	0.062	25	0.248%		0.005%
15	Acetaldehyde	4	5983-B1	0.076	25	0.303%		0.005%
15	Acetaldehyde	6	5983-C1	0.13	25	0.509%		0.005%
15	Acetaldehyde	8	5983-D1	0.15	25	0.619%		0.005%
15	Acetaldehyde	10	5983-E1	0.19	25	0.740%		0.005%
15	Acetaldehyde	12	5983-F1	0.20	25	0.783%		0.005%
15	Acetaldehyde	14	5983-G1	0.18	25	0.724%		0.005%
15	Acetaldehyde	16	5983-H2	0.19	25	0.749%		0.005%
16	Butanal	2	5982-A1	0.020	25	0.081%		0.001%
16	Butanal	16	5982-H1	0.034	25	0.134%		0.001%
16	Butanal	2	5982-A2	0.00021	25	0.001%	YES	0.001%
16	Butanal	4	5982-B1	0.00020	25	0.001%	YES	0.001%
16	Butanal	6	5982-C1	0.00020	25	0.001%	YES	0.001%
16	Butanal	8	5982-D1	0.00021	25	0.001%	YES	0.001%
16	Butanal	10	5982-E1	0.00020	25	0.001%	YES	0.001%
16	Butanal	14	5982-G1	0.00027	25	0.001%	YES	0.001%
16	Butanal	16	5982-H2	0.00027	25	0.001%	YES	0.001%
16	Butanal	2	5983-A1	0.021	25	0.085%		0.001%
16	Butanal	16	5983-H1	0.019	25	0.075%		0.001%
16	Butanal	2	5983-A2	0.00020	25	0.001%	YES	0.001%
16	Butanal	4	5983-B1	0.00026	25	0.001%		0.001%
16	Butanal	6	5983-C1	0.00020	25	0.001%	YES	0.001%
16	Butanal	8	5983-D1	0.00021	25	0.001%	YES	0.001%
16	Butanal	10	5983-E1	0.00020	25	0.001%	YES	0.001%
16	Butanal	12	5983-F1	0.00020	25	0.001%	YES	0.001%
16	Butanal	14	5983-G1	0.00020	25	0.001%	YES	0.001%
16	Butanal	16	5983-H2	0.00023	25	0.001%	YES	0.001%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
19	Furan	2	5982-A1	0.00001	0.001	0.873%	YES	0.933%
19	Furan	16	5982-H1	0.00001	0.001	0.861%	YES	0.933%
19	Furan	2	5982-A2	0.00001	0.001	0.929%	YES	0.933%
19	Furan	4	5982-B1	0.00001	0.001	0.925%	YES	0.933%
19	Furan	6	5982-C1	0.00001	0.001	1.02%		0.933%
19	Furan	8	5982-D1	0.00001	0.001	0.933%	YES	0.933%
19	Furan	10	5982-E1	0.00001	0.001	1.26%		0.933%
19	Furan	12	5982-F1	0.00001	0.001	0.844%	YES	0.933%
19	Furan	14	5982-G1	0.00001	0.001	0.872%	YES	0.933%
19	Furan	16	5982-H2	0.00001	0.001	0.869%	YES	0.933%
19	Furan	2	5983-A1	0.00005	0.001	4.86%		0.933%
19	Furan	16	5983-H1	0.00001	0.001	0.889%	YES	0.933%
19	Furan	2	5983-A2	0.00001	0.001	0.886%	YES	0.933%
19	Furan	4	5983-B1	0.00001	0.001	0.880%	YES	0.933%
19	Furan	6	5983-C1	0.00001	0.001	0.906%	YES	0.933%
19	Furan	8	5983-D1	0.00001	0.001	0.882%	YES	0.933%
19	Furan	10	5983-E1	0.00001	0.001	0.895%	YES	0.933%
19	Furan	12	5983-F1	0.00001	0.001	0.895%	YES	0.933%
19	Furan	14	5983-G1	0.00001	0.001	0.880%	YES	0.933%
19	Furan	16	5983-H2	0.00001	0.001	0.900%	YES	0.933%
20	2,3-Dihydrofuran	2	5982-A1	0.00074	0.001	**74.5%**		1.81%
20	2,3-Dihydrofuran	16	5982-H1	0.00002	0.001	1.67%	YES	1.81%
20	2,3-Dihydrofuran	2	5982-A2	0.00002	0.001	1.81%	YES	1.81%
20	2,3-Dihydrofuran	4	5982-B1	0.00002	0.001	1.80%	YES	1.81%
20	2,3-Dihydrofuran	6	5982-C1	0.00002	0.001	1.78%	YES	1.81%
20	2,3-Dihydrofuran	8	5982-D1	0.00002	0.001	1.81%	YES	1.81%
20	2,3-Dihydrofuran	10	5982-E1	0.00002	0.001	1.70%	YES	1.81%
20	2,3-Dihydrofuran	12	5982-F1	0.00002	0.001	1.64%	YES	1.81%
20	2,3-Dihydrofuran	14	5982-G1	0.00002	0.001	1.69%	YES	1.81%
20	2,3-Dihydrofuran	16	5982-H2	0.00002	0.001	1.69%	YES	1.81%
20	2,3-Dihydrofuran	2	5983-A1	0.00002	0.001	1.60%	YES	1.81%
20	2,3-Dihydrofuran	16	5983-H1	0.00070	0.001	**70.0%**		1.81%
20	2,3-Dihydrofuran	2	5983-A2	0.00002	0.001	1.72%	YES	1.81%
20	2,3-Dihydrofuran	4	5983-B1	0.00002	0.001	1.71%	YES	1.81%
20	2,3-Dihydrofuran	6	5983-C1	0.00002	0.001	1.76%	YES	1.81%
20	2,3-Dihydrofuran	8	5983-D1	0.00002	0.001	1.71%	YES	1.81%
20	2,3-Dihydrofuran	10	5983-E1	0.00002	0.001	1.74%	YES	1.81%
20	2,3-Dihydrofuran	12	5983-F1	0.00002	0.001	1.74%	YES	1.81%
20	2,3-Dihydrofuran	14	5983-G1	0.00002	0.001	1.71%	YES	1.81%
20	2,3-Dihydrofuran	16	5983-H2	0.00002	0.001	1.75%	YES	1.81%
21	2,5-Dihydrofuran	2	5982-A1	0.00021	0.001	**20.7%**		2.31%
21	2,5-Dihydrofuran	16	5982-H1	0.00002	0.001	2.14%	YES	2.31%
21	2,5-Dihydrofuran	2	5982-A2	0.00002	0.001	2.31%	YES	2.31%
21	2,5-Dihydrofuran	4	5982-B1	0.00002	0.001	2.30%	YES	2.31%
21	2,5-Dihydrofuran	6	5982-C1	0.00002	0.001	2.28%	YES	2.31%
21	2,5-Dihydrofuran	8	5982-D1	0.00002	0.001	2.31%	YES	2.31%
21	2,5-Dihydrofuran	10	5982-E1	0.00002	0.001	2.17%	YES	2.31%
21	2,5-Dihydrofuran	12	5982-F1	0.00003	0.001	3.09%		2.31%
21	2,5-Dihydrofuran	14	5982-G1	0.00002	0.001	2.17%	YES	2.31%
21	2,5-Dihydrofuran	16	5982-H2	0.00002	0.001	2.16%	YES	2.31%
21	2,5-Dihydrofuran	2	5983-A1	0.00014	0.001	**14.2%**		2.31%
21	2,5-Dihydrofuran	16	5983-H1	0.00016	0.001	**16.3%**		2.31%
21	2,5-Dihydrofuran	2	5983-A2	0.00002	0.001	2.20%	YES	2.31%
21	2,5-Dihydrofuran	4	5983-B1	0.00002	0.001	2.18%	YES	2.31%
21	2,5-Dihydrofuran	6	5983-C1	0.00002	0.001	2.25%	YES	2.31%
21	2,5-Dihydrofuran	8	5983-D1	0.00002	0.001	2.19%	YES	2.31%
21	2,5-Dihydrofuran	10	5983-E1	0.00002	0.001	2.22%	YES	2.31%
21	2,5-Dihydrofuran	12	5983-F1	0.00002	0.001	2.22%	YES	2.31%
21	2,5-Dihydrofuran	14	5983-G1	0.00002	0.001	2.19%	YES	2.31%
21	2,5-Dihydrofuran	16	5983-H2	0.00002	0.001	2.23%	YES	2.31%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
22	2-Methylfuran	2	5982-A1	0.00010	0.001	10.5%		1.98%
22	2-Methylfuran	16	5982-H1	0.00011	0.001	11.1%		1.98%
22	2-Methylfuran	2	5982-A2	0.00002	0.001	1.97%	YES	1.98%
22	2-Methylfuran	4	5982-B1	0.00002	0.001	1.96%	YES	1.98%
22	2-Methylfuran	6	5982-C1	0.00002	0.001	1.95%	YES	1.98%
22	2-Methylfuran	8	5982-D1	0.00002	0.001	1.98%	YES	1.98%
22	2-Methylfuran	10	5982-E1	0.00002	0.001	1.85%	YES	1.98%
22	2-Methylfuran	12	5982-F1	0.00002	0.001	1.79%	YES	1.98%
22	2-Methylfuran	14	5982-G1	0.00002	0.001	1.85%	YES	1.98%
22	2-Methylfuran	16	5982-H2	0.00004	0.001	4.40%		1.98%
22	2-Methylfuran	2	5983-A1	0.00009	0.001	9.12%		1.98%
22	2-Methylfuran	16	5983-H1	0.00012	0.001	12.3%		1.98%
22	2-Methylfuran	2	5983-A2	0.00002	0.001	1.88%	YES	1.98%
22	2-Methylfuran	4	5983-B1	0.00002	0.001	1.86%	YES	1.98%
22	2-Methylfuran	6	5983-C1	0.00002	0.001	1.92%	YES	1.98%
22	2-Methylfuran	8	5983-D1	0.00002	0.001	1.87%	YES	1.98%
22	2-Methylfuran	10	5983-E1	0.00002	0.001	1.90%	YES	1.98%
22	2-Methylfuran	12	5983-F1	0.00002	0.001	1.90%	YES	1.98%
22	2-Methylfuran	14	5983-G1	0.00002	0.001	1.87%	YES	1.98%
22	2-Methylfuran	16	5983-H2	0.00002	0.001	1.91%	YES	1.98%
23	2,5-Dimethylfuran	2	5982-A1	0.00003	0.001	2.95%	YES	3.16%
23	2,5-Dimethylfuran	16	5982-H1	0.00003	0.001	2.91%	YES	3.16%
23	2,5-Dimethylfuran	2	5982-A2	0.00003	0.001	3.14%	YES	3.16%
23	2,5-Dimethylfuran	4	5982-B1	0.00003	0.001	3.13%	YES	3.16%
23	2,5-Dimethylfuran	6	5982-C1	0.00003	0.001	3.11%	YES	3.16%
23	2,5-Dimethylfuran	8	5982-D1	0.00003	0.001	3.16%	YES	3.16%
23	2,5-Dimethylfuran	10	5982-E1	0.00003	0.001	2.96%	YES	3.16%
23	2,5-Dimethylfuran	12	5982-F1	0.00003	0.001	2.85%	YES	3.16%
23	2,5-Dimethylfuran	14	5982-G1	0.00003	0.001	2.95%	YES	3.16%
23	2,5-Dimethylfuran	16	5982-H2	0.00003	0.001	2.94%	YES	3.16%
23	2,5-Dimethylfuran	2	5983-A1	0.00003	0.001	2.79%	YES	3.16%
23	2,5-Dimethylfuran	16	5983-H1	0.00003	0.001	3.01%	YES	3.16%
23	2,5-Dimethylfuran	2	5983-A2	0.00003	0.001	3.00%	YES	3.16%
23	2,5-Dimethylfuran	4	5983-B1	0.00003	0.001	2.98%	YES	3.16%
23	2,5-Dimethylfuran	6	5983-C1	0.00003	0.001	3.07%	YES	3.16%
23	2,5-Dimethylfuran	8	5983-D1	0.00003	0.001	2.98%	YES	3.16%
23	2,5-Dimethylfuran	10	5983-E1	0.00003	0.001	3.03%	YES	3.16%
23	2,5-Dimethylfuran	12	5983-F1	0.00003	0.001	3.03%	YES	3.16%
23	2,5-Dimethylfuran	14	5983-G1	0.00003	0.001	2.98%	YES	3.16%
23	2,5-Dimethylfuran	16	5983-H2	0.00003	0.001	3.04%	YES	3.16%
27	2-Pentylfuran	2	5982-A1	0.00002	0.001	1.63%	YES	1.74%
27	2-Pentylfuran	16	5982-H1	0.00002	0.001	1.62%	YES	1.74%
27	2-Pentylfuran	2	5982-A2	0.00002	0.001	1.73%	YES	1.74%
27	2-Pentylfuran	4	5982-B1	0.00002	0.001	2.48%		1.74%
27	2-Pentylfuran	6	5982-C1	0.00002	0.001	2.21%		1.74%
27	2-Pentylfuran	8	5982-D1	0.00002	0.001	1.74%	YES	1.74%
27	2-Pentylfuran	10	5982-E1	0.00002	0.001	2.06%		1.74%
27	2-Pentylfuran	12	5982-F1	0.00002	0.001	1.57%	YES	1.74%
27	2-Pentylfuran	14	5982-G1	0.00002	0.001	1.62%	YES	1.74%
27	2-Pentylfuran	16	5982-H2	0.00002	0.001	1.65%		1.74%
27	2-Pentylfuran	2	5983-A1	0.00004	0.001	3.57%		1.74%
27	2-Pentylfuran	16	5983-H1	0.00002	0.001	1.67%	YES	1.74%
27	2-Pentylfuran	2	5983-A2	0.00002	0.001	1.65%	YES	1.74%
27	2-Pentylfuran	4	5983-B1	0.00002	0.001	2.21%		1.74%
27	2-Pentylfuran	6	5983-C1	0.00002	0.001	1.98%		1.74%
27	2-Pentylfuran	8	5983-D1	0.00002	0.001	2.41%		1.74%
27	2-Pentylfuran	10	5983-E1	0.00002	0.001	1.66%	YES	1.74%
27	2-Pentylfuran	12	5983-F1	0.00002	0.001	1.67%	YES	1.74%
27	2-Pentylfuran	14	5983-G1	0.00002	0.001	1.69%		1.74%
27	2-Pentylfuran	16	5983-H2	0.00002	0.001	1.66%	YES	1.74%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
28	2-Heptylfuran	2	5982-A1	0.00002	0.001	1.87%		1.15%
28	2-Heptylfuran	16	5982-H1	0.00001	0.001	1.07%	YES	1.15%
28	2-Heptylfuran	2	5982-A2	0.00001	0.001	1.14%	YES	1.15%
28	2-Heptylfuran	4	5982-B1	0.00001	0.001	1.14%	YES	1.15%
28	2-Heptylfuran	6	5982-C1	0.00001	0.001	1.13%	YES	1.15%
28	2-Heptylfuran	8	5982-D1	0.00001	0.001	1.15%	YES	1.15%
28	2-Heptylfuran	10	5982-E1	0.00001	0.001	1.07%	YES	1.15%
28	2-Heptylfuran	12	5982-F1	0.00001	0.001	1.04%	YES	1.15%
28	2-Heptylfuran	14	5982-G1	0.00001	0.001	1.35%		1.15%
28	2-Heptylfuran	16	5982-H2	0.00001	0.001	1.06%	YES	1.15%
28	2-Heptylfuran	2	5983-A1	0.00005	0.001	4.51%		1.15%
28	2-Heptylfuran	16	5983-H1	0.00001	0.001	1.10%	YES	1.15%
28	2-Heptylfuran	2	5983-A2	0.00001	0.001	1.09%	YES	1.15%
28	2-Heptylfuran	4	5983-B1	0.00001	0.001	1.08%	YES	1.15%
28	2-Heptylfuran	6	5983-C1	0.00001	0.001	1.11%	YES	1.15%
28	2-Heptylfuran	8	5983-D1	0.00001	0.001	1.08%	YES	1.15%
28	2-Heptylfuran	10	5983-E1	0.00001	0.001	1.10%	YES	1.15%
28	2-Heptylfuran	12	5983-F1	0.00001	0.001	1.10%	YES	1.15%
28	2-Heptylfuran	14	5983-G1	0.00001	0.001	1.32%		1.15%
28	2-Heptylfuran	16	5983-H2	0.00001	0.001	1.10%	YES	1.15%
29	2-Propylfuran	2	5982-A1	0.00003	0.001	2.64%	YES	2.82%
29	2-Propylfuran	16	5982-H1	0.00003	0.001	2.62%	YES	2.82%
29	2-Propylfuran	2	5982-A2	0.00003	0.001	2.81%	YES	2.82%
29	2-Propylfuran	4	5982-B1	0.00003	0.001	2.80%	YES	2.82%
29	2-Propylfuran	6	5982-C1	0.00003	0.001	2.77%	YES	2.82%
29	2-Propylfuran	8	5982-D1	0.00003	0.001	2.82%	YES	2.82%
29	2-Propylfuran	10	5982-E1	0.00003	0.001	2.64%	YES	2.82%
29	2-Propylfuran	12	5982-F1	0.00003	0.001	2.55%	YES	2.82%
29	2-Propylfuran	14	5982-G1	0.00003	0.001	2.64%	YES	2.82%
29	2-Propylfuran	16	5982-H2	0.00003	0.001	2.60%	YES	2.82%
29	2-Propylfuran	2	5983-A1	0.00002	0.001	2.49%	YES	2.82%
29	2-Propylfuran	16	5983-H1	0.00011	0.001	11.1%		2.82%
29	2-Propylfuran	2	5983-A2	0.00003	0.001	2.68%	YES	2.82%
29	2-Propylfuran	4	5983-B1	0.00003	0.001	2.66%	YES	2.82%
29	2-Propylfuran	6	5983-C1	0.00003	0.001	2.74%	YES	2.82%
29	2-Propylfuran	8	5983-D1	0.00003	0.001	2.66%	YES	2.82%
29	2-Propylfuran	10	5983-E1	0.00003	0.001	2.70%	YES	2.82%
29	2-Propylfuran	12	5983-F1	0.00003	0.001	2.70%	YES	2.82%
29	2-Propylfuran	14	5983-G1	0.00003	0.001	2.66%	YES	2.82%
29	2-Propylfuran	16	5983-H2	0.00003	0.001	2.70%	YES	2.82%
33	Diethylphthalate	2	5982-A1	0.00009	0.55	0.017%	YES	0.017%
33	Diethylphthalate	16	5982-H1	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	2	5982-A2	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	4	5982-B1	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	6	5982-C1	0.00009	0.55	0.016%	YES	0.017%
33	Diethylphthalate	8	5982-D1	0.00009	0.55	0.017%	YES	0.017%
33	Diethylphthalate	10	5982-E1	0.00009	0.55	0.015%	YES	0.017%
33	Diethylphthalate	12	5982-F1	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	16	5982-H2	0.00008	0.55	0.015%	YES	0.017%
33	Diethylphthalate	2	5983-A1	0.00021	0.55	0.039%	YES	0.041%
33	Diethylphthalate	16	5983-H1	0.00021	0.55	0.039%	YES	0.041%
33	Diethylphthalate	2	5983-A2	0.00020	0.55	0.036%	YES	0.041%
33	Diethylphthalate	4	5983-B1	0.00021	0.55	0.038%	YES	0.041%
33	Diethylphthalate	6	5983-C1	0.00021	0.55	0.038%	YES	0.041%
33	Diethylphthalate	8	5983-D1	0.00022	0.55	0.040%	YES	0.041%
33	Diethylphthalate	10	5983-E1	0.00022	0.55	0.041%	YES	0.041%
33	Diethylphthalate	12	5983-F1	0.00022	0.55	0.040%	YES	0.041%
33	Diethylphthalate	14	5983-G1	0.00022	0.55	0.040%	YES	0.041%
33	Diethylphthalate	16	5983-H2	0.00021	0.55	0.039%	YES	0.041%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
34	Acetonitrile	2	5982-A1	0.085	20	0.424%		0.001%
34	Acetonitrile	16	5982-H1	0.14	20	0.695%		0.001%
34	Acetonitrile	2	5982-A2	0.021	20	0.105%		0.001%
34	Acetonitrile	4	5982-B1	0.46	20	2.29%		0.001%
34	Acetonitrile	6	5982-C1	0.076	20	0.380%		0.001%
34	Acetonitrile	8	5982-D1	0.12	20	0.587%		0.001%
34	Acetonitrile	10	5982-E1	0.091	20	0.454%		0.001%
34	Acetonitrile	14	5982-G1	0.18	20	0.885%		0.001%
34	Acetonitrile	16	5982-H2	0.23	20	1.13%		0.001%
34	Acetonitrile	2	5983-A1	0.15	20	0.767%		0.001%
34	Acetonitrile	16	5983-H1	0.10	20	0.502%		0.001%
34	Acetonitrile	2	5983-A2	0.050	20	0.252%		0.001%
34	Acetonitrile	4	5983-B1	1.9	20	9.45%		0.001%
34	Acetonitrile	6	5983-C1	0.18	20	0.922%		0.001%
34	Acetonitrile	8	5983-D1	0.18	20	0.893%		0.001%
34	Acetonitrile	10	5983-E1	0.29	20	1.43%		0.001%
34	Acetonitrile	12	5983-F1	0.56	20	2.78%		0.001%
34	Acetonitrile	14	5983-G1	0.15	20	0.767%		0.001%
34	Acetonitrile	16	5983-H2	0.15	20	0.755%		0.001%
35	Propanenitrile	2	5982-A1	0.018	6.0	0.306%		0.003%
35	Propanenitrile	16	5982-H1	0.023	6.0	0.386%		0.003%
35	Propanenitrile	2	5982-A2	0.00018	6.0	0.003%	YES	0.003%
35	Propanenitrile	4	5982-B1	0.00018	6.0	0.003%	YES	0.003%
35	Propanenitrile	6	5982-C1	0.00034	6.0	0.006%		0.003%
35	Propanenitrile	8	5982-D1	0.00167	6.0	0.028%		0.003%
35	Propanenitrile	10	5982-E1	0.00501	6.0	0.084%		0.003%
35	Propanenitrile	14	5982-G1	0.032	6.0	0.540%		0.003%
35	Propanenitrile	16	5982-H2	0.054	6.0	0.899%		0.003%
35	Propanenitrile	2	5983-A1	0.018	6.0	0.308%		0.003%
35	Propanenitrile	16	5983-H1	0.017	6.0	0.286%		0.003%
35	Propanenitrile	2	5983-A2	0.00038	6.0	0.006%		0.003%
35	Propanenitrile	4	5983-B1	0.00049	6.0	0.008%		0.003%
35	Propanenitrile	6	5983-C1	0.00029	6.0	0.005%		0.003%
35	Propanenitrile	8	5983-D1	0.00080	6.0	0.013%		0.003%
35	Propanenitrile	10	5983-E1	0.00264	6.0	0.044%		0.003%
35	Propanenitrile	12	5983-F1	0.00628	6.0	0.105%		0.003%
35	Propanenitrile	14	5983-G1	0.013	6.0	0.223%		0.003%
35	Propanenitrile	16	5983-H2	0.038	6.0	0.633%		0.003%
36	Butanenitrile	2	5982-A1	0.010	8.0	0.126%		0.003%
36	Butanenitrile	16	5982-H1	0.018	8.0	0.231%		0.003%
36	Butanenitrile	2	5982-A2	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	4	5982-B1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	6	5982-C1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	8	5982-D1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	10	5982-E1	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	14	5982-G1	0.00020	8.0	0.003%	YES	0.003%
36	Butanenitrile	16	5982-H2	0.00032	8.0	0.004%		0.003%
36	Butanenitrile	2	5983-A1	0.014	8.0	0.172%		0.003%
36	Butanenitrile	16	5983-H1	0.011	8.0	0.135%		0.003%
36	Butanenitrile	2	5983-A2	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	4	5983-B1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	6	5983-C1	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	8	5983-D1	0.00013	8.0	0.002%	YES	0.003%
36	Butanenitrile	10	5983-E1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	12	5983-F1	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	14	5983-G1	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	16	5983-H2	0.00014	8.0	0.002%	YES	0.003%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
37	Pentanenitrile	2	5982-A1	0.00335	6.0	0.056%		0.003%
37	Pentanenitrile	16	5982-H1	0.011	6.0	0.188%		0.003%
37	Pentanenitrile	2	5982-A2	0.00014	6.0	0.002%	YES	0.003%
37	Pentanenitrile	4	5982-B1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	6	5982-C1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	8	5982-D1	0.00014	6.0	0.002%	YES	0.003%
37	Pentanenitrile	10	5982-E1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	14	5982-G1	0.00048	6.0	0.008%		0.003%
37	Pentanenitrile	16	5982-H2	0.00021	6.0	0.003%	YES	0.003%
37	Pentanenitrile	2	5983-A1	0.00635	6.0	0.106%		0.003%
37	Pentanenitrile	16	5983-H1	0.00496	6.0	0.083%		0.003%
37	Pentanenitrile	2	5983-A2	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	4	5983-B1	0.00014	6.0	0.002%	YES	0.003%
37	Pentanenitrile	6	5983-C1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	8	5983-D1	0.00014	6.0	0.002%	YES	0.003%
37	Pentanenitrile	10	5983-E1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	12	5983-F1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	14	5983-G1	0.00013	6.0	0.002%	YES	0.003%
37	Pentanenitrile	16	5983-H2	0.00015	6.0	0.003%	YES	0.003%
38	Hexanenitrile	2	5982-A1	0.00221	6.0	0.037%		0.003%
38	Hexanenitrile	16	5982-H1	0.00159	6.0	0.026%		0.003%
38	Hexanenitrile	2	5982-A2	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	4	5982-B1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	6	5982-C1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	8	5982-D1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	10	5982-E1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	14	5982-G1	0.00018	6.0	0.003%	YES	0.003%
38	Hexanenitrile	16	5982-H2	0.00018	6.0	0.003%	YES	0.003%
38	Hexanenitrile	2	5983-A1	0.00275	6.0	0.046%		0.003%
38	Hexanenitrile	16	5983-H1	0.00188	6.0	0.031%		0.003%
38	Hexanenitrile	2	5983-A2	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	4	5983-B1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	6	5983-C1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	8	5983-D1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	10	5983-E1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	12	5983-F1	0.00011	6.0	0.002%	YES	0.003%
38	Hexanenitrile	14	5983-G1	0.00010	6.0	0.002%	YES	0.003%
38	Hexanenitrile	16	5983-H2	0.00012	6.0	0.002%	YES	0.003%
42	Ethylamine	2	5982-A1	0.18	5.0	3.63%		0.103%
42	Ethylamine	16	5982-H1	0.020	5.0	0.403%		0.103%
42	Ethylamine	2	5982-A2	0.00459	5.0	0.092%	YES	0.103%
42	Ethylamine	4	5982-B1	0.00501	5.0	0.100%	YES	0.103%
42	Ethylamine	6	5982-C1	0.00494	5.0	0.099%	YES	0.103%
42	Ethylamine	8	5982-D1	0.00515	5.0	0.103%	YES	0.103%
42	Ethylamine	10	5982-E1	0.00479	5.0	0.096%	YES	0.103%
42	Ethylamine	12	5982-F1	0.00460	5.0	0.092%	YES	0.103%
42	Ethylamine	14	5982-G1	0.00464	5.0	0.093%	YES	0.103%
42	Ethylamine	16	5982-H2	0.00473	5.0	0.095%	YES	0.103%
42	Ethylamine	2	5983-A1	0.021	5.0	0.421%		0.103%
42	Ethylamine	16	5983-H1	0.014	5.0	0.286%		0.103%
42	Ethylamine	2	5983-A2	0.00420	5.0	0.084%	YES	0.103%
42	Ethylamine	4	5983-B1	0.00474	5.0	0.095%	YES	0.103%
42	Ethylamine	6	5983-C1	0.00479	5.0	0.096%	YES	0.103%
42	Ethylamine	8	5983-D1	0.00474	5.0	0.095%	YES	0.103%
42	Ethylamine	10	5983-E1	0.00488	5.0	0.098%	YES	0.103%
42	Ethylamine	12	5983-F1	0.00487	5.0	0.097%	YES	0.103%
42	Ethylamine	14	5983-G1	0.00480	5.0	0.096%	YES	0.103%
42	Ethylamine	16	5983-H2	0.00487	5.0	0.097%	YES	0.103%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
43	N-Nitrosodimethylamine	2	5982-A1	0.00040	0.0003	134%		11.7%
43	N-Nitrosodimethylamine	16	5982-H1	0.00009	0.0003	29.3%		11.7%
43	N-Nitrosodimethylamine	2	5982-A2	0.00003	0.0003	11.4%	YES	11.7%
43	N-Nitrosodimethylamine	4	5982-B1	0.00004	0.0003	11.7%	YES	11.7%
43	N-Nitrosodimethylamine	6	5982-C1	0.00003	0.0003	11.6%	YES	11.7%
43	N-Nitrosodimethylamine	8	5982-D1	0.00004	0.0003	11.7%	YES	11.7%
43	N-Nitrosodimethylamine	10	5982-E1	0.00003	0.0003	11.3%	YES	11.7%
43	N-Nitrosodimethylamine	12	5982-F1	0.00003	0.0003	10.9%	YES	11.7%
43	N-Nitrosodimethylamine	14	5982-G1	0.00003	0.0003	11.2%	YES	11.7%
43	N-Nitrosodimethylamine	16	5982-H2	0.00003	0.0003	11.2%	YES	11.7%
43	N-Nitrosodimethylamine	2	5983-A1	0.00018	0.0003	60.6%		11.7%
43	N-Nitrosodimethylamine	16	5983-H1	0.00028	0.0003	94.0%		11.7%
43	N-Nitrosodimethylamine	2	5983-A2	0.00003	0.0003	11.4%	YES	11.7%
43	N-Nitrosodimethylamine	4	5983-B1	0.00004	0.0003	11.7%	YES	11.7%
43	N-Nitrosodimethylamine	6	5983-C1	0.00004	0.0003	11.7%	YES	11.7%
43	N-Nitrosodimethylamine	8	5983-D1	0.00003	0.0003	11.3%	YES	11.7%
43	N-Nitrosodimethylamine	10	5983-E1	0.00003	0.0003	11.4%	YES	11.7%
43	N-Nitrosodimethylamine	12	5983-F1	0.00003	0.0003	11.3%	YES	11.7%
43	N-Nitrosodimethylamine	14	5983-G1	0.00003	0.0003	11.2%	YES	11.7%
43	N-Nitrosodimethylamine	16	5983-H2	0.00003	0.0003	11.3%	YES	11.7%
44	N-Nitrosodiethylamine	2	5982-A1	0.00003	0.0001	26.5%		24.4%
44	N-Nitrosodiethylamine	16	5982-H1	0.00002	0.0001	23.3%	YES	24.4%
44	N-Nitrosodiethylamine	2	5982-A2	0.00002	0.0001	23.7%	YES	24.4%
44	N-Nitrosodiethylamine	4	5982-B1	0.00002	0.0001	24.4%	YES	24.4%
44	N-Nitrosodiethylamine	6	5982-C1	0.00002	0.0001	24.2%	YES	24.4%
44	N-Nitrosodiethylamine	8	5982-D1	0.00002	0.0001	24.3%	YES	24.4%
44	N-Nitrosodiethylamine	10	5982-E1	0.00002	0.0001	23.5%	YES	24.4%
44	N-Nitrosodiethylamine	12	5982-F1	0.00002	0.0001	22.7%	YES	24.4%
44	N-Nitrosodiethylamine	14	5982-G1	0.00002	0.0001	23.4%	YES	24.4%
44	N-Nitrosodiethylamine	16	5982-H2	0.00002	0.0001	23.3%	YES	24.4%
44	N-Nitrosodiethylamine	2	5983-A1	0.00003	0.0001	34.5%		24.4%
44	N-Nitrosodiethylamine	16	5983-H1	0.00002	0.0001	23.4%	YES	24.4%
44	N-Nitrosodiethylamine	2	5983-A2	0.00002	0.0001	23.7%	YES	24.4%
44	N-Nitrosodiethylamine	4	5983-B1	0.00002	0.0001	24.4%	YES	24.4%
44	N-Nitrosodiethylamine	6	5983-C1	0.00002	0.0001	24.4%	YES	24.4%
44	N-Nitrosodiethylamine	8	5983-D1	0.00002	0.0001	23.6%	YES	24.4%
44	N-Nitrosodiethylamine	10	5983-E1	0.00002	0.0001	23.7%	YES	24.4%
44	N-Nitrosodiethylamine	12	5983-F1	0.00002	0.0001	23.6%	YES	24.4%
44	N-Nitrosodiethylamine	14	5983-G1	0.00002	0.0001	23.2%	YES	24.4%
44	N-Nitrosodiethylamine	16	5983-H2	0.00002	0.0001	23.5%	YES	24.4%
45	N-Nitrosomethylethylamine	2	5982-A1	0.00040	0.0003	132%		9.85%
45	N-Nitrosomethylethylamine	16	5982-H1	0.00003	0.0003	10.2%		9.85%
45	N-Nitrosomethylethylamine	2	5982-A2	0.00003	0.0003	9.56%	YES	9.85%
45	N-Nitrosomethylethylamine	4	5982-B1	0.00003	0.0003	9.85%	YES	9.85%
45	N-Nitrosomethylethylamine	6	5982-C1	0.00003	0.0003	9.77%	YES	9.85%
45	N-Nitrosomethylethylamine	8	5982-D1	0.00003	0.0003	9.82%	YES	9.85%
45	N-Nitrosomethylethylamine	10	5982-E1	0.00003	0.0003	9.47%	YES	9.85%
45	N-Nitrosomethylethylamine	12	5982-F1	0.00003	0.0003	9.15%	YES	9.85%
45	N-Nitrosomethylethylamine	14	5982-G1	0.00003	0.0003	9.45%	YES	9.85%
45	N-Nitrosomethylethylamine	16	5982-H2	0.00003	0.0003	9.42%	YES	9.85%
45	N-Nitrosomethylethylamine	2	5983-A1	0.00030	0.0003	101%		9.85%
45	N-Nitrosomethylethylamine	16	5983-H1	0.00005	0.0003	17.7%		9.85%
45	N-Nitrosomethylethylamine	2	5983-A2	0.00003	0.0003	9.59%	YES	9.85%
45	N-Nitrosomethylethylamine	4	5983-B1	0.00003	0.0003	9.85%	YES	9.85%
45	N-Nitrosomethylethylamine	6	5983-C1	0.00003	0.0003	9.85%	YES	9.85%
45	N-Nitrosomethylethylamine	8	5983-D1	0.00003	0.0003	9.52%	YES	9.85%
45	N-Nitrosomethylethylamine	10	5983-E1	0.00003	0.0003	9.56%	YES	9.85%
45	N-Nitrosomethylethylamine	12	5983-F1	0.00003	0.0003	9.54%	YES	9.85%
45	N-Nitrosomethylethylamine	14	5983-G1	0.00003	0.0003	9.38%	YES	9.85%
45	N-Nitrosomethylethylamine	16	5983-H2	0.00003	0.0003	9.50%	YES	9.85%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
46	N-Nitrosomorpholine	2	5982-A1	0.00011	0.0006	18.3%		3.58%
46	N-Nitrosomorpholine	16	5982-H1	0.00002	0.0006	3.42%		3.58%
46	N-Nitrosomorpholine	2	5982-A2	0.00002	0.0006	3.47%	YES	3.58%
46	N-Nitrosomorpholine	4	5982-B1	0.00002	0.0006	3.58%	YES	3.58%
46	N-Nitrosomorpholine	6	5982-C1	0.00002	0.0006	3.54%	YES	3.58%
46	N-Nitrosomorpholine	8	5982-D1	0.00002	0.0006	3.56%	YES	3.58%
46	N-Nitrosomorpholine	10	5982-E1	0.00002	0.0006	3.44%	YES	3.58%
46	N-Nitrosomorpholine	12	5982-F1	0.00002	0.0006	3.32%	YES	3.58%
46	N-Nitrosomorpholine	14	5982-G1	0.00002	0.0006	3.43%	YES	3.58%
46	N-Nitrosomorpholine	16	5982-H2	0.00002	0.0006	3.42%	YES	3.58%
46	N-Nitrosomorpholine	2	5983-A1	0.00005	0.0006	8.74%		3.58%
46	N-Nitrosomorpholine	16	5983-H1	0.00004	0.0006	6.25%		3.58%
46	N-Nitrosomorpholine	2	5983-A2	0.00002	0.0006	3.48%	YES	3.58%
46	N-Nitrosomorpholine	4	5983-B1	0.00002	0.0006	3.58%	YES	3.58%
46	N-Nitrosomorpholine	6	5983-C1	0.00002	0.0006	3.58%	YES	3.58%
46	N-Nitrosomorpholine	8	5983-D1	0.00002	0.0006	3.46%	YES	3.58%
46	N-Nitrosomorpholine	10	5983-E1	0.00002	0.0006	3.47%	YES	3.58%
46	N-Nitrosomorpholine	12	5983-F1	0.00002	0.0006	3.46%	YES	3.58%
46	N-Nitrosomorpholine	14	5983-G1	0.00002	0.0006	3.41%	YES	3.58%
46	N-Nitrosomorpholine	16	5983-H2	0.00002	0.0006	3.45%	YES	3.58%
47	Tributyl phosphate	2	5982-A1	0.00016	0.20	0.081%	YES	0.084%
47	Tributyl phosphate	16	5982-H1	0.00014	0.20	0.072%	YES	0.084%
47	Tributyl phosphate	2	5982-A2	0.00015	0.20	0.073%	YES	0.084%
47	Tributyl phosphate	4	5982-B1	0.00015	0.20	0.075%	YES	0.084%
47	Tributyl phosphate	6	5982-C1	0.00016	0.20	0.080%	YES	0.084%
47	Tributyl phosphate	8	5982-D1	0.00017	0.20	0.084%	YES	0.084%
47	Tributyl phosphate	10	5982-E1	0.00015	0.20	0.076%	YES	0.084%
47	Tributyl phosphate	12	5982-F1	0.00015	0.20	0.073%	YES	0.084%
47	Tributyl phosphate	16	5982-H2	0.00015	0.20	0.076%	YES	0.084%
47	Tributyl phosphate	2	5983-A1	0.00014	0.20	0.071%	YES	0.084%
47	Tributyl phosphate	16	5983-H1	0.00014	0.20	0.071%	YES	0.084%
47	Tributyl phosphate	2	5983-A2	0.00013	0.20	0.067%	YES	0.084%
47	Tributyl phosphate	4	5983-B1	0.00014	0.20	0.069%	YES	0.084%
47	Tributyl phosphate	6	5983-C1	0.00014	0.20	0.070%	YES	0.084%
47	Tributyl phosphate	8	5983-D1	0.00015	0.20	0.074%	YES	0.084%
47	Tributyl phosphate	10	5983-E1	0.00015	0.20	0.074%	YES	0.084%
47	Tributyl phosphate	12	5983-F1	0.00015	0.20	0.073%	YES	0.084%
47	Tributyl phosphate	14	5983-G1	0.00015	0.20	0.073%	YES	0.084%
47	Tributyl phosphate	16	5983-H2	0.00014	0.20	0.071%	YES	0.084%
48	Dibutyl butylphosphonate	2	5982-A1	0.00008	0.007	1.20%	YES	1.46%
48	Dibutyl butylphosphonate	16	5982-H1	0.00007	0.007	1.05%	YES	1.46%
48	Dibutyl butylphosphonate	2	5982-A2	0.00008	0.007	1.07%	YES	1.46%
48	Dibutyl butylphosphonate	4	5982-B1	0.00008	0.007	1.10%	YES	1.46%
48	Dibutyl butylphosphonate	6	5982-C1	0.00008	0.007	1.17%	YES	1.46%
48	Dibutyl butylphosphonate	8	5982-D1	0.00009	0.007	1.24%	YES	1.46%
48	Dibutyl butylphosphonate	10	5982-E1	0.00008	0.007	1.12%	YES	1.46%
48	Dibutyl butylphosphonate	12	5982-F1	0.00008	0.007	1.08%	YES	1.46%
48	Dibutyl butylphosphonate	16	5982-H2	0.00008	0.007	1.11%	YES	1.46%
48	Dibutyl butylphosphonate	2	5983-A1	0.00010	0.007	1.39%	YES	1.46%
48	Dibutyl butylphosphonate	16	5983-H1	0.00010	0.007	1.40%	YES	1.46%
48	Dibutyl butylphosphonate	2	5983-A2	0.00009	0.007	1.30%	YES	1.46%
48	Dibutyl butylphosphonate	4	5983-B1	0.00009	0.007	1.35%	YES	1.46%
48	Dibutyl butylphosphonate	6	5983-C1	0.00010	0.007	1.36%	YES	1.46%
48	Dibutyl butylphosphonate	8	5983-D1	0.00010	0.007	1.45%	YES	1.46%
48	Dibutyl butylphosphonate	10	5983-E1	0.00010	0.007	1.46%	YES	1.46%
48	Dibutyl butylphosphonate	12	5983-F1	0.00010	0.007	1.43%	YES	1.46%
48	Dibutyl butylphosphonate	14	5983-G1	0.00010	0.007	1.43%	YES	1.46%
48	Dibutyl butylphosphonate	16	5983-H2	0.00010	0.007	1.40%	YES	1.46%

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
51	Pyridine	2	5982-A1	0.00256	1.0	0.256%		0.15%
51	Pyridine	16	5982-H1	0.00277	1.0	0.277%		0.15%
51	Pyridine	2	5982-A2	0.00141	1.0	0.141%	YES	0.15%
51	Pyridine	4	5982-B1	0.00140	1.0	0.140%	YES	0.15%
51	Pyridine	6	5982-C1	0.00139	1.0	0.139%	YES	0.15%
51	Pyridine	8	5982-D1	0.00142	1.0	0.142%	YES	0.15%
51	Pyridine	10	5982-E1	0.00137	1.0	0.137%	YES	0.15%
51	Pyridine	12	5982-F1	0.00135	1.0	0.135%	YES	0.15%
51	Pyridine	14	5982-G1	0.00140	1.0	0.140%	YES	0.15%
51	Pyridine	16	5982-H2	0.00141	1.0	0.141%	YES	0.15%
51	Pyridine	2	5983-A1	0.00195	1.0	0.195%		0.15%
51	Pyridine	16	5983-H1	0.00200	1.0	0.200%		0.15%
51	Pyridine	2	5983-A2	0.00141	1.0	0.141%	YES	0.15%
51	Pyridine	4	5983-B1	0.00133	1.0	0.133%	YES	0.15%
51	Pyridine	6	5983-C1	0.00148	1.0	0.148%	YES	0.15%
51	Pyridine	8	5983-D1	0.00145	1.0	0.145%	YES	0.15%
51	Pyridine	10	5983-E1	0.00146	1.0	0.146%	YES	0.15%
51	Pyridine	12	5983-F1	0.00146	1.0	0.146%	YES	0.15%
51	Pyridine	14	5983-G1	0.00144	1.0	0.144%	YES	0.15%
51	Pyridine	16	5983-H2	0.00141	1.0	0.141%	YES	0.15%
52	2,4-Dimethylpyridine	2	5982-A1	0.00270	0.50	0.540%		0.22%
52	2,4-Dimethylpyridine	16	5982-H1	0.00266	0.50	0.532%		0.22%
52	2,4-Dimethylpyridine	2	5982-A2	0.00104	0.50	0.208%	YES	0.22%
52	2,4-Dimethylpyridine	4	5982-B1	0.00104	0.50	0.207%	YES	0.22%
52	2,4-Dimethylpyridine	6	5982-C1	0.00103	0.50	0.206%	YES	0.22%
52	2,4-Dimethylpyridine	8	5982-D1	0.00105	0.50	0.210%	YES	0.22%
52	2,4-Dimethylpyridine	10	5982-E1	0.00101	0.50	0.203%	YES	0.22%
52	2,4-Dimethylpyridine	12	5982-F1	0.00099	0.50	0.199%	YES	0.22%
52	2,4-Dimethylpyridine	14	5982-G1	0.00104	0.50	0.207%	YES	0.22%
52	2,4-Dimethylpyridine	16	5982-H2	0.00104	0.50	0.209%	YES	0.22%
52	2,4-Dimethylpyridine	2	5983-A1	0.00217	0.50	0.434%		0.22%
52	2,4-Dimethylpyridine	16	5983-H1	0.00235	0.50	0.470%		0.22%
52	2,4-Dimethylpyridine	2	5983-A2	0.00104	0.50	0.208%	YES	0.22%
52	2,4-Dimethylpyridine	4	5983-B1	0.00098	0.50	0.196%	YES	0.22%
52	2,4-Dimethylpyridine	6	5983-C1	0.00109	0.50	0.218%	YES	0.22%
52	2,4-Dimethylpyridine	8	5983-D1	0.00107	0.50	0.214%	YES	0.22%
52	2,4-Dimethylpyridine	10	5983-E1	0.00107	0.50	0.215%	YES	0.22%
52	2,4-Dimethylpyridine	12	5983-F1	0.00108	0.50	0.216%	YES	0.22%
52	2,4-Dimethylpyridine	14	5983-G1	0.00107	0.50	0.213%	YES	0.22%
52	2,4-Dimethylpyridine	16	5983-H2	0.00104	0.50	0.208%	YES	0.22%

Appendix E

Plots of Other COPCs with Significant (2–10% of the OEL) Detected Values

Appendix E

Plots of Other COPCs with Significant (2-10% of the OEL) Detected Values

1-Butanol *(see Figure E.1)* **–** The detection limit (DL) for 1-butanol corresponds to approximately 0.005% of the OEL. All four respirator inlet measurements were above the DL for 1-butanol but were less than 10% of its OEL. The final inlet measurement for SCOTT 7422-SC1 had the highest measured value at 5.0% of the OEL. The outlet concentrations for both cartridges were at or near the DL, with only three measurements for SCOTT 7422-SD1 reaching up to 0.008% of the OEL, indicating no evidence of breakthrough.

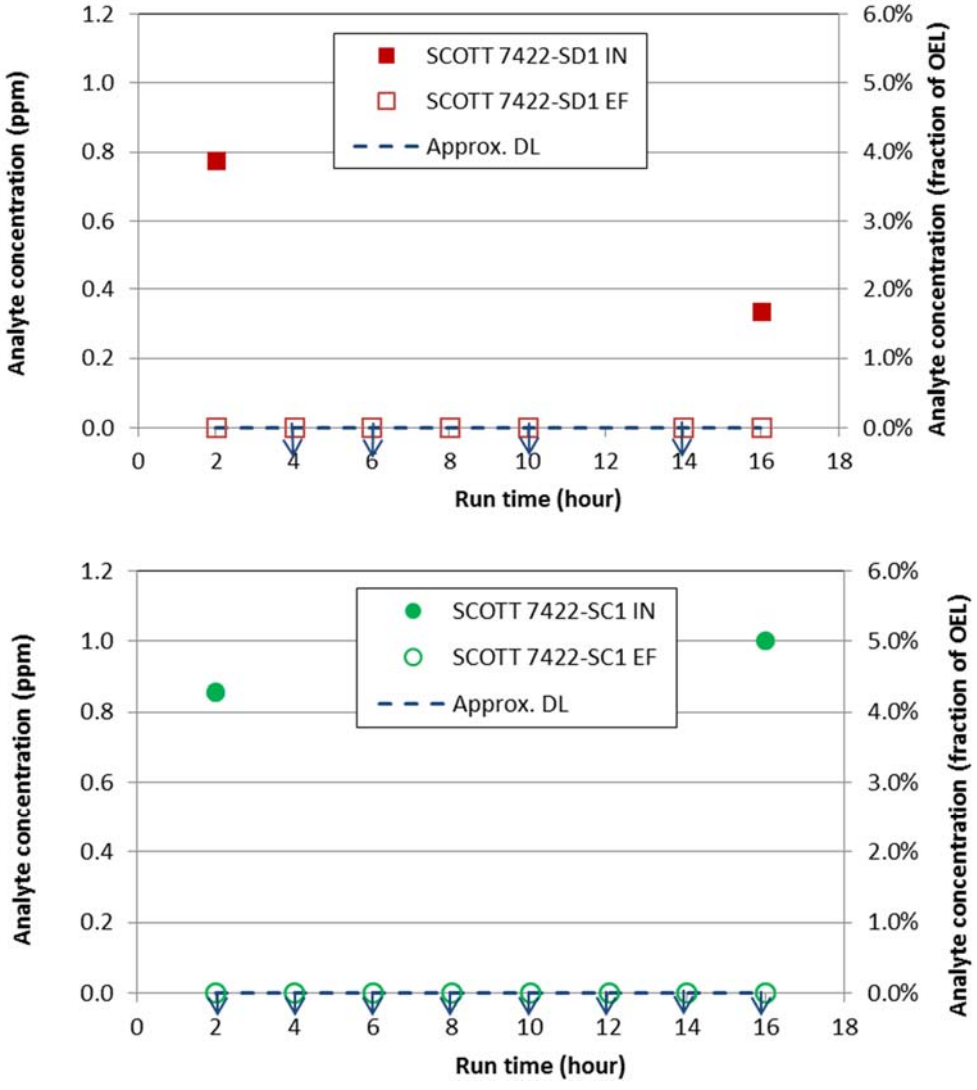

Figure E.1. Plot of Measured 1-Butanol Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

Formaldehyde *(see Figure E.2)* – The DL for formaldehyde corresponds to approximately 0.63% of its OEL. All inlet and outlet values measured for both respirator cartridges were less than 10% of the OEL for formaldehyde—specifically less than 8.6%. The first inlet values for both respirator cartridges were the highest of all of the measurements (8.56% and 6.0% of the OEL, respectively). Inlet measurements were lower at the end of each campaign (2.66% and 3.94% of the OEL, respectively). All outlet measurements were at or slightly above the DL, with only four measurements for SCOTT 7422-SC1 reaching up to 0.85% of the OEL. No evidence of breakthrough was observed during the testing period.

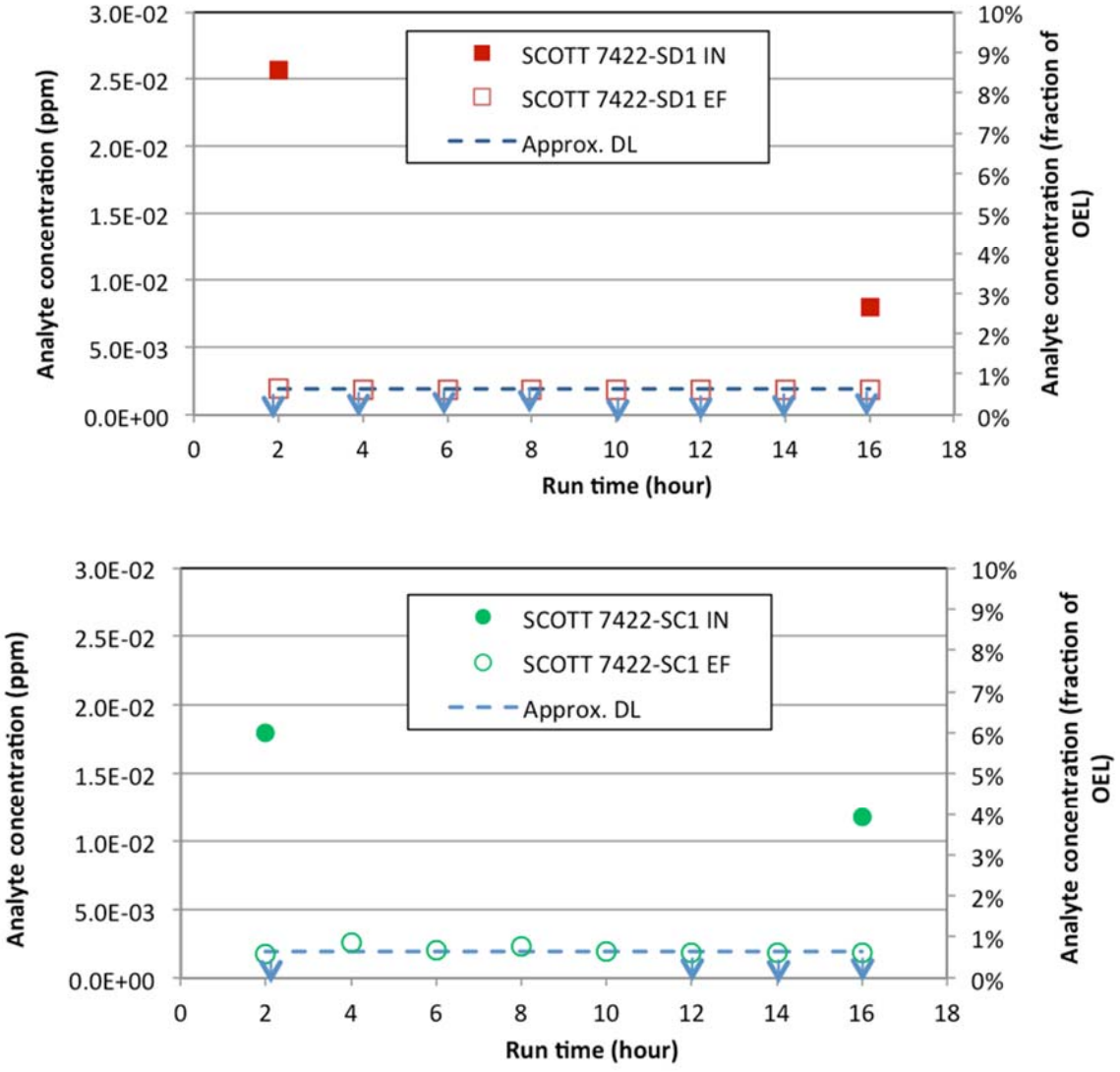

Figure E.2. Plot of Measured Formaldehyde Concentrations before the Inlets and after the Outlets of the two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2-Pentylfuran *(see Figure E.3)* – The DL for 2-pentylfuran corresponds to approximately 1.74% of its OEL. All values (inlet and outlet) were less than 10% of the OEL for 2-pentylfuran—specifically, less than 3.6%. Multiple inlet and outlet values were greater than the DL, but all of these except one inlet (3.6%) were less than 2.5% of the OEL. The general trends of the data do not support evidence of breakthrough because there was no steady increase in outlet concentrations with time. The decreasing outlet concentrations could indicate a 2-pentylfuran background concentration in the system. Even if the outlet readings above the DL resulted from some breakthrough mechanism, all of the measurements were below 3% of the OEL.

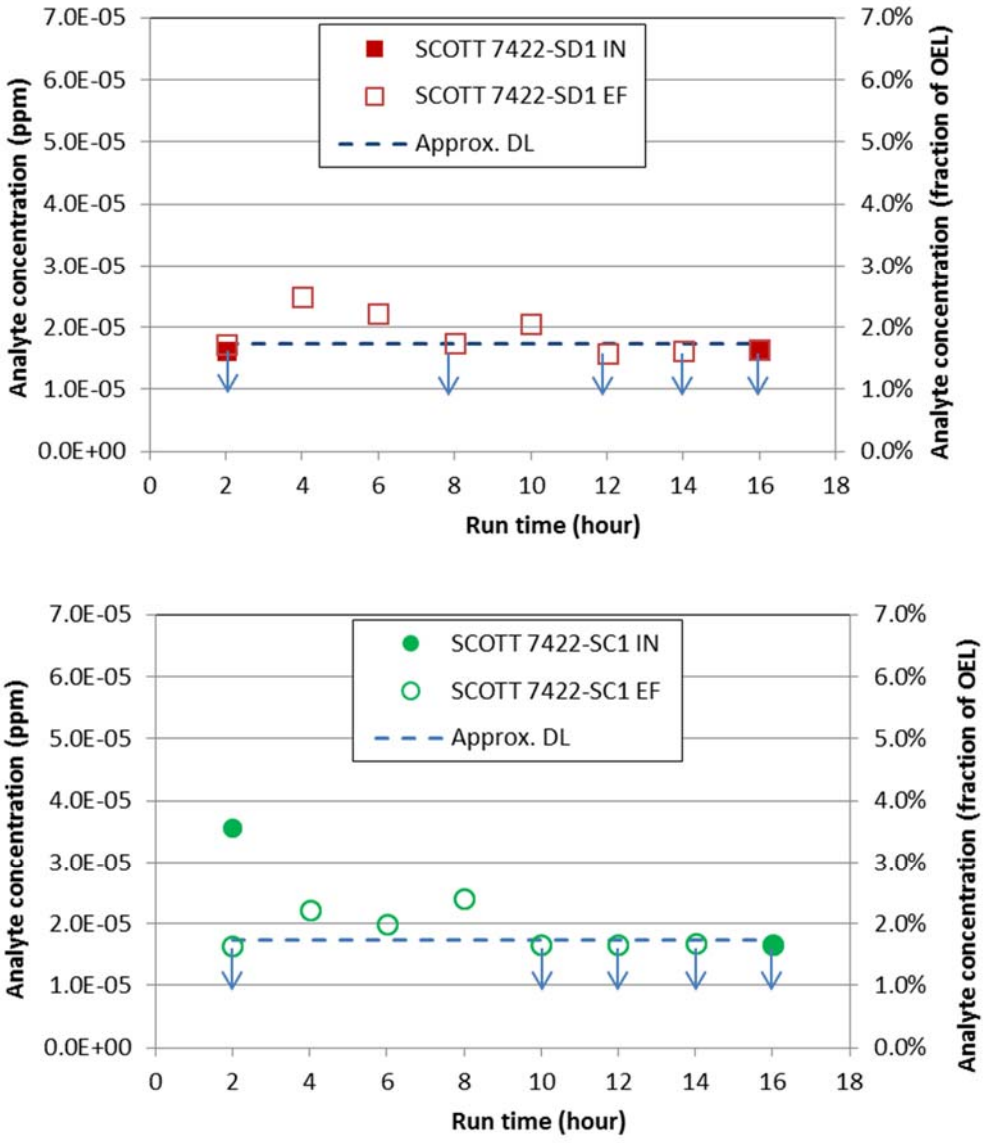

Figure E.3. Plot of Measured 2-Pentylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

2-Heptylfuran *(see Figure E.4)* **–** The DL for 2-heptylfuran corresponds to approximately 1.15% of its OEL. The first two initial inlet concentrations for the two respirator cartridges had measurements above the DL (1.87% and 4.51% of the OEL, respectively), whereas the inlet measurements after 16 hours for both cartridges were less than the DL. Outlet measurements at 14 hours for each cartridge were slightly above the DL at 1.35% and 1.32% of the OEL, respectively. All other outlet measurements were below the DL. Therefore, no evidence of breakthrough is observed in the data.

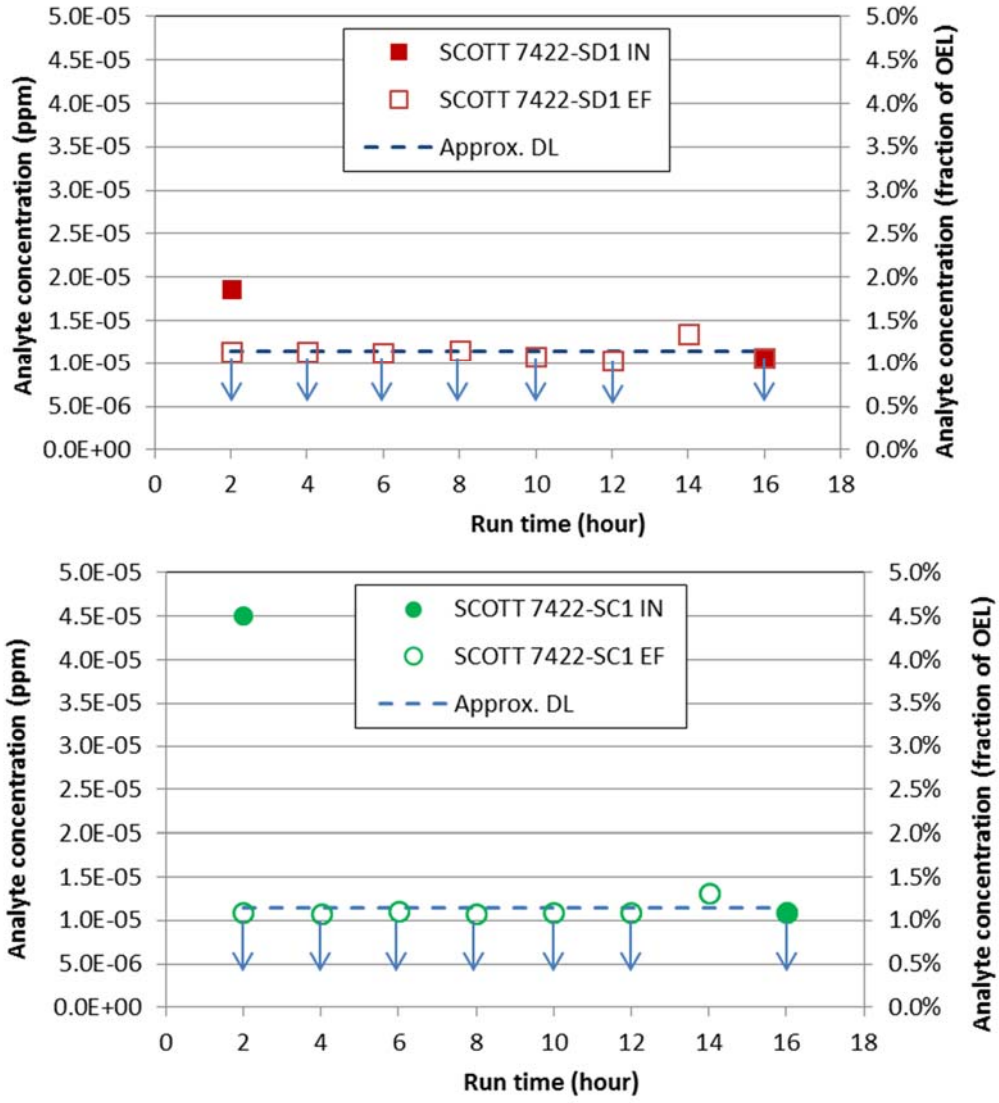

Figure E.4. Plot of Measured 2-Heptylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

Ethylamine *(see Figure E.5)* **–** The DL for ethylamine corresponds to approximately 0.10% of its OEL. All inlet concentrations were above the DL. The initial inlet concentration for the SCOTT 7422-SD1 cartridge was 3.63% of the OEL. All other inlet concentrations for both cartridges were substantially lower, ranging from 0.29 to 0.42% of the OEL. All outlet measurements were below DLs. Therefore, no evidence of breakthrough is observed in the data.

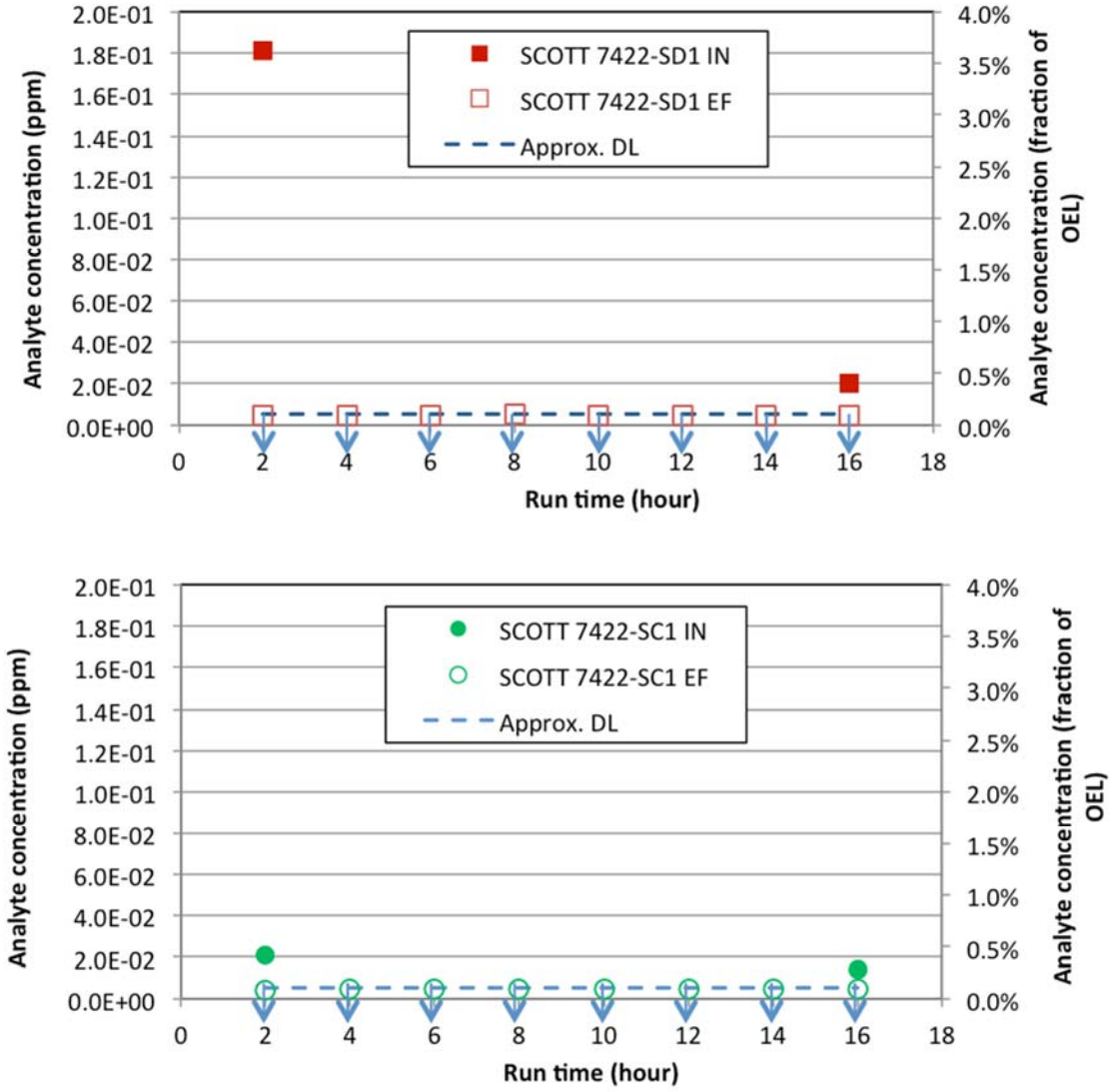

Figure E.5. Plot of Measured Ethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

Appendix F

Historical Data Comparison

Appendix F

Historical Data Sources and Comparisons

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-BY-108 (BY-108) and its exhaust system were obtained via a TWINS query on June 20, 2016, for TWINS HS,[1] and another query on October 7, 2016, for TWINS IH. More recent headspace data were also obtained from the Site-Wide Industrial Hygiene Database (SWIHD) by two queries. The first, on July 12, 2016, contained all data loaded as of that date. The second query contained all data with survey dates between May 1, 2016, and October 7, 2016. This latter data set was used to update and supplement the former, producing a set referred to as "SWIHD HS."

TWINS HS and TWINS IH data were eliminated from consideration if they were:

- Quality Assurance samples (blanks, laboratory control samples, or spikes)
- Marked as suspect (Data Qualifier flag S)
- Associated with a contaminant in a blank, trip blank, or field blank (Data Qualifier flags B, T, or F)
- A laboratory control sample that was out of range (Data Qualifier flag a)
- An excessive relative percent difference (Data Qualifier flag c)
- Marked with a laboratory-defined flag whose meaning was not generically defined and might indicate a serious data-quality issue (Data Qualifier flags L or Y).

Flags a, c, and L were found only in the TWINS IH database, not in TWINS HS.

The exclusions for the SWIHD HS data set were similar:

- Having a laboratory control sample that was out of range (flag a)
- Associated with a contaminant in a blank (flags b or B)
- Having an excessive relative percent difference or relative standard deviation (flags c or d)
- Having an excessive difference between the sample result and its serial dilution (flag e)
- Having a failed mass spectrometer reading on the sample but not on its serial dilution (flag f)
- Marked with a laboratory-defined flag whose meaning was not generically defined and might indicate a serious data-quality issue (flags L or Y).

[1] No data have been added to TWINS HS since April 2005, so the June 2016 download does not require updating.

TWINS HS results associated with chemicals that were ambiguously identified (e.g., "alkane," "unknown," "C6 ketone") were deleted unless the molecular weight of one of the chemicals could be unambiguously specified (e.g., "octanenitrile and others" was kept). In these mixture cases, where the Chemical ID consisted of a Chemical Abstracts Service number followed by M, the molecular weight of the identified chemical was added to the data record, the number was used for the Chemical ID, and the concentration expressed in parts per million (absent from the downloaded database) was calculated from the concentration in milligrams per cubic meter at 25°C and the molecular weight.

A number of chemicals in the TWINS IH data set had "needs conversion" notes in the concentration (mg/m^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,[1] except that measurements that were non-reports—less than the reporting limit (RL) for the analyte—were excluded in PNNL-25880 and were not excluded in this study.

For comparison to cartridge tests that were made using a gas stream from the BY-108 headspace, only headspace measurements were appropriate. This required no scrutiny for the TWINS HS or SWIHD HS databases because they were headspace only for BY Farm tanks, but the TWINS IH database required sorting so that only headspace data were used. The BY Farm data in the TWINS IH database were all attributed to individual tank locations (i.e., there were no Location designations such as "Inside Farm", "Outside Farm", etc.). Of the data that had BY-108 as a Location, all had Survey Titles that included phrases such as "BY-108 BF COPC Sampling," "BY-108 COPC Sampling," or "BY-108 BF COPC Make-up." Because the Location was specified as BY-108, and many of the surveys contained BF (i.e., "Breather Filter") in the title, all TWINS IH BY-108 data were considered to be from the tank headspace.

Maximum and average[2] headspace concentrations were found for each analyte for the combined TWINS IH and SWIHD HS databases.[(3)] These maxima and averages are given in Table F.1,[(4)] together with Occupational Exposure Limits (OELs) and counts of the number of samples. The notation "n/a" is used where there were no measurements of the analyte.

Because the TWINS HS data were older, they were considered less representative of the vapors present during cartridge testing, and the default was to omit them from calculations. However, in some cases, the maximum and average for an analyte were considerably different if they were determined from a combination of all three databases. When this was the case, the results for the three-database combination are tabulated along with those for the default two-database combination. That is, Table F.1 contains two

[1] Hoppe, EW, LA Mahoney, J Cole, and KS Rohlfing. 2016. *Hanford Tank Vapors COPCs Update*. PNNL-25880, Pacific Northwest National Laboratory, Richland, Washington.

[2] Arithmetic average.

[3] 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.

[4] All % OEL values were calculated from concentration data that had been rounded to a minimum of 3 significant figures.

rows for the chemical instead of one, with the upper row (the default two-database combination) in normal font and the lower row (the two-database combination) in italics. The criterion for tabulating this extra information was that there was difference of a factor of three or more, in either direction, between the value obtained from the two-database combination and that from the three-database combination.

Because the reporting limits on concentrations in the historical database were generally higher than the reporting limits or detection limits in the cartridge tests, it was necessary to analyze data in a way that would let the effect of <RL historical data be recognized. To do this, it was assumed that all non-reports in the databases had concentrations equal to RLs of the measurements. Then the following rules were applied:

1. If a maximum value was a non-report, it was marked as "<RL" in the table.
2. If all the data contributing to an average were non-reports, the average was marked as "<RL".
3. If the presence of non-reports in an average caused it to be more than a factor of two different, in either direction, from the value it would have had if only the reported concentrations were averaged, the average was marked with an asterisk ("*").

Table F.1. COPC Comparison to Historical BY-108 Measurements

	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[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	1	644	644	2576%	2576%	1915%	1731%	1912%	2.35% (RL)
2	Nitrous Oxide	10024-97-2	-127	Poling et al., 2007	50 ppm	1 *40*	1.8 *831*	1.8 *545*	3.6% *1662%*	3.6% *1090%*	Not Measured			
3	Mercury	7439-97-6	674	Poling et al., 2007	0.025 mg/m^3	1	0.0161	0.0161	64%	64%	52.0%	48.9%	13.5%	7.43% (RL)
Hydrocarbons														
4	1,3-Butadiene	106-99-0	24	Poling et al., 2007	1 ppm	2 *31*	3.38 *3.38*	1.7 *0.174**	338% *338%*	170% *17%**	138%	119%	268%	2.02% (RL)
5	Benzene	71-43-2	176	Poling et al., 2007	0.5 ppm	4	<RL	<RL	<RL	<RL	0.86%	0.72%	0.049%	0.024%
6	Biphenyl	92-52-4	491	Poling et al., 2007	0.2 ppm	4	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.048- 0.092%
Alcohols														
7	1-Butanol	71-36-3	243	NIOSH	20 ppm	4 *78*	4.32 *63.5*	3.81 *14.6*	22% *318%*	19% *73%*	5.02%	3.72%	0.008%	0.005%
8	Methanol	67-56-1	148	Poling et al., 2007	200 ppm	1	<RL	<RL	<RL	<RL	Not Measured			
Ketones														
9	2-Hexanone	591-78-6	262	NIOSH	5 ppm	4	<RL	0.0281	<RL	0.56%	0.37%	0.34%	<DL	0.003%
10	3-Methyl-3-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	0	n/a	n/a	n/a	n/a	0.27%	0.24%	<DL	0.030%
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	4	<RL	<RL	<RL	<RL	23.5%	11.0%	1.86%	0.090%
Aldehydes														
14	Formaldehyde	50-00-0	-6	NIOSH	0.3 ppm	1	0.00381	0.00381	1.3%	1.3%	8.56%	5.29%	0.85%	0.63% (RL)
15	Acetaldehyde	75-07-0	69	NIOSH	25 ppm	1	2.82	2.82	11%	11%	1.12%	1.08%	0.78%	0.005% (RL)
16	Butanal	123-72-8	167	Oxford safety data[6]	25 ppm	5	0.0727	0.0566	0.29%	0.23%	0.13%	0.094%	0.001%	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 BY-108 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	[A] *Carbotrap 300 TDU method*													
19	Furan[A]	110-00-9	88	Poling et al., 2007	1 ppb	5 *6*	<RL *547*	23.1* *110**	<RL *5470%*	2310%* *11000%**	819%	456%	698%	17.2%
20	2,3-Dihydrofuran	1191-99-7	130	Alfa Aesar[8]	1 ppb	1	<RL	<RL	<RL	<RL	74.5%	36.9%	<DL	1.81%
21	2,5-Dihydrofuran[A]	1708-29-8	152	Aldrich[9]	1 ppb	5	<RL	<RL	<RL	<RL	278%	88.9%	377%	32.2%
22	2-Methylfuran[A]	534-22-5	147	Oxford safety data	1 ppb	5	<RL	<RL	<RL	<RL	39.2%	30.5%	<RL	18.6%
23	2,5-Dimethylfuran	625-86-5	199	Alfa Aesar	1 ppb	1	<RL	<RL	<RL	<RL	<DL	<DL	<DL	3.16%
24	2-Ethyl-5-methylfuran	1703-52-2	246	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
25	4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9	328	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
26	3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4	306	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
27	2-Pentylfuran	3777-69-3	333	Alfa Aesar	1 ppb	1	<RL	<RL	<RL	<RL	3.57%	2.12%	2.48%	1.74%
28	2-Heptylfuran	3777-71-7	410	Alfa Aesar	1 ppb	1 *3*	<RL *61.2*	<RL *29.7*	<RL *6120%*	<RL *2970%*	4.51%	2.14%	1.35%	1.15%
29	2-Propylfuran	4229-91-8	231	Alfa Aesar	1 ppb	1	<RL	<RL	<RL	<RL	11.1%	4.71%	<DL	2.82%
30	2-Octylfuran	4179-38-8	452	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
31	2-(3-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 availabl	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	4	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.017- 0.041%

Table F.1. COPC Comparison to Historical BY-108 Measurements (continued)

	COPC Number and Name	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	5	<RL	0.116	<RL	0.6%	0.77%	0.60%	9.45%	0.001%
35	Propanenitrile	107-12-0	207	NIOSH	6 ppm	4	<RL	<RL	<RL	<RL	0.39%	0.32%	0.90%	0.003%
36	Butanenitrile	109-74-0	244	NIOSH	8 ppm	4	<RL	<RL	<RL	<RL	0.23%	0.17%	0.004%	0.003%
37	Pentanenitrile	110-59-8	284	Alfa Aesar	6 ppm	4	<RL	<RL	<RL	<RL	0.19%	0.11%	0.008%	0.003%
38	Hexanenitrile	628-73-9	328	Predicted ACD/Labs	6 ppm	4	<RL	<RL	<RL	<RL	0.046%	0.035%	<DL	0.003%
39	Heptanenitrile	629-08-3	368	Alfa Aesar	6 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
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	1	<RL	<RL	<RL	<RL	3.63%	1.18%	<RL	0.10% (RL)
Nitrosamines														
43	N-Nitrosodimethylamine	62-75-9	306	NIOSH	0.3 ppb	1	0.238	0.238	79%	79%	134%	79.5%	<RL	11.7% (RL)
44	N-Nitrosodiethylamine	55-18-5	351	Oxford safety data	0.1 ppb	1	0.00809	0.00809	8.1%	8.1%	34.5%	27.0%	<RL	24.4% (RL)
45	N-Nitrosomethylethylamine	10595-95-6	310	Predicted ACD/Labs	0.3 ppb	1	0.0239	0.0239	8.0%	8.0%	132%	65.1%	<RL	9.85% (RL)
46	N-Nitrosomorpholine	59-89-2	435	Oxford safety data	0.6 ppb	1	0.0482	0.0482	8.0%	8.0%	18.3%	9.2%	<RL	3.58% (RL)
Organophospates														
47	Tributyl phosphate	126-73-8	552	NIOSH	0.2 ppm	4	<RL	<RL	<RL	<RL	<DL	<DL	<DL	0.084%
48	Dibutyl butylphosphonate	78-46-6	602	Predicted ACD/Labs	0.007 ppm	4	<RL	<RL	<RL	<RL	<DL	<DL	<DL	1.46%
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	0 *1*	n/a *0.53*	n/a *0.53*	n/a *530%*	n/a *530%*	Not Detected - TIC			

Table F.1. COPC Comparison to Historical BY-108 Measurements (continued)

	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[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)
Pyridines														
51	Pyridine	110-86-1	240	NIOSH	1 ppm	5	<RL	<RL	<RL	<RL	0.28%	0.23%	<DL	0.15% (RL)
52	2,4-Dimethylpyridine	108-47-4	318	Alfa Aesar	0.5 ppm	5	<RL	<RL	<RL	<RL	0.54%	0.49%	<DL	0.22% (RL)
Organonitrites														
53	Methyl nitrite	624-91-9	10	Oxford safety data	0.1 ppm	0	n/a	n/a	n/a	n/a		Not Detected - TIC		
54	Butyl nitrite	544-16-1	172	Alfa Aesar	0.1 ppm	0	n/a	n/a	n/a	n/a		Not Detected - TIC		
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	20 ppb	0	n/a	n/a	n/a	n/a		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 2
** indicates that the value of the average would differ by a factor of 2 or more (in either direction) if non-reports were excluded.*
"< RL" indicates that all pertinent measurements of the analyte were less than the reporting limit
Plain font in the table indicates that only the recent databases (SWIHD headspace and TWINS Industrial Hygiene) were included. Italics mean that the pre-2006 TWINS headspace data were also included.
"n/a" indicates no historical data was found in the databases

[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 BY-108 Headspace (2016 Tests): 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 there were differences, the historical data were examined for explanations in the type or circumstances of sampling.

Tank BY-108 has been inactive throughout the period of record for which historical vapor concentration data have been collected. Regarding waste disturbances, it must be noted that BY Farm tanks are arranged in six-tank cascades that tie three tanks in BX Farm to three tanks in BY Farm. Tanks BX-107, BX-108, BX-109, BY-107, BY-108, and BY-109 tanks are connected by overflow lines through which vapors can move from one tank headspace to another (Huckaby et al. 2004). Thus, it would have been physically possible for waste disturbances in any of five other tanks to have affected vapor concentrations in BY-108. However, there were no such waste-disturbing operations in any of the tanks of the BY-108-related cascades in the period during which vapor data were recorded. Hence, none of the available data for BY-108 were taken during waste-disturbing 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 was 1915% of the OEL, compared to the historical maximum concentration of 644 ppm (2576% of the OEL). This historical data point comes from the TWINS IH database, which contains only one ammonia datum, and was a breather-filter measurement made on July 14, 2009. For comparison, five October 2016 samples in SWIHD HS were lower, containing 367 to 441 ppm ammonia. The maximum cartridge-inlet concentration was comparable to the historical maximum and more recent headspace data.

F.2.2 Nitrous Oxide

Nitrous oxide was not measured in cartridge testing. The maximum historical concentration found in the TWINS HS database was 831 ppm (1662% of the OEL). This concentration was measured on September 10, 1996. Forty measurements in TWINS HS are all above-report, ranging from 440 ppm to 831 ppm, and all were taken between 1994 and 1997. Only one recent measurement, made on July 15, 2009, was found in TWINS IH. However, this concentration of 1.8 ppm (3.6% of the OEL) was measured via a nitrous oxide badge, which probably did not describe the nitrous oxide concentration in the tank headspace.

F.2.3 Mercury

The maximum cartridge inlet concentration was 52.0% of the OEL. The value is comparable to the historical maximum, 0.0170 mg/m^3 (concentration 68.0% of the OEL). This measurement came from SWIHD HS and was taken on October 6, 2016. The cartridge inlet maximum is not significantly below historical[1].

[1] 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 greater than 10% of the OEL and the maximum cartridge inlet concentration was less than 50% of the historical value. However, discrepancies are considered significant only if the maximum historical concentration was greater than 10% of the OEL and the maximum cartridge inlet concentration is less than 20% of the historical value.

F.2.4 1,3-Butadiene

The maximum cartridge inlet concentration of 138% of the OEL is low compared to the historical maximum concentration, the sole above-report datum from TWINS IH, which was taken on April 8, 2008. It had a concentration of 3.38 ppm (338% of the OEL). The 10 above-reports in TWINS HS were taken between 1994 and 1997 and ranged from 0.043 ppm to 0.174 ppm (4 to 17% of the OEL). For comparison, six October 2016 samples in SWIHD HS contained 1.79 to 2.64 ppm of butadiene. The maximum cartridge inlet concentration was less than 50% but greater than 20% of the maximum historical measurement and therefore was not substantially lower than the historical record.

F.2.5 Benzene

The maximum cartridge inlet concentration of 0.86% of the OEL is low compared to the historical maximum concentration, a below-report datum that had an RL of 0.0529 ppm (<11% of the OEL). This RL was for a September 17, 2009, sample with a small volume of 0.15 L, producing an unusually high RL. The maximum relatively recent above-report concentration, excluding TWINS HS data, was 0.0100 ppm (2.00% OEL), found in the SWIHD HS database and measured in October 2016. There were no above-report historical data in TWINS IH. The numerous above-report historical data in TWINS HS, which were collected between 1994 and 1997, ranged from 0.016 ppm to 0.19 ppm (3 to 38% of the OEL).[1] The cartridge inlet concentration is less than 20% of the historical maximum and is considered significantly less than the maximum historical measurement, with the caveat that recent SWIHD HS headspace concentrations were close to the cartridge inlet maximum..

F.2.6 1-Butanol

The maximum cartridge inlet concentration of 5.0% of the OEL is slightly more than 20% of the TWINS IH maximum found from 2009 breather filter data but is much lower than the 63.5 ppm (318% of the OEL) measured in the headspace on October 27, 1994. The above-report TWINS HS headspace data collected on other dates between 1994 and 1997 were between 4 and 22 ppm (20 to 110% of the OEL). The maximum headspace concentration in SWIHD HS was 4.17 ppm (20.9% of the OEL), measured on October 6, 2016. The cartridge inlet concentration is less than 20% of the historical maximum from TWINS HS and is about 25% of the more recent maximum from SWIHD HS. It is concluded that the cartridge inlet concentration was significantly lower than the historical maxima.

F.2.7 Acetaldehyde

The maximum cartridge inlet concentration of 1.1% of the OEL is lower than the maximum of 2.8 ppm (11.3% of the OEL) that was measured on April 8, 2008. This was the only measurement in TWINS IH. No data were found in TWINS HS, and the October 2016 SWIHD HS maximum was 0.302 ppm (1.21% of the OEL). The cartridge inlet concentration is less than 20% of the historical maximum and is considered significantly less than the historical maximum, with the caveat that several recent headspace concentrations were close to the cartridge inlet maximum.

[1] The TWINS HS maximum of 38% of the OEL does not appear in the tables because it does not fully meet the criteria for use of TWINS HS data in analysis: it is greater than 3 times the maximum in more recent historical data, but it does not exceed the OEL.

F.2.8 Furan

The maximum cartridge inlet concentration of 819% of the OEL (as measured by the Carbotrap 300 TDU method) is much lower than the maximum in the TWINS IH database, which is a below-report with an RL of 58.3 ppb (<5830% of the OEL), a high RL that came from a 0.15-L sample taken on September 17, 2009. The cartridge inlet concentration also was much lower than the only above-report concentration in the TWINS HS database, 547 ppb (54700% of the OEL), which was measured in the headspace in 1994. The only above-report concentration in the TWINS IH database was 10.3 ppb (1030% of the OEL), which was measured in a 1-L sample taken at a breather filter on September 17, 2009. In the SWIHD HS database, the maximum concentration was 18.4 ppb (1840% of the OEL) in October 2016. The cartridge inlet concentration is less than 20% of the historical maximum and is considered significantly less than historical, with the caveat that recent SWIHD HS headspace concentrations were close to the cartridge inlet maximum.

F.2.9 2,3-Dihydrofuran, 2,5-Dimethylfuran, 2-Pentylfuran, 2-Propylfuran

The cartridge inlet maxima were 74.5% of the OEL for 2,3-dihydrofuran, less than a detection limit (DL) of ~3% of the OEL for 2,5-dimethylfuran, 3.57% of the OEL for 2-pentylfuran, and 11.1% of the OEL for 2-propylfuran. All of the cartridge concentrations were measured by the furans[1] method. All of the historical maxima were below-reports with RLs in the range of ~20 to 50% of the OEL.

The cartridge-inlet maximum concentration of 2,3-dihydrofuran was high enough to make it consistent with the historical maxima, even at the highest historical RL. For the other furans, the cartridge-inlet concentrations were low and 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.2.10 2,5-Dihydrofuran, 2-Methylfuran

The maximum cartridge inlet concentration, measured by the Carbotrap 300 TDU method, was 278% of the OEL for 2,5-dihydrofuran and 39.2% of the OEL for 2-methylfuran, both concentrations are much less than the below-report historical maxima that had RLs of ~5000% of the OEL for these two furans. These high RLs came from the same 0.15-L TWINS IH sample discussed for furan. 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.2.11 2-Heptylfuran

The maximum cartridge inlet concentration of 4.5% of the OEL (a below-report for which the RL was 11% of the OEL) is within the range of the historical maximum from recent data, a SWIHD HS below-report with an RL of 0.196 ppb (<19.6% of the OEL). In addition, the cartridge inlet maximum is much lower than the TWINS HS maximum of 61.2 ppb (6120% of the OEL) measured in the headspace in 1994. The cartridge inlet concentration is less than 20% of the maximum (TWINS HS) historical data. However, it is worth noting that both of the BY-108 2-heptylfuran measurements that are present in TWINS HS were considered to be misidentifications.[16]

[1] Using the TDU Tenax tube method.

F.2.12 Acetonitrile

The maximum cartridge inlet concentration of 0.77% of the OEL, measured by the Carbotrap 300 TDU method, is much lower than the historical maximum of 18.8 ppm (94.0% of the OEL) measured in October 2016. This historical maximum comes from SWIHD HS and was made using the acetonitrile method. Other measurements made in the same period, by the same method, ranged from 2.23 ppm to 9.76 ppm. The cartridge inlet concentration is less than 20% of the historical maximum and is considered significantly less than historical.

F.2.13 N-nitrosodimethylamine (NDMA)

The maximum cartridge inlet concentration was 134% of the OEL, much lower than the historical maximum of 6.19 ppb (2063% of the OEL). The historical maximum came from the SWIHD HS database, a headspace measurement made in October 2016. There are no TWINS HS data for nitrosamines in this tank. The cartridge inlet maximum falls below 20% of the historical maximum and therefore is considered significantly below historical.

F.2.14 N-nitrosodiethylamine (NDEA), N-nitrosomethylethylamine (NMEA), and N-nitrosomorpholine (NMOR)

For these three nitrosamines, the cartridge inlet maxima were 34.5% of the OEL for NDEA, 132% of the OEL for NMEA, and 18.3% OEL for N-nitrosomorpholine. The historical maxima were October 2016 SWIHD HS below-reports that had RLs of 1030% of the OEL for NDEA, 413% for NMEA, and 153% for N-nitrosomorpholine. The only above-report data come from a single breather-filter sample in TWINS IH, taken on July 15, 2009. The concentrations were 0.00809 ppb NDEA (8.09% of the OEL), 0.0239 ppb NMEA (7.97% of the OEL), and 0.0482 ppb N-nitrosomorpholine (8.03% of the OEL). There are no TWINS HS data for nitrosamines in this tank. The cartridge inlet maxima are higher than the above-report historical maxima for all three nitrosamines.

F.2.15 Dibutyl butylphosphonate (DBBP)

The maximum cartridge inlet concentration of <1.5% of the OEL, which is below its DL, is low compared to the historical maximum concentration, a below-report datum with an RL of 0.00636 ppm (<91% of the OEL). This RL was for a September 17, 2009, sample in TWINS IH that had a small volume, of 0.15 L.

F.2.16 2-Fluoropropene

The cartridge inlet concentration was a tentatively identified compound (TIC)—it was not positively identified as being present—while the historical maximum concentration was 0.53 ppm (530% of the OEL). The historical data were present only in the TWINS HS database, a single data point taken in 1994. The cartridge inlet concentration is probably less than 20% of historical data, but because it is a TIC no conclusion can be drawn.

F.2.17 Summary of Historical Data for the BY-108 Headspace (2016 Tests)

In summary, cartridge inlet concentration maxima for samples from the BY-108 headspace that were substantially lower than historical maxima can be described as follows:

- Differences arising from use of historical data taken during disturbance for the historical maximum: none.
- Differences arising from use of RLs of below-report data for the historical maximum: none.
- Differences arising from use of data from an inventory that no-longer-exists for the historical maximum: none.
- Differences that could not be resolved because of the scarcity of non-disturbance above-report data: 2,5-dihydrofuran, 2-methylfuran, 2,5-dimethylfuran, 2-pentylfuran, 2-propylfuran, dibutyl butylphosphonate, 2-fluoropropene.
- Cartridge inlet concentrations that were determined to be significantly lower than above-report historical concentrations: benzene, 1-butanol, acetaldehyde, furan, 2-heptylfuran, acetonitrile, N-nitrosodimethylamine.

Appendix G

Assessment of the Use of Alternate Furan Measurements for Respirator Cartridge Performance Determinations

Appendix G

Assessment of the Use of Alternate Furan Measurements for Respirator Cartridge Performance Determinations

From Letter Report 69802-01, May 8, 2018

G.1 Overview

Two sorbent tubes are currently used in both vapor source characterization and cartridge testing that support quantitation of the furans class of Chemicals of Potential Concern (COPC), which includes furan (CAS# 110-00-9) and 13 other substituted furans. To date, the preferred sorbent tube has been the Tenax TA TDU "furans" tube, which uses a modified U.S. Environmental Protection Agency (EPA) TO-17 method with gas chromatography/mass spectrometry GC/MS for quantitation. This furans tube addresses eight of the 14 furans COPCs. A separate sorbent tube, also used to measure furans, is the Carbotrap 300 TDU tube. This tube also is analyzed with a modified EPA TO-17 method with GC/MS for quantitation. The Carbotrap 300 TDU tubes, also called VOA (Volatile Organic Analysis) tubes, are calibrated for three furan COPCs: furan; 2,5-dihydrofuran; and 2-methylfuran—all of which are also quantified with the furans tube. Six other furan COPCs are tentatively identified compounds (TICs) measured using the Carbotrap 300 TDU tube, without calibration standards. Table G.1 provides a summary of the 14 furans COPCs and current analytical methods.

Table G.1. Furans COPCs and Corresponding Analytical Methods

		Sorbent Tube Analysis Methods[1]	
Furans COPCs Name	CAS Number	'Furans' Tube (TENAX TA)[2]	Carbotrap 300 Tube[2]
Furan	110-00-9	X	X
2,3-Dihydrofuran	1191-99-7	X	
2,5-Dihydrofuran	1708-29-8	X	X
2-Methylfuran	534-22-5	X	X
2,5-Dimethylfuran	625-86-5	X	
2-Ethyl-5-methylfuran	1703-52-2		TIC
4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9		TIC
3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4		TIC
2-Pentylfuran	3777-69-3	X	
2-Heptylfuran	3777-71-7	X	
2-Propylfuran	4229-91-8	X	
2-Octylfuran	4179-38-8		TIC
2-(3-Oxo-3-phenylprop-1-enyl)furan	717-21-5		TIC
2-(2-Methyl-6-oxoheptyl)furan	51595-87-0		TIC

[1] Both sorbent tubes are thermally desorbed and analyzed with GC/MS using a modified EPA TO-17 method at the 222S Laboratory. The target sample collection flow rate is the same for both sorbent tubes, at approximately 33 mL/min during respirator cartridge testing.

[2] "X" indicates the method is calibrated for the COPC. "TIC" indicates that a reference standard is not available to accurately quantify, assign an analytical DL or RL, or definitively confirm the identity of the TIC.

In cartridge testing, PNNL was instructed by Washington River Protection Solutions (WRPS) 222S Laboratory management to use the furans tube data in lieu of Carbotrap 300 TDU tube data because it provided a lower level of quantitation. The Carbotrap 300 TDU tube furans results were only to be used to determine whether furan TICs were detected.

In comparing furan measurements from the Site-Wide Industrial Hygiene database (SWIHD) headspace and exhauster data, a discrepancy was noted between data from the furans and Carbotrap 300 TDU sorbent tubes for samples taken at the same location and time. Figure G.1 shows SWIHD source concentrations of furans quantified from the Carbotrap 300 TDU sorbent tube with consistently higher concentrations than those obtained at the same time with the furans sorbent tube.

The quantitative difference varies from survey-to-survey, but in all cases the Carbotrap 300 TDU tube provides significantly higher results. Further review of SWIHD headspace data confirmed that historic maxima reported for furan from each tank farm resulted from Carbotrap 300 TDU tube quantitation versus furans tube quantitation. Similarly, all historic maxima from samples collected since 2006 for the other two calibrated substituted furans from the Carbotrap 300 TDU tube—2,5-dihydrofuran, and 2-methylfuran—resulted from the Carbotrap 300 TDU tube quantitation rather than the furans tube.

Figure G.1. Comparison of Selected SWIHD Furan Analysis Results from Two Sorbent Tubes. Data Points noted with ↓ indicates measurements less than the detection limit.

G.2 Potential Impact and Path Forward

Although both sorbent tubes are calibrated for selected furan compounds, it is apparent that one of the two methods is providing a false reading for the calibrated furan compounds. The 222S Laboratory team and Industrial Hygiene evaluated the data and methods. Results indicate that the Carbotrap 300 TDU tube is providing a more accurate measurement, while the furans tube results represent a false negative for furan. Specifically, it appears that several of the lower boiling point and molecular weight furan COPCs have the propensity to be released from the furans tube prior to quantitation. This observation is based on a

volume challenge test conducted at the 222S Laboratory on both tubes. The 222S Laboratory team also addressed a question about the potential interference of other compounds on the furan peaks measured from the Carbotrap 300 TDU tube, and the potential for those interferences to drive elevated readings. Their response cited a calibration protocol that assured them of minimal interferences with the furan measurements.

Based on the current interrogation results and recommendations from the 222S laboratory and Industrial Hygiene management, PNNL reprocessed all prior cartridge test results to provided quantitative furans data using the Carbotrap 300 TDU tube analysis results. Results indicate significantly higher cartridge inlet concentrations for furan using the Carbotrap 300 TDU tube data compared to the original furans tube analysis results documented in previous cartridge reports. [1-10]

A summary of analysis results for furan, 2,5-dihydrofuran, and 2-methyl furan from the Carbotrap 300 TDU sorbent tubes are shown in Table G.2 for those tests where inlet concentrations exceeded DL. Furan inlet concentrations exceeded 10% of the OEL in 10 of the 11 tanks or exhausters tested, and inlet concentrations exceeded 100% of the OEL in 6 of the tests. The highest inlet concentrations observed (where inlet concentrations exceeded 1000% of the OEL for most of the test) were during 702-AZ exhauster tests under waste-disturbing conditions.

For cartridge tests where maximum inlet furan concentrations ranged from 24 to 392% of the OEL (0.24 to 3.9 ppb), all outlet concentrations were less than the DL, indicating no evidence of breakthrough. A plot from the AW Exhauster testing (Figure G.2) is representative of the eight tanks or exhausters tested with maximum inlet concentrations at or below 392% of the OEL.

For the BY-108 cartridge testing, the inlet furan concentrations ranged from 233% to 819% of the OEL (see Figure G.3). Here, furan breakthrough times corresponding to outlet concentrations above the DL (~17% of the OEL) ranged from just after 6 hours for the SCOTT SD1 cartridge (maximum inlet 819% of the OEL), to after 8 hours for the SCOTT SC1 cartridge (maximum inlet 298% of the OEL). For comparison, ammonia breakthrough for BY-108 SD1 and SC1 tests occurred within 2 hours,[4] and total volatile organic compound (VOC) breakthrough was evident after 6 hours.[10] Furan breakthrough in the BY-108 tests appears to correlate with the onset of total VOC breakthrough. Breakthrough of 2,5-Dihydrofuran was also observed after 10 to 12 hours, but only in the BY-108 SD1 test.

For the cartridge testing on the 702-AZ waste disturbing event, inlet furan concentrations ranged from 440% to 2995% of the OEL (see Figure G.4). Here, furan breakthrough times ranged from after 8 hours for the SCOTT SD1 cartridge (maximum inlet 2995% of the OEL), to after 10 hours for the SCOTT SC1 cartridge (maximum inlet 2533% of the OEL). For comparison, ammonia breakthrough for 702-AZ SD1 and SC1 tests occurred after 6 hours and 4 hours, respectively.[9] Total VOC analysis has not been conducted for the 702-AZ exhauster waste disturbing test. Ammonia breakthrough continued to precede all other breakthrough observations, including furan.

G.3 Conclusions

Using analytical results from Carbotrap 300 TDU tube for three calibrated furan compounds (furan, 2,5-dihydrofuran, and 2-methylfuran), respirator cartridge breakthrough analyses were re-assessed for the 11-tank headspace and tank farm exhauster cartridge tests conducted during FY 2016 and FY 2017. This re-assessment was driven by observed differences between historic headspace and exhauster sample analysis using different sorbent tubes. An assessment from WRPS 222S Laboratory and Industrial Hygiene management also indicated that the baseline furans sorbent tube appears to be

providing false-negative concentrations for these furan compounds and that the Carbotrap 300 TDU tubes provide better quantitation.

Table G.2. Summary of Furan Inlet and Outlet Concentrations for Cartridge Tests using Carbotrap 300 TDU Sorbent Tube and Furans Sorbent Tube Analysis Results.[1]

Test/Tank Headspace or Exhauster Slip Stream	COPC	Furans Tube		Carbotrap 300 TDU Tube		Carbotrap 200 TDU Tube Comments
		Inlet Max | Avg. (% of OEL)	Outlet Max (% of OEL)	Inlet Max | Avg. (% of OEL)	Outlet Max (% of OEL)	
AP Exhauster	Furan	2 | 2	1	392 | 355	<DL (16)	
A-101	Furan	5 | 3	1	42 | 26	<DL (16)	
BY-108	Furan	5 | 2	1	819 | 456	698	Breakthrough after 6 hours (SD1) and 8 hours (SC1)
	2,5-Dihydrofuran	21 | 13	3	278 | 89	377	Breakthrough after 10–12 hr (SD1)
	2-Methyfuran	12 | 11	4	39 | 30	<DL (19)	
AX-101	Furan	15 | 5	6	24 | <DL (17)	<DL (17)	
702-AZ Exhauster (non-waste disturbing)	Furan[1]	9 | <DL (6)	<DL (6)	62 | 27	<DL (20)	
702-AZ Exhauster (waste disturbing)	Furan[1]	5 | 3	<DL (2)	3084 | 1392	87	Breakthrough after 8 hours (SD1) and 10 hours (SC1)
AW Exhauster	Furan	<DL | <DL (6)	<DL (6)	204 | 146	<DL (17)	
AN Exhauster	Furan	<DL | <DL (6)	<DL (6)	85 | 48	<DL (18)	
SX-101 (SD1/SC1)	Furan	<DL | <DL (4)	<DL (4)	169 | 75	<DL (29)	
SX-104 (TL/FR57)[2]	Furan	<DL | <DL (3)	<DL (3)	100 | 39	<DL (28)	

[1] 2-Methylfuran had at least one measurement slightly greater than DL, but all measurements were <RL.
[2] Only results available as of 5/4/18 for Powered-Air Purifying Respirator tests with MSA TL and 3M FR57 cartridges.

[1] In the final quality approved spreadsheet *AY-AZ (2017) Master Calculations 16JUL2018.xlsx, 7/*16/18 3:30 PM, the maximum OEL values changed to 2995% of the OEL for the inlet on the SD1 cartridge and 2533% of the OEL for the inlet on the SC1 cartridge. Additionally, in the 702-AZ 2017 SCOTT SD1 cartridge test, the Carbotrap 300 tube measured 2-methylfuran inlet concentrations of 13.8% of the OEL. The 702-AZ 2017 SCOTT SC1 cartridge test Carbotrap 300 tube measured 2-methylfuran inlet concentrations of 11.5% of the OEL.

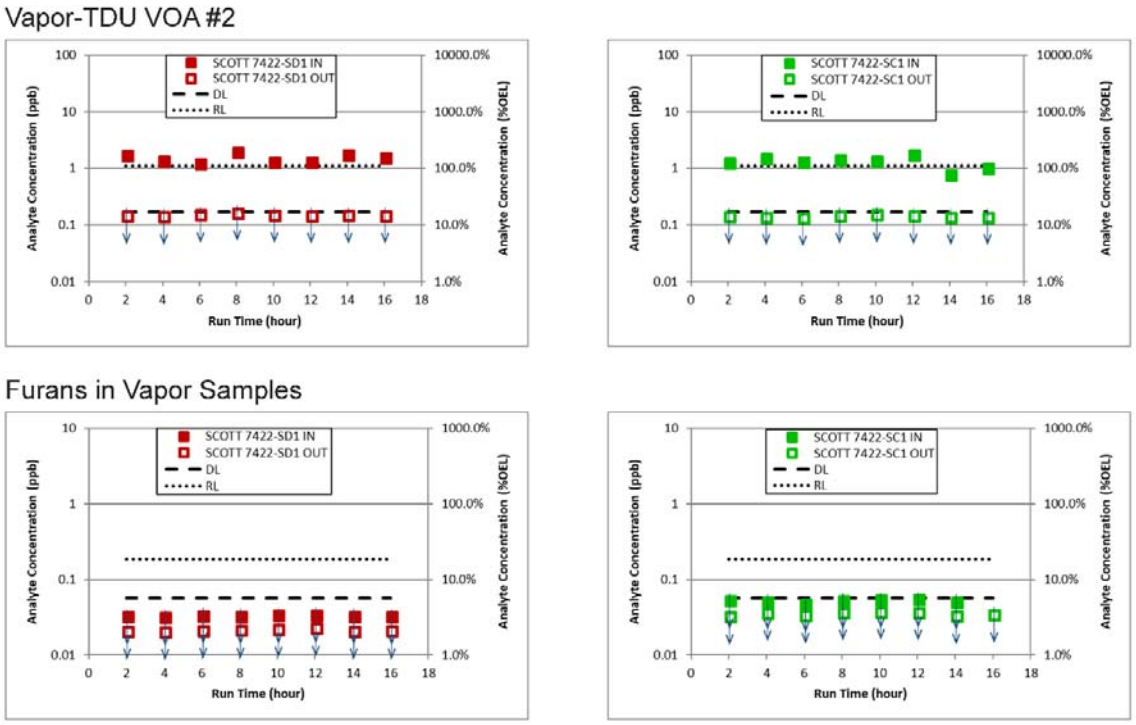

Figure G.2. Plots of Measured Furan Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested on an AW Exhauster Slipstream. Top panels represent Carbotrap 300 TDU sorbent tube results; bottom panels represent furans sorbent tube results.

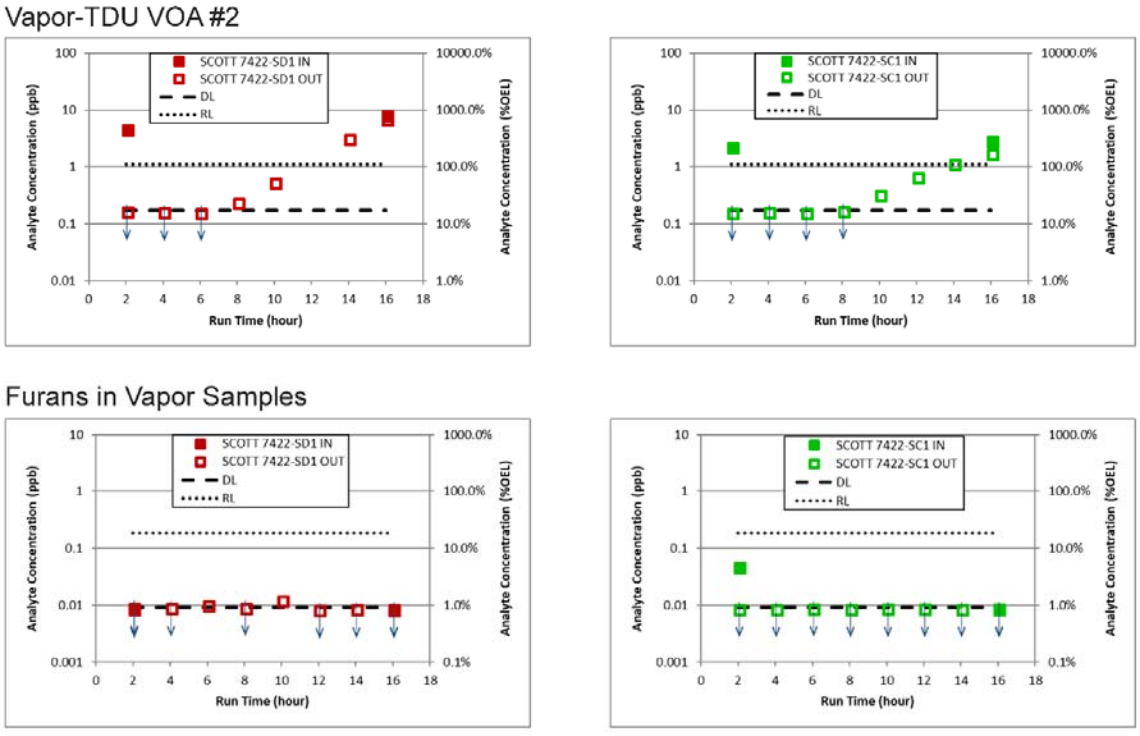

Figure G.3. Plots of Measured Furan Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested on BY-108 Headspace Vapors. Top panels represent Carbotrap 300 TDU sorbent tube results; bottom panels represent furans sorbent tube results.

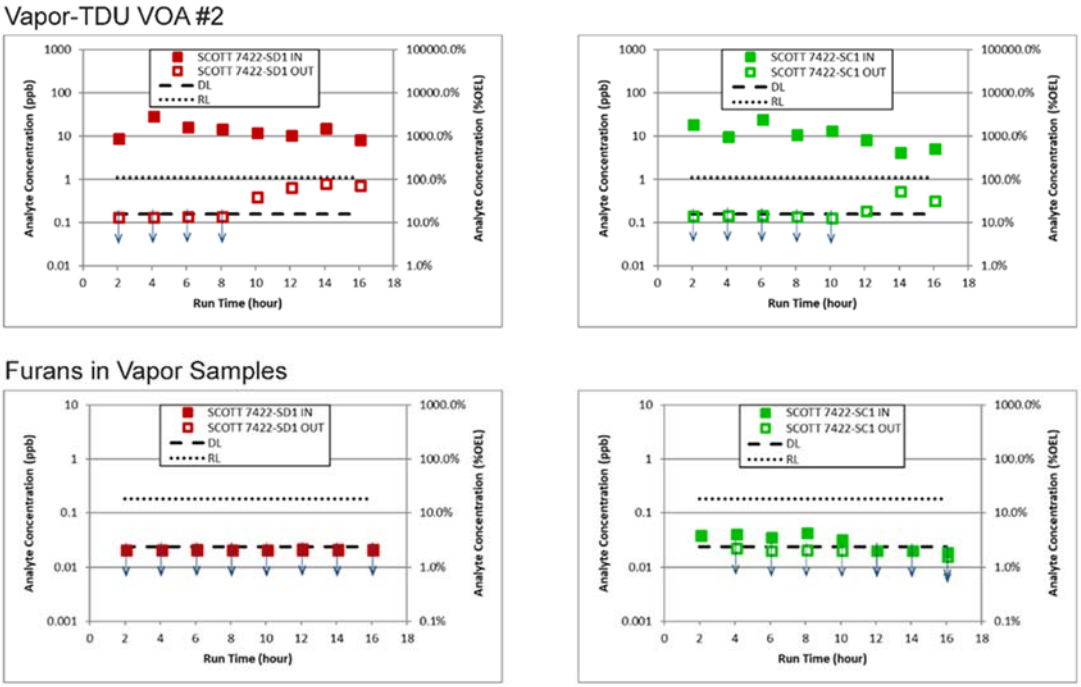

Figure G.4. Plots of Measured Furan Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested on the 702-AZ Exhauster Slipstream under waste-disturbing conditions in 2017. Top panels represent Carbotrap 300 TDU sorbent tube results; bottom panels represent furans sorbent tube results.

Re-assessment results using data from the Carbotrap 300 TDU sorbent tube indicate that the SCOTT 7422-SD1 and -SC1 APR cartridges effectively removed furan. Inlet concentrations of furan up to 392% of the OEL resulted in outlet concentrations greater than the DL for the entire testing period (up to 16 hours of testing).

Furan breakthrough was only observed in two tests, where furan inlet concentrations achieved the highest maximum values of 819% and 3084% of the OEL.

- In the BY-108 tests, furan breakthrough occurred after 6 hours for the SCOTT SD1 cartridge (maximum inlet 819% of the OEL), and after 8 hours for the SCOTT SC1 cartridge (maximum inlet 298% of the OEL). In comparison, ammonia breakthrough was observed in less than 2 hours. Furan breakthrough appeared to correlate with total VOCs breakthrough.
- In the 702-AZ tests under waste disturbing conditions, furan breakthrough occurred after 8 hours for the SCOTT SD1 cartridge (maximum inlet 2995% of the OEL), and after 10 hours for the SCOTT SC1 cartridge (maximum inlet 2533% of the OEL)[1]. In comparison, ammonia breakthrough for the

[1] In the final quality approved spreadsheet *AY-AZ (2017) Master Calculations 16JUL2018.xlsx,* 7/16/18 3:30 PM the maximum OEL values changed to 2995% of the OEL for the inlet on the SD1 cartridge and 2533% of the OEL for the inlet on the SC1 cartridge. Additionally, in the 702-AZ 2017 SCOTT SD1 cartridge test Carbotrap 300 tube measured 2-methylfuran inlet concentrations of 13.8% of the OEL. The 702-AZ 2017 SCOTT SC1 cartridge test Carbotrap 300 tube measured 2-methylfuran inlet concentrations of 11.5% of the OEL.

SD1 and SC1 tests occurred after 6 hours and 4 hours, respectively. Total VOC concentrations are not available at this time, so they could not be compared.

In all tests, ammonia breakthrough continues to precede all other breakthrough observations, including furan, indicating that ammonia continues to define the minimum breakthrough times for the cartridges.

G.4 References

1. Nune SK, J Liu, CJ Freeman, and TM Brouns. 2016a. Analysis of Respirator Cartridge Performance Testing on a Hanford AP Tank Farm Primary Exhauster Slipstream. PNNL-25860, Pacific Northwest National Laboratory, Richland, Washington.
2. Nune SK, J Liu, CJ Freeman, TM Brouns, and LA Mahoney. 2016b. Analysis of Respirator Cartridge Performance Testing on Hanford Tank SY-102. PNNL-26041, Pacific Northwest National Laboratory, Richland, Washington.
3. Nune SK, J Liu, CJ Freeman, TM Brouns, and LA Mahoney. 2017a. Analysis of Respirator Cartridge Performance Testing on Hanford Tank A-101. PNNL-26131, Pacific Northwest National Laboratory, Richland, Washington.
4. Nune SK, CK Clayton, J Liu, CJ Freeman, TM Brouns, and LA Mahoney. 2017b. Analysis of Respirator Cartridge Performance Testing on Hanford Tank BY-108. PNNL-26180, Pacific Northwest National Laboratory, Richland, Washington.
5. Nune SK, CK Clayton, J Liu, CJ Freeman, TM Brouns, and LA Mahoney. 2017c. Analysis of Respirator Cartridge Performance Testing on the 702-AZ Primary Exhauster for the Hanford AY/AZ Tank Farms. PNNL-26243, Pacific Northwest National Laboratory, Richland, Washington.
6. Nune SK, CK Clayton, J Liu, CJ Freeman, TM Brouns, and LA Mahoney. 2017d. Analysis of Respirator Cartridge Performance Testing on Hanford Tank AX-101. PNNL-26254, Pacific Northwest National Laboratory, Richland, Washington.
7. Nune SK, CK Clayton, J Liu, CJ Freeman, TM Brouns, and LA Mahoney. 2017e. Analysis of Respirator Cartridge Performance Testing on a Hanford AW Tank Farm Exhauster Slipstream. PNNL-26337 Rev. A, Pacific Northwest National Laboratory, Richland, Washington.
8. Nune SK, CK Clayton, J Liu, CJ Freeman, TM Brouns, and LA Mahoney. 2017f. Analysis of Respirator Cartridge Performance Testing on a Hanford AN Tank Farm Exhauster Slipstream. PNNL-26317 Rev. A, Pacific Northwest National Laboratory, Richland, Washington.
9. Nune SK, CK Clayton, J Liu, CJ Freeman, TM Brouns, and LA Mahoney. 2017g. Analysis of Respirator Cartridge Performance Testing on the 702-AZ Primary Exhauster for the Hanford AY/AZ Tank Farms during a Waste-Disturbing Event. PNNL-26863 Rev. A, Pacific Northwest National Laboratory, Richland, Washington.
10. Freeman CJ, J Liu, C Clayton, SK Nune, LA Mahoney, CL Bottenus, TM Brouns, MJ Minette, and P Humble. 2020. Overview of 2016 through 2018 Testing of Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhausters. PNNL-26821 Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

Table G3. Tank BY-108 Furan, 2,5-Dihydrofuran, and 2-Methylfuran Analytical Results using the Carbotrap 300 TDU Tube Alternative Methodology.

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
19	Furan	2	001-IN-A	4.7E-03	0.001	474%			17.2%
19	Furan	16	001-IN-H	8.2E-03	0.001	819%			17.2%
19	Furan	2	001-EF-A	1.7E-04	0.001	16.8%	YES		17.2%
19	Furan	4	001-EF-B	1.6E-04	0.001	16.3%	YES		17.2%
19	Furan	6	001-EF-C	1.6E-04	0.001	16.3%	YES		17.2%
19	Furan	8	001-EF-D	2.4E-04	0.001	23.9%		J	17.2%
19	Furan	10	001-EF-E	5.5E-04	0.001	54.7%		J	17.2%
19	Furan	12	001-EF-F		0.001				17.2%
19	Furan	14	001-EF-G	3.2E-03	0.001	320%			17.2%
19	Furan	16	001-EF-H	7.0E-03	0.001	698%			17.2%
19	Furan	2	002-IN-A	2.3E-03	0.001	233%			17.2%
19	Furan	16	002-IN-H	3.0E-03	0.001	298%			17.2%
19	Furan	2	002-EF-A	1.6E-04	0.001	16.2%	YES		17.2%
19	Furan	4	002-EF-B	1.7E-04	0.001	16.6%	YES		17.2%
19	Furan	6	002-EF-C	1.6E-04	0.001	16.2%	YES		17.2%
19	Furan	8	002-EF-D	1.7E-04	0.001	17.2%	YES		17.2%
19	Furan	10	002-EF-E	3.4E-04	0.001	33.5%		J	17.2%
19	Furan	12	002-EF-F	6.8E-04	0.001	68.1%		J	17.2%
19	Furan	14	002-EF-G	1.2E-03	0.001	118%			17.2%
19	Furan	16	002-EF-H	1.8E-03	0.001	177%			17.2%
21	2,5-Dihydrofuran	2	001-IN-A	2.5E-04	0.001	25.3%	YES		32.2%
21	2,5-Dihydrofuran	16	001-IN-H	2.8E-03	0.001	278%			32.2%
21	2,5-Dihydrofuran	2	001-EF-A	2.9E-04	0.001	28.6%	YES		32.2%
21	2,5-Dihydrofuran	4	001-EF-B	2.8E-04	0.001	27.8%	YES		32.2%
21	2,5-Dihydrofuran	6	001-EF-C	2.8E-04	0.001	27.7%	YES		32.2%
21	2,5-Dihydrofuran	8	001-EF-D	2.8E-04	0.001	28.3%	YES		32.2%
21	2,5-Dihydrofuran	10	001-EF-E	2.8E-04	0.001	27.6%	YES		32.2%
21	2,5-Dihydrofuran	12	001-EF-F		0.001				32.2%
21	2,5-Dihydrofuran	14	001-EF-G	4.1E-04	0.001	41.5%		J	32.2%
21	2,5-Dihydrofuran	16	001-EF-H	3.8E-03	0.001	377%			32.2%
21	2,5-Dihydrofuran	2	002-IN-A	2.5E-04	0.001	25.4%	YES		32.2%
21	2,5-Dihydrofuran	16	002-IN-H	2.7E-04	0.001	27.0%	YES		32.2%
21	2,5-Dihydrofuran	2	002-EF-A	2.8E-04	0.001	27.5%	YES		32.2%
21	2,5-Dihydrofuran	4	002-EF-B	2.8E-04	0.001	28.2%	YES		32.2%
21	2,5-Dihydrofuran	6	002-EF-C	2.7E-04	0.001	27.5%	YES		32.2%
21	2,5-Dihydrofuran	8	002-EF-D	2.9E-04	0.001	29.3%	YES		32.2%
21	2,5-Dihydrofuran	10	002-EF-E	2.8E-04	0.001	27.6%	YES		32.2%
21	2,5-Dihydrofuran	12	002-EF-F	2.8E-04	0.001	27.6%	YES		32.2%
21	2,5-Dihydrofuran	14	002-EF-G	2.7E-04	0.001	26.8%	YES		32.2%
21	2,5-Dihydrofuran	16	002-EF-H	3.2E-04	0.001	32.2%	YES		32.2%
22	2-Methylfuran	2	001-IN-A	2.4E-04	0.001	23.9%		J	18.6%
22	2-Methylfuran	16	001-IN-H	3.9E-04	0.001	39.2%		J	18.6%
22	2-Methylfuran	2	001-EF-A	1.7E-04	0.001	16.5%	YES		18.6%
22	2-Methylfuran	4	001-EF-B	1.6E-04	0.001	16.1%	YES		18.6%
22	2-Methylfuran	6	001-EF-C	1.6E-04	0.001	16.1%	YES		18.6%
22	2-Methylfuran	8	001-EF-D	1.6E-04	0.001	16.4%	YES		18.6%
22	2-Methylfuran	10	001-EF-E	1.6E-04	0.001	16.0%	YES		18.6%
22	2-Methylfuran	12	001-EF-F		0.001				18.6%
22	2-Methylfuran	14	001-EF-G	1.0E-04	0.001	10.5%	YES		18.6%
22	2-Methylfuran	16	001-EF-H	1.0E-04	0.001	10.5%	YES		18.6%
22	2-Methylfuran	2	002-IN-A	3.4E-04	0.001	34.1%		J	18.6%
22	2-Methylfuran	16	002-IN-H	2.5E-04	0.001	24.7%		J	18.6%
22	2-Methylfuran	2	002-EF-A	1.6E-04	0.001	15.9%	YES		18.6%
22	2-Methylfuran	4	002-EF-B	1.6E-04	0.001	16.3%	YES		18.6%
22	2-Methylfuran	6	002-EF-C	1.6E-04	0.001	15.9%	YES		18.6%
22	2-Methylfuran	8	002-EF-D	1.7E-04	0.001	17.0%	YES		18.6%
22	2-Methylfuran	10	002-EF-E	1.6E-04	0.001	16.0%	YES		18.6%
22	2-Methylfuran	12	002-EF-F	1.6E-04	0.001	16.0%	YES		18.6%
22	2-Methylfuran	14	002-EF-G	1.6E-04	0.001	15.5%	YES		18.6%
22	2-Methylfuran	16	002-EF-H	1.9E-04	0.001	18.6%	YES		18.6%

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