

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

July 2020

SK Nune CK Clayton J Liu CJ Freeman TM Brouns LA Mahoney MJ Minette



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 performance¹ 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, furan², 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 limits¹ (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.

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						
	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 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 drivers¹ 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-SC1¹ 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 reevaluation recommended using the Carbotrap 300 TDU for measuring furan, 2,5-dihydrofuran and 2methylfuran. 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-dihydrofuran¹, 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.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.

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			I			
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				1	1	
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< td=""></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< td=""></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		1		l	1

Table 1. Summary of Analyzed COPCs

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 \geq 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< td=""></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.<="" td=""></dl>
23 2,5-Dimethylfuran	625-86-5	0.03 ppb	1 ppb	3.16%	х	
24 2-Ethyl-5-methylfuran	1703-52-2	Not Detected	1 ppb	TIC	х	
25 4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9	Not Detected	1 ppb	TIC	х	
26 3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4	Not Detected	1 ppb	TIC	х	
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.< td=""></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	х	
32 2-(2-Methyl-6-oxoheptyl)furan	51595-87-0	Not Detected	1 ppb	TIC	х	
Phthalates						
33 Diethylphthalate	84-66-2	0.0020 mg/m3	5 mg/m3	0.017-0.041%	х	
<i>Nitriles</i> 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< td=""></dl<>
39 Heptanenitrile	629-08-3	Not Detected	6 ppm	TIC	х	
40 2-Methylene butanenitrile	1647-11-6	Not Detected	0.3 ppm	TIC	х	
41 2,4-Pentadienenitrile	1615-70-9	Not Detected	0.3 ppm	TIC	х	

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	1			ł	II	
42 Ethylamine Nitrosamines	75-04-7	0.181 ppm	5 ppm	0.103%	х	Up to 3.6% of OEL for inlet values. All outlets <dl< td=""></dl<>
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< td=""></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< td=""></dl<>
45 N-Nitrosomethylethylamine	10595-95-6	0.40 ppb	0.3 ppb	9.85%	х	Up to 132% of OEL for inlet values. All outlets <dl< td=""></dl<>
46 N-Nitrosomorpholine	59-89-2	0.11 ppb	0.6 ppb	3.58%	х	Up to 18.3% of OEL for inlet values. All outlets <dl< td=""></dl<>
Organophospates	1		[
47 Tributyl phosphate	126-73-8	0.0002 ppm	0.2 ppm	0.084%	х	
48 Dibutyl butylphosphonate	78-46-6	0.0001 ppm	0.007 ppm	1.46%	х	
Halogenated	1		[I I	
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< td=""></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< td=""></dl<>
Organonitrites			·		, , , , , , , , , , , , , , , , , , ,	
53 Methyl nitrite	624-91-9	Not Detected	0.1 ppm	TIC	х	
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	х	
56 1,4-Butanediol, dinitrate	3457-91-8	Not Detected	0.05 ppm	TIC	х	
57 2-Nitro-2-methylpropane	594-70-7	Not Detected	0.3 ppm	TIC	х	
58 1,2,3-Propanetriol, 1,3-dinitrate	623-87-0	Not Detected	0.05 ppm	TIC	x	
Isocyanates	I		I		ı	
59 Methyl Isocyanate	624-83-9	Not Detected	20 ppb	TIC	х	

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).

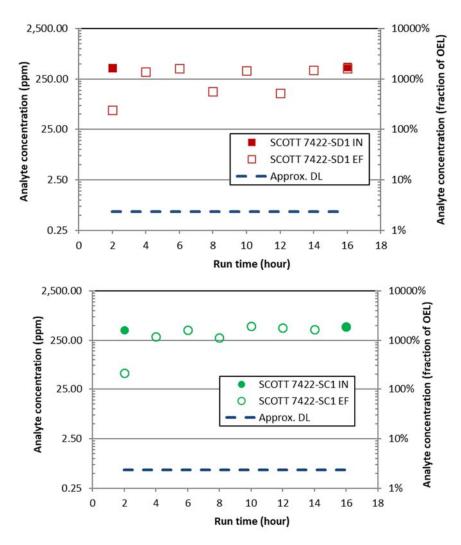


Figure 1. Plot of Measured Ammonia Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1)

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. Breakthrough¹ 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.

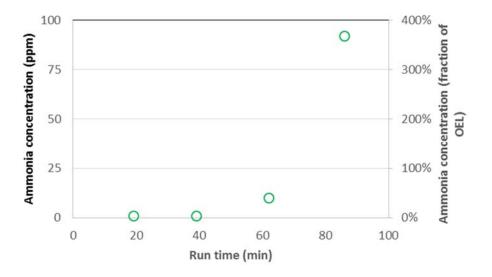


Figure 2. Plot of Direct Reading Instrument Measurements of Ammonia Concentrations after the Outlet of the SCOTT 7422-SC1 Respirator Cartridge Tested

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 μ g/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.

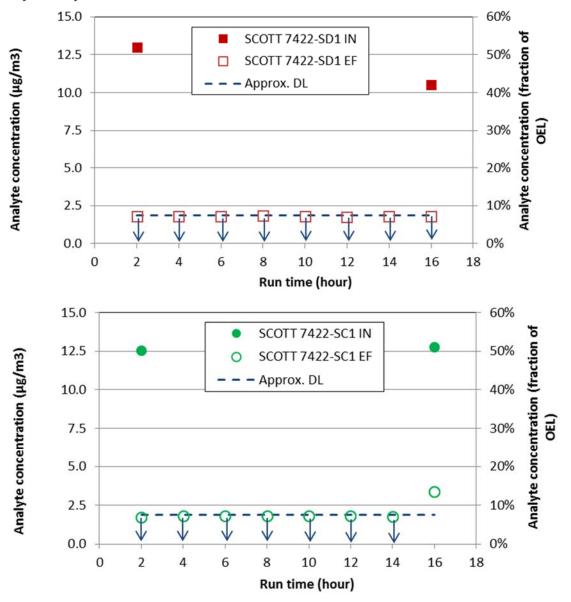


Figure 3. Plot of Measured Mercury Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1).Data points noted with ↓ indicates measurements less than the DL or RL.

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.

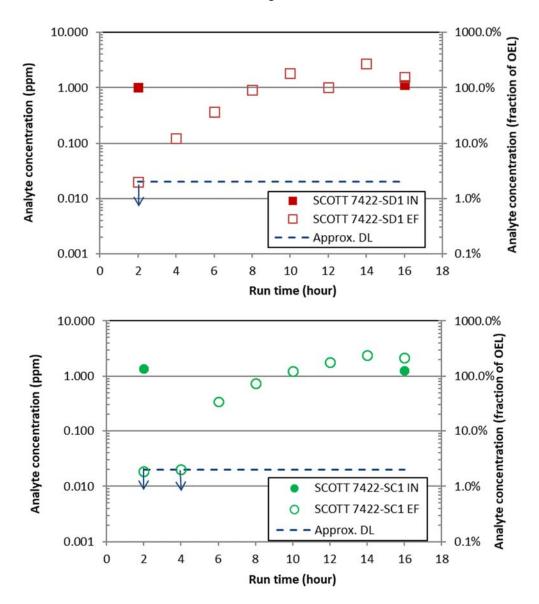


Figure 4. Plot of Measured 1,3-Butadiene Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

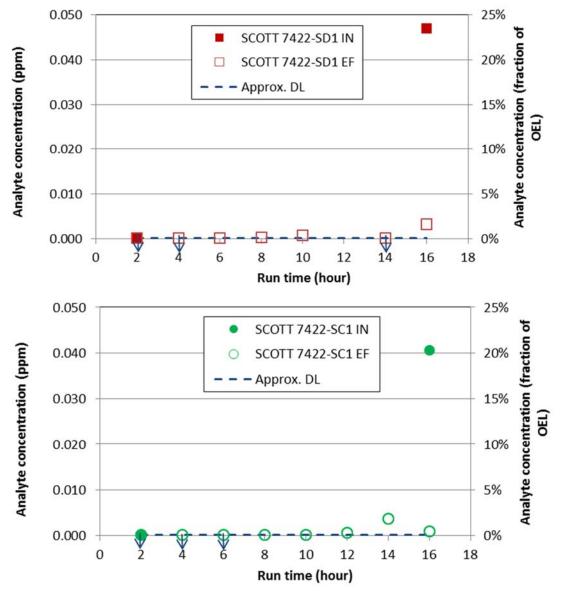


Figure 5. Plot of Measured 3-Buten-2-one Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

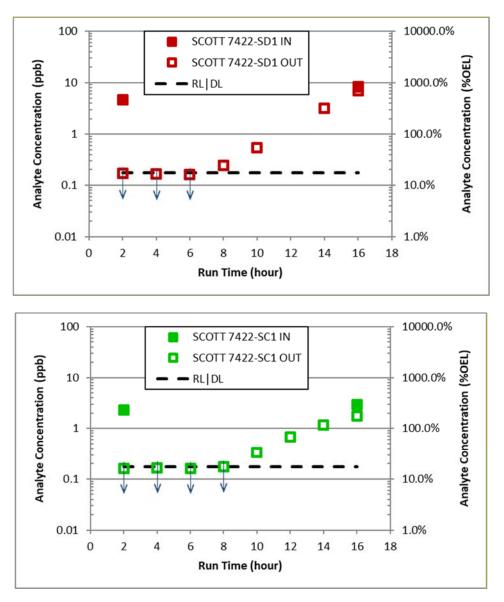


Figure 6. Plot of Measured Furan Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

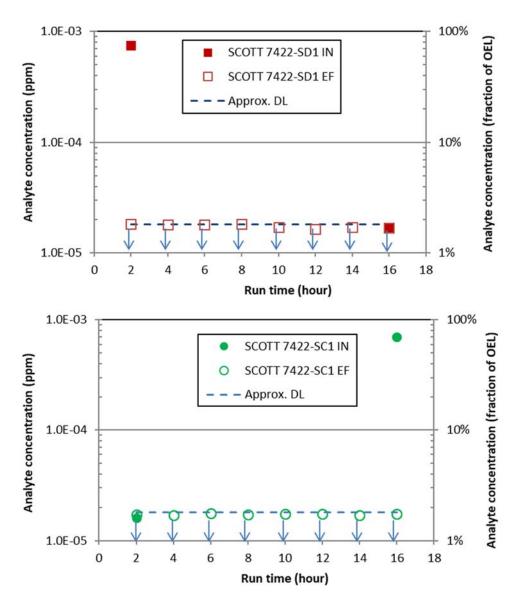


Figure 7. Plot of Measured 2,3-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

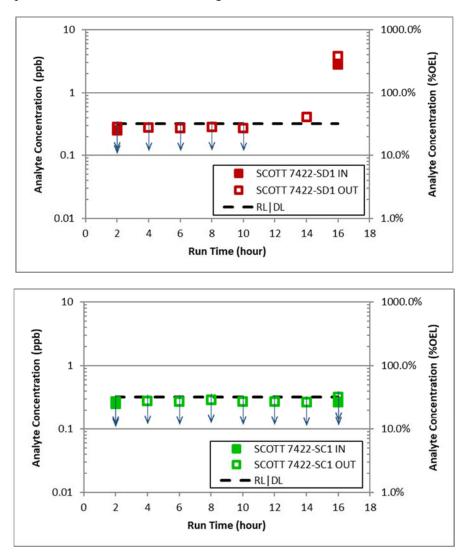


Figure 8. Plot of Measured 2,5-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

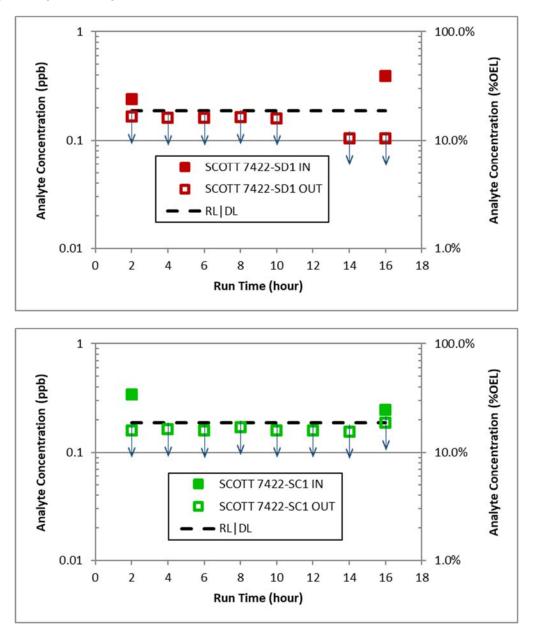


Figure 9. Plot of Measured 2-Methylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

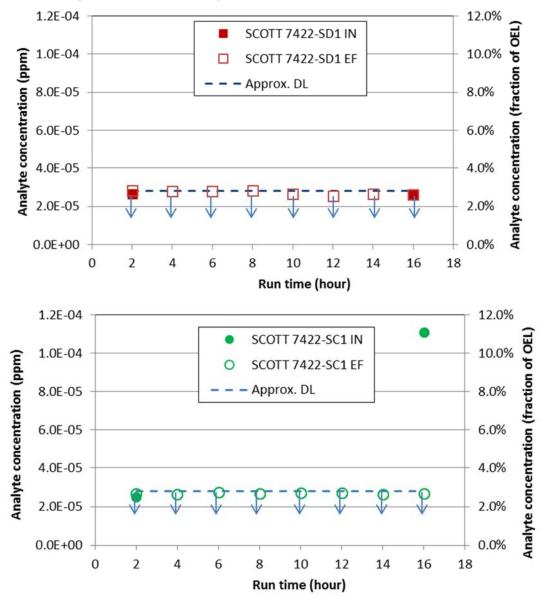


Figure 10. Plot of Measured 2-Propylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

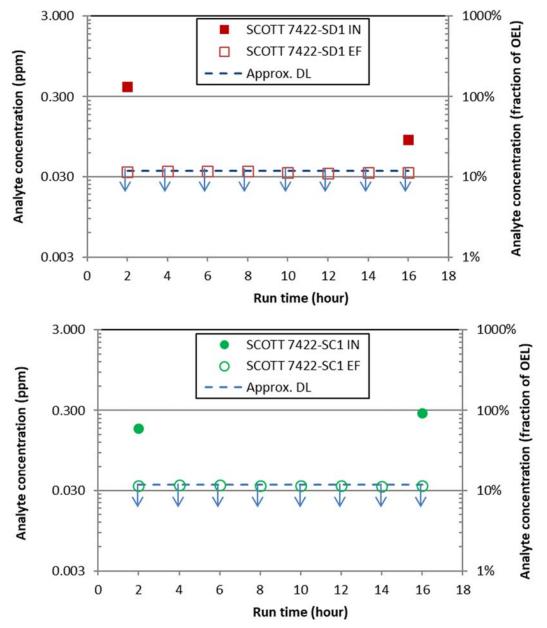


Figure 11. Plot of Measured N-nitrosodimethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

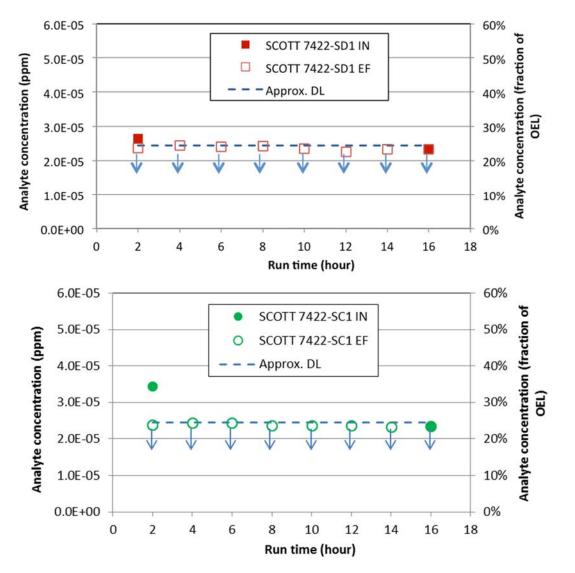


Figure 12. Plot of Measured N-nitrosodiethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

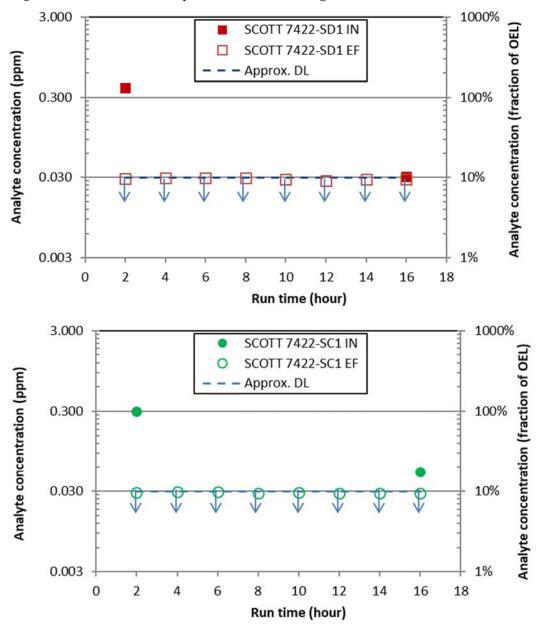


Figure 13. Plot of Measured N-nitrosomethylethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

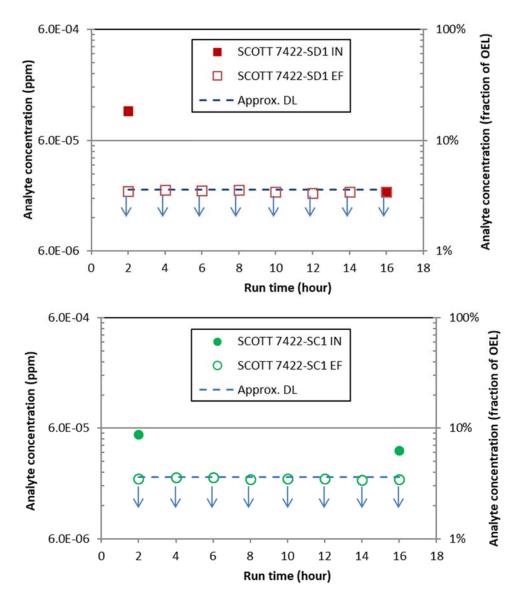


Figure 14. Plot of Measured N-nitrosomorpholine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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 consistent¹ 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.

	, ,					Historica	al Measur	ements ¹		Measuremen	nts in this Study
cc	DPC 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 <i>831</i>	1.8 545	3.6% 1662%	3.6% 1090%	Not N	Neasured
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 Det	ected - 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 Def	ected - TIC
4	1,3-Butadiene	106-99-0	24	1 ppm	2 31	3.38 <i>3.38</i>	1.7 0.174*	338% <i>338%</i>	170% <i>17%*</i>	138%	268%
42	Ethylamine	75-04-7	62	5 ppm	1	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>3.6%</td><td>$0.10\% (RL)^2$</td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>3.6%</td><td>$0.10\% (RL)^2$</td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>3.6%</td><td>$0.10\% (RL)^2$</td></rl<></td></rl<>	<rl< td=""><td>3.6%</td><td>$0.10\% (RL)^2$</td></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</rl 	23.1* <i>110*</i>	<rl 54700%</rl 	2310%* <i>11000%*</i>	819%	698%
59	Methyl Isocyanate	624-83-9	103	20 ppb	0	n/a	n/a	n/a	n/a	Not Det	ected - TIC
20	2,3-Dihydrofuran	1191-99-7	130	1 ppb	1	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>74.5%</td><td>1.8% (DL)</td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>74.5%</td><td>1.8% (DL)</td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>74.5%</td><td>1.8% (DL)</td></rl<></td></rl<>	<rl< td=""><td>74.5%</td><td>1.8% (DL)</td></rl<>	74.5%	1.8% (DL)
22	2-Methylfuran	534-22-5	147	1 ppb	5	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>39.2%</td><td><rl< td=""></rl<></td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>39.2%</td><td><rl< td=""></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>39.2%</td><td><rl< td=""></rl<></td></rl<></td></rl<>	<rl< td=""><td>39.2%</td><td><rl< td=""></rl<></td></rl<>	39.2%	<rl< td=""></rl<>
8	Methanol	67-56-1	148	200 ppm	1	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>Not N</td><td>leasured</td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>Not N</td><td>leasured</td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>Not N</td><td>leasured</td></rl<></td></rl<>	<rl< td=""><td>Not N</td><td>leasured</td></rl<>	Not N	leasured
21	2,5-Dihydrofuran	1708-29-8	152	1 ppb	5	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>278%</td><td>377%</td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>278%</td><td>377%</td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>278%</td><td>377%</td></rl<></td></rl<>	<rl< td=""><td>278%</td><td>377%</td></rl<>	278%	377%

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

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

"(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 OELs¹. 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-25860¹ 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 date² (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

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Appendix A

Description of Respirator Cartridge Testing Setup

Appendix A

Description of Respirator Cartridge Testing Setup

The respirator cartridge-testing system was developed by Washington River Protection Solutions and HiLine Engineering (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 TeflonTM 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, VitonTM, glass, and Masterflex C-flex tubing, which are commonly used for various vapor-sampling applications.

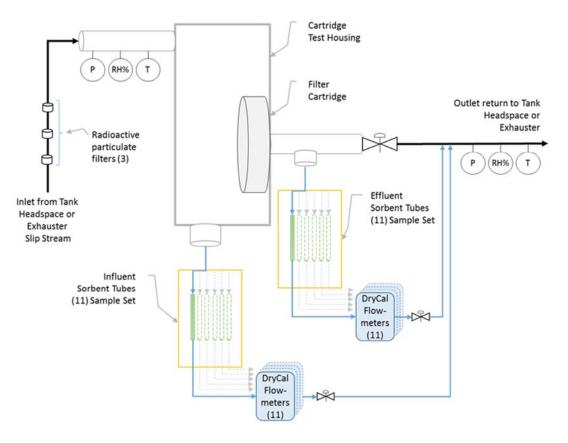


Figure A.1. General Schematic of Respirator Cartridge Test Apparatus

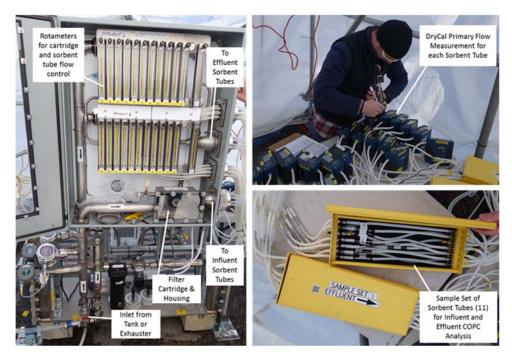


Figure A.2. Photographs of the Respirator Cartridge Test Equipment

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 Med Methods to Extract Analyte Estimate the Concentrations	from Sorbent M	ledia, and Method		•
		Flow Rate	Analytical	Instrument	Analysis

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
EPA: U.S. E OSHA: Occu ^b Instrument Used GC-FID: Ga: GC/MS: Gas CVAA: Cold IC: Ion Chro HPLC: High GC-TEA: Ga HPLC-UV: H ^c Analysis Location ALS: ALS Env WRPS-222S: WHL-222S: V	ional Institute of Occupati nvironmental Protection A upational Safety and Healt s Chromatography-Flame Chromatography-Mass S l Vapor Atomic Absorptio matography Performance Liquid Chro as Chromatography-Thern High Performance Liquid	Agency Agency Administration Ionization Detector pectrometry on omatography nal Energy Analyzer Chromatography-Ult tion Solutions, Organ ory	raviolet Detector ic Studies 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

					Volum	es Air Co	llected (L)					
Sample Box Nu	mber	Mach.	Mach.	64	A2	B1	64	D1	E1	F.4	G1	H1	H2
Analyte	Line	Base 1	Base 2	A1	AZ	BI	C1	DI	EI	F1	GI	HI	HZ
SVOC	Α	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	В	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	С	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	Ε	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	н	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	1	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

					FIOW	nales (i	my mmny						
Sample Box Nu	mber	Mach.	Mach.	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2
Analyte	Line	Base 1	Base 2	AI	AZ.	DI	CI	DI	ET.	LT.	01	TI	IT2
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	В	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	С	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	Е	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	н	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	- 16 -	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	К	1991.5	2089.5	1990	2060	2005	2020	2005	2030	2050	2010	1990	2010

Flow Rates (ml/min)

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

					volum	es All Cu	necteu (-)					
Sample Box Nu	1000	Mach.	Mach.	A1	A2	B1	C1	D1	E1	F1	G1	H1	H2
Analyte	Line	Base 1	Base 2		1.100		~~			D.A.		0.0.4	
SVOC	Α	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	В	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	С	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	н	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	1	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

Volumes Air Collected (L)

Flow Rates (ml/min)

Sample Box Nu	mber	Mach.	Mach.		100	D4	~	54		24		114	H2
Analyte	Line	Base 1	Base 2	A1	A2	B1	C1	D1	E1	F1	G1	H1	HZ
SVOC	Α	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	В	34.777	33.55	33.953	31.611	31.8	32.919	30.201	32.31	32	32.75	32.19	27.265
Furans	С	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	Е	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	Н	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	16	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	К	2030	2010	2035	1990	1995	2015	2040	2050	2035	2050	2015	2025

C.2.2 Temperature, Pressure, and Relative Humidity

Influent- P	re				After	Sample T	aken			
Reading	UOM	Baseline	A	В	С	D	E	F	G	н
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 - Po	ost				After	Sample T	aken			_
Reading	UOM	Baseline	Α	В	С	D	E	F	G	н
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 - P	re				After	Sample T	aken			
Reading	UOM	Baseline	Α	В	С	D	E	F	G	н
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			1			[
VOC	ppm									
Effluent- Po	st	1			After	Sample T	aken			-
Reading	UOM	Baseline	Α	В	C	D	E	F	G	н
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

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

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

Influent- P	re				After	Sample 1	aken			
Reading	UOM	Baseline	A	В	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 - Po	ost				After	Sample 1	aken 🛛		_	_
Reading	UOM	Baseline	A	В	C	D	E	F	G	н
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				1			10		
VOC	ppm									
Effluent - P	re				After	Sample 1	aken			
Reading	UOM	Baseline	A	В	С	D	E	F	G	Н
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- Po	ost				After	Sample 1	aken			
Reading	UOM	Baseline	A	В	С	D	E	F	G	н
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+				1			
VOC	ppm		21.7							

C.3 Raw Analytical Data

C.3.1 SVOC and SVOCTIC

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Cartridge Evaluation Data Summary Report

Sample Group: 20162089 SDG Number:

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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 %	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	U SVOA #2									1			
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	06	<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	26	<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	06	<0.81	61	n/a	n/a	n/a	n/a	0.81	n/a	ш
S16T021061	544-76-3	Hexadecane-	NGS	88	<1.9	4.1	n/a	n/a	n/a	n/a	1.9	n/a	7
S16T021061	629-59-4	Tetradecane	NGS	87	<1.2	6.3	n/a	n/a	n/a	n/a	1.2	n/a	-
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	-

8/11/10

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

T - Tentatively Identified Compound

B - Blank Contamination

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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# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	U 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	Na	3.4	n/a
S16T021062	108-39-4M	Cresol (m & p)	NGS	66	<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	na	2.8	n/a
S16T021062	112-40-3	Dodecane	NGS	06	<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

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

T - Tentatively Identified Compound

B - Blank Contamination

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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

VAPOR-TDU SVOA #2 VAPOR-TDU SVOA #2 S167D210633 3891-89.3 2.6,10-Trimethylodocane NGS 88 <1.1 n/a n/a n/a n/a n/a 1.1 n/a S167D210633 954-87 2.6,10-Trimethylodocane NGS 88 <1.1 n/a <	Sample# R	A# CAS#		Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD % Spk Rec %	k Rec %	Det Limit Cut	Det Limit Cnt Err % Qual Flags
	VAPOR-TD	U SVOA #2												
95-48-7 2-Methylphenol NGS 86 < 3.4 < 7.3 $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ $< 1/2$ <th< td=""><td>S16T021063</td><td>3891-96</td><td>8-3</td><td>2,6,10-Trimethyldodecane</td><td>NGS</td><td>88</td><td><1.1</td><td><1.1</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td><td>1.1</td><td>n/a</td></th<>	S16T021063	3891-96	8-3	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	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a
	S16T021063	108-39-	1-4M	Cresol (m & p)	NGS	06	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a
78-46-6 Dibutyl butypinosphonate NGS 97 ~2.9 ~2.9 n/a n/a n/a n/a n/a 2.9 84-66-2 Diethylphosphonate NGS 83 ~2.8 ~2.8 n/a n/a n/a n/a n/a n/a n/a 2.8 112-40-3 Dodecane NGS 89 ~0.81 70 n/a n/a n/a n/a n/a n/a 1.9 2.8 544-76-3 Hexadecane NGS 87 ~1.9 ~1.9 n/a n/a n/a n/a n/a n/a 1.9 1.9 544-76-3 Hexadecane NGS 87 ~1.2 5.1 n/a n/a n/a n/a 1.4 1.2 629-59-4 Tetradecane NGS 110 ~6.0 ~6.0 n/a n/a n/a n/a 1.2 126-73-8 Tributyl phosphate NGS 110 ~6.0 ~6.0 n/a n/a n/a <td>S16T021063</td> <td>92-52-4</td> <td></td> <td>Biphenyl</td> <td>NGS</td> <td>83</td> <td><2.0</td> <td><2.0</td> <td>n/a</td> <td>n/a</td> <td>n/a</td> <td>n/a</td> <td>2.0</td> <td>n/a</td>	S16T021063	92-52-4		Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a
84-65-2 Diethylphthalate NGS 83 <2.8 <2.8 n/a n/a n/a n/a 2.8 112-40-3 Dodecane NGS 90 <0.81	S16T021063	78-46-6	9	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a
112-40-3 Dodecane NGS 90 <0.81 70 n/a n/a n/a n/a 0.81 <th< td=""><td>S16T021063</td><td>84-66-2</td><td>2</td><td>Diethylphthalate</td><td>NGS</td><td>83</td><td><2.8</td><td><2.8</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td><td>2.8</td><td>n/a</td></th<>	S16T021063	84-66-2	2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a
544-76-3 Hexadecane- NGS 88 <1.9 n/a n/a n/a n/a n/a 1.9 1.9 629-59-4 Tetradecane NGS 87 <1.2	S16T021063	112-40-		Dodecane	NGS	90	<0.81	20	n/a	n/a	n/a	n/a	0.81	n/a E
629-59-4 Tetradecane NGS 87 <1.2 5.1 n/a n/a n/a n/a n/a 1.2 126-73-8 Tributyl phosphate NGS 110 <6.0	S16T021063	544-76-	-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a
126-73-8 Tributyl phosphate NGS 110 <6.0 <6.0 <6.0 n/a n/a n/a n/a 6.0 629-50-5 Tridecane NGS 95 <0.50	S16T021063	629-59-	P	Tetradecane	NGS	87	<1.2	5.1	n/a	n/a	n/a	n/a	1.2	n/a J
629-50-5 Tridecane NGS 95 <0.50 18 n/a n/a n/a n/a 0.46 <t< td=""><td>S16T021063</td><td>126-73-</td><td>89</td><td>Tributyl phosphate</td><td>NGS</td><td>110</td><td><6.0</td><td><6.0</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td><td>6.0</td><td>n/a</td></t<>	S16T021063	126-73-	89	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a
629-78-7 Heptadecane NGS 100 <5.2 <5.2 n/a n/a n/a 5.2 629-62-9 Pentadecane NGS 88 <2.8	S16T021063	629-50-	-5	Tridecane	NGS	95	<0.50	18	n/a	n/a	n/a	n/a	0.46	n/a
629-62-9 Pentadecane NGS 88 <2.8 <2.8 n/a n/a n/a 2.8	S16T021063	629-78-	2-1	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	n/a
	S16T021063	629-62-	6-3	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a

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

T - Tentatively Identified Compound

B - Blank Contamination

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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 %	Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	U SVOA #2											
S16T021064	3891-98-3	2,6,10-Trimethyldodecane	NGS	88	4.1	<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	06	<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	26	<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	06	<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#	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	U SV	(OA #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	6	<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	26	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a
S16T021065		84-66-2	Diethyiphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a
S16T021065		112-40-3	Dodecane	NGS	66	<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	l alu
S16T021065		629-59-4	Tetradecane	NGS	87	<1.2	8.5	n/a	n/a	n/a	n/a	1.2	la 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 J - Estimated

T - Tentatively Identified Compound

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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	Det Limit Cnt Err % Qual Flags	Ual Flags
VAPOR-TDU SVOA #2	I 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	26	<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	66	<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	U/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	L B/U	

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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	¥#	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit C	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	U SV	OA #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	06	<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	26	<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	06	<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

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

T - Tentatively Identified Compound

B - Blank Contamination

E - Outside Calibration Range N - Named TIC

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Cartridge Evaluation Data Summary Report

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

no.		CUSIONING SAMPLE ID. 10-0302-1-ELL-DASE										
Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit Cnt	Ę
VAPOR-TDU SVOA #2	U SVOA #2											L
S16T021069	3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	1.1	E.
S16T021069	95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	1
S16T021069	108-39-4M	A Cresol (m & p)	NGS	06	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	L .
S16T021069	92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	
S16T021069	78-46-6	Dibutyl butylphosphonate	NGS	16	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	L .
S16T021069	84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	
S16T021069	112-40-3	Dodecane	NGS	90	<0.81	31	n/a	n/a	n/a	n/a	0.81	
S16T021069	544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	
S16T021069	629-59-4	Tetradecane	NGS	87	<1.2	3.2	n/a	n/a	n/a	n/a	1.2	
S16T021069	126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	
S16T021069	629-50-5	Tridecane	NGS	95	<0.50	12	n/a	n/a	n/a	n/a	0.46	
S16T021069	629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	5.2	
S16T021069	629-62-9	Pentadecane	NGS	88	<2.8	3.2	n/a	n/a	n/a	n/a	2.8	1

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

T - Tentatively Identified Compound

B - Blank Contamination

E - Outside Calibration Range N - Named TIC

it Err % Qual Flags

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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	Det Limit Cnt Err % Qual Flags	I Flags
VAPOR-TDU SVOA #2	J 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	Γ
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	06	<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	26	<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	06	<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		

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

T - Tentatively Identified Compound

B - Blank Contamination

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Cartridge Evaluation Data Summary Report

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

Sample# R	A# CAS #	Analyto	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	I SVOA #2						1					
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	96	<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	16	<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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T - Tentatively Identified Compound

B - Blank Contamination

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Cartridge Evaluation Data Summary Report

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

Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD % Spk Rec %		Det Limit Cnt Err % Qual Flags	Qual Flags
VAPOR-TDU SVOA #2	J SVOA #2											
S16T021073	3891-98-3	2,6,10-Trimethyldodecane	NGS	86	<1.1	<10	n/a	n/a	n/a n	n/a	1.1 n/a	
S16T021073	95-48-7	2-Methylphenol	NGS	06	<3.4	<10	n/a	n/a	n/a n	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	n/a	2.4 n/a	
S16T021073	92-52-4	Biphenyl	NGS	93	<2.0	<10	n/a	n/a	n/a n	n/a	2.0 n/a	
S16T021073	78-46-6	Dibutyl butylphosphonate	NGS	100	<2.9	<10	n/a	n/a	n/a n	n/a	2.9 n/a	
S16T021073	84-66-2	Diethylphthalate	NGS	78	<2.8	<10	n/a	n/a	n/a n	n/a	2.8 n/a	
S16T021073	112-40-3	Dodecane	NGS	92	1.0	27	n/a	n/a	n/a n	n/a	0.81 n/a B	
S16T021073	544-76-3	Hexadecane-	NGS	92	<1.9	<10	n/a	n/a	n/a n	n/a	1.9 n/a	
S16T021073	629-59-4	Tetradecane	NGS	26	<1.2	<10	n/a	n/a	n/a n	n/a	1.2 n/a	
S16T021073	126-73-8	Tributyl phosphate	NGS	130	<6.0	<10	n/a	n/a	n/a n	n/a	6.0 n/a	
S16T021073	629-50-5	Tridecane	NGS	89	1.8	<10	n/a	n/a	n/a n	n/a	0.46 n/a BJ	8
S16T021073	629-78-7	Heptadecane	NGS	120	<5.2	<10	n/a	n/a	n/a n	n/a	5.2 n/a	
S16T021073	629-62-9	Pentadecane	NGS	96	<2.8	<10	n/a	n/a	n/a n	n/a	2.8 n/a	

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T - Tentatively Identified Compound

E - Outside Calibration Range N - Named TIC

B - Blank Contamination

11 - Aug - 2016 15:06:27 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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	Det Limit Cnt Err % Qual Flags	al Flags
VAPOR-TDU SVOA #2	J 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	06	<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	Biphenyi	NGS	93	<2.0	<10	n/a	n/a	n/a	n/a	2.0		
S16T021203	78-46-6	Dibutyl butylphosphonate	NGS	100	<2.9	<10	n/a	n/a	n/a	n/a	2.9		
S16T021203	84-66-2	Diethylphthalate	NGS	78	<2.8	<10	n/a	n/a	n/a	n/a	2.8		
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	l alu	
S16T021203	629-59-4	Tetradecane	NGS	26	<1.2	<10	n/a	n/a	n/a	n/a	1.2	L N/a	
S16T021203	126-73-8	Tributyl phosphate	NGS	130	<6.0	<10	n/a	n/a	n/a	n/a	6.0		
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		
S16T021203	629-62-9	Pentadecane	NGS	96	<2.8	<10	n/a	n/a	n/a	n/a	28	l e/u	

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T - Tentatively Identified Compound

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E - Outside Calibration Range N - Named TIC

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Cartridge Evaluation Data Summary Report

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05 - Dec - 2016 14:45:37 DSRHardcopyWOLImits 3.0.13 DSR.Jar v. 3.0.12

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

202	Iduipe iauioisno	18-1-20200-01 .UI AI											
Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	ual Flags
VAPOR-TDU SVOA #2	U SVOA #2												ľ
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	Γ
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	66	<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	16	<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	6	<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	r a/u	
S16T021061	629-59-4	Tetradecane	NGS	87	<1.2	6.3	n/a	n/a	n/a	Na	1.2	L e/u	
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	Γ
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

NA = Not Analyzed, ND = Not Detected

J - Estimated

T - Tentatively Identified Compound

N - Named TIC

E - Outside Calibration Range B - Blank Contamination

05 - Dec - 2016 14:45:37 DSRHardcopyWOLimits 3.0.13 DSR.Jar v. 3.0.12

Cartridge Evaluation Data Summary Report

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

Sample# R	Alt CAS +	Analyte	1 lots	in and	Diant	Desult	Dual land				111	
	A DAD	as from a		210%	Anald	MINSON	ouplicate	Average		KPU % Spk Kec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	U 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	06	<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	26	<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	06	<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	l a/u
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	e/u	e/u	n/a	9 6	1 olu

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E - Outside Calibration Range B - Blank Contamination

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

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Cartridge Evaluation Data Summary Report

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

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Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	I 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	60	<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	16	<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	60	<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

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

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Cartridge Evaluation Data Summary Report

05 - Dec - 2016 14:45:37 DSRHardcopyWOLimits 3.0.13 DSR.Jar v. 3.0.12

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

R Aff CAS.# OR-TDU S/VOA.#2 3891-98-3 1064 3891-98-3 064 95-48-7 064 95-48-7 064 108-39-4M 064 108-39-4M 064 112-40-3 064 112-40-3 064 544-76-3 064 542-59-4 064 126-73-8 064 126-53-8 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5 064 629-50-5	l	ļ													
TDU SVOA #2 TDU SVOA #2 3881-98-3 2.6,10-Trimethyldodecane NGS 88 <1.1 r/1 r/a	Sample# R	₹	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cut Err % Qual FI	lads
	VAPOR-TD	VS U	/OA #2	3											•
95-48-7 2.Methylphenol NGS 86 < 3.4 π/a	\$16T021064		3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1>	n/a	n/a	n/a		11		
	\$16T021064		95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a		3.4		
82-52-4 Biphenyl NGS 83 <2.0 $< < 2.0$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$ $< < 1/2$	316T021064		108-39-4M	Cresol (m & p)	NGS	06	<2.4	<2.4	n/a	n/a	n/a		24		
78-46-6 Dibutyf burtyfnosphonate NGS 97 ~2.9 ~2.9 n/a n/a n/a n/a 2.9 84-66-2 Dibutyf burtyfnosphonate NGS 83 ~2.8 ~2.8 n/a n/a n/a n/a 2.8 112-40-3 Dodecane NGS 83 ~2.8 ~2.8 n/a n/a n/a n/a 2.8 544-76-3 Hexadecane NGS 89 ~1.9 ~1.9 n/a n/a n/a n/a 1.9 544-76-3 Hexadecane NGS 88 <1.9	316T021064		92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a		2.0		
84-66-2 Diethylphthaiate NGS 83 <2.8 <2.8 n/a n/a n/a n/a n/a 2.8 112-40-3 Dodecane NGS 90 <0.81	16T021064		78-46-6	Dibutyl butylphosphonate	NGS	16	<2.9	<2.9	n/a	n/a	n/a		2.9		
(12-40-3) Dodecane NGS 90 <0.81 <0.81 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8 <0.8	16T021064		84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a		2.8		
544-76-3 Hexadecane- NGS 88 <1.9 <1.9 <1/a <1/a <1/a <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9 <1.9	16T021064		112-40-3	Dodecane	NGS	06	<0.81	<0.81	n/a	n/a	n/a		0.81		
629-59-4 Tetradecane NGS 87 <1.2 <1.2 n/a n/a n/a n/a 1.2 126-73-8 Tributy phosphate NGS 110 <6.0	16T021064		544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a		19		
126-73-8 Tributy phosphate NGS 110 <6.0 <6.0 n/a n/a n/a n/a 6.0 <th6.0< th=""> <th6.0< th=""> 6.0</th6.0<></th6.0<>	16T021064		629-59-4	Tetradecane	NGS	87	<1.2	<1.2	n/a	n/a	n/a		1.2		
629-50-5 Tridecane NGS 95 <0.50 <0.50 n/a n/a n/a 0.50 629-78-7 Heptadecane NGS 100 <5.2	16T021064		126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a		6.0		
629-78-7 Heptadecane NGS 100 <5.2 <5.2 n/a n/a n/a 5.2 629-62-9 Pentadecane NGS 88 <2.8	16T021064		629-50-5	Tridecane	NGS	96	<0.50	<0.50	n/a	n/a	n/a		0.50		
629-62-9 Pentadecane NGS 88 <2.8 <2.8 n/a n/a n/a 1/a 28	16T021064		629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a		52		
	16T021064		629-62-9	Pentadecane	NGS	88	<2.8	<2.8	n/a	n/a	n/a		28		

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

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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

	and man annound										
Sample# R	A# CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD % Spk Rec %	Kec %	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	U 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	
S16T021065	108-39-4M	Cresol (m & p)	NGS	06	<2.4	<2.4	n/a	n/a	n/a	n/a	
S16T021065	92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	
S16T021065	78-46-6	Dibutyl butylphosphonate	NGS	26	<2.9	<2.9	n/a	n/a	n/a	n/a	
S16T021065	84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	
S16T021065	112-40-3	Dodecane	NGS	06	<0.81	81	n/a	n/a	n/a	n/a	
S16T021065	544-76-3	Hexadecane-	NGS	88	<1.9	6.1	n/a	n/a	n/a	n/a	
S16T021065	629-59-4	Tetradecane	NGS	87	<1.2	8.5	n/a	n/a	n/a	n/a	
S16T021065	126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	
S16T021065	629-50-5	Tridecane	NGS	95	<0.50	36	n/a	n/a	n/a	n/a	
S16T021065	629-78-7	Heptadecane	NGS	100	<5.2	6.2	n/a	n/a	n/a	n/a	
S16T021065	629-62-9	Pentadecane	NGS	88	<2.8	10	n/a	n/a	n/a	n/a	

E - Outside Calibration Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

05 - Dec - 2016 14:45:37 DSRHardcopyWOLimits 3.0.13 DSR.Jar v. 3.0.12

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

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and and and	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Cut Frr % Oual Flags
VAPOR-TDU SVOA #2	U SVOA #2											
S16T021066	3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1>	<1.1	n/a	n/a	n/a	n/a	11	10/u
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	66	<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	20	e/u
S16T021066	78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	n/a	29	n/a
S16T021066	84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	
S16T021066	112-40-3	Dodecane	NGS	06	<0.81	40	n/a	n/a	e/u	n/a	0.81	
S16T021066	544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	nla	a)u	elu	10	T
S16T021066	629-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	0.1	
S16T021066	126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	alu	e o s	a put
S16T021066	629-50-5	Tridecane	NGS	95	<0.50	11	n/a	n/a	n/a	n/a	0.46	D/a
S16T021066	629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	52	n/a
S16T021066	629-62-9	Pentadecane	NGS	88	<2.8	3.5	n/a	n/a	n/a	n/a	2.8	l'a/u

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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 %	RPD % Sok Rec %	Det Limit	Det Limit Ont Frr % Oual Flace
VAPOR-TDU SVOA #2	U SVOA #2											
S16T021067	3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1	<1.1	n/a	n/a	n/a	n/a	11	n/a
S16T021067	95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	34	nla
S16T021067	108-39-4M	Cresol (m & p)	NGS	6	<2.4	<2.4	n/a	n/a	n/a	n/a	24	n/a
S16T021067	92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	00	nla
S16T021067	78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	alu alu	00	elu
S16T021067	84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	alu	80	2/2 C/2
S16T021067	112-40-3	Dodecane	NGS	06	<0.81	33	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	e/u	a/u	alu	10	n/a 1
S16T021067	629-59-4	Tetradecane	NGS	87	<1.2	3.4	n/a	n/a	n/a	n/a	12	1 a l
S16T021067	126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	60	n/a
S16T021067	629-50-5	Tridecane	NGS	95	<0.50	9.3	n/a	n/a	n/a	n/a	0.46	1/a.1
S16T021067	629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	n/a	52	n/a
S16T021067	629-62-9	Pentadecane	NGS	88	<28	45	ola	ala	-1	1		

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E - Outside Calibration Range B - Blank Contamination

Cartridge Evaluation Data Summary Report

05 - Dec - 2016 14:45:37 DSRHardcopyWOLimits 3.0.13 DSR.Jar v. 3.0.12

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

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	K AW CAS#	Analyte	IUN	210%	Blank	Result	Duplicate	Average	RPD % Spk Rec %	k Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	I SVOA #2											0
S16T021069	3891-98-3	2,6,10-Trimethyldodecane	NGS	88	<1.1>	<1.1	n/a	n/a	n/a	n/a	11	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	66	<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	66	<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	l a J
S16T021069	126-73-8	Tributyl phosphatè	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

05 - Dec - 2016 14:45:37 DSRHardcopyWOLimits 3.0.13 DSR.Jar v. 3.0.12

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

	AT CASE	Analyte	Inte		Diant							
	-			210%	Antero	Insan	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flaos
VAPOR-TDU SVOA #2	SVOA #2											
S16T021070	3891-98-3	2 6 10-Trimethyldodecane	NICC	00	1.1.1					İ		
			CON	8	1.12	1.12	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	34	
S16T021070	108-39-4M	Cresol (m & p)	NGS	90	<2.4	<2.4	e/u	clu	ola	ala ala		
S16T021070	92-52-4	Binhenvl	NICO	6	00			511	Dal	201	2.4	D/3
		Guandia	2021	3	0.22	<2.0	n/a	n/a	n/a	n/a	2.0	n/a
S161021070	78-46-6	Dibutyl butylphosphonate	NGS	97	<2.9	<2.9	n/a	n/a	n/a	alu	20	
S16T021070	84-66-2	Diethylphthalate	NGS	83	<2.8	0.0	olu	da	ole ole		0.4	
C16T031070	440 40.0					2	0.11	PAI	ING	BAI	2.2	n/a
0101201010	2-0+-211	Dodecane	NGS	06	<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	alu	ela	clo	10	
S16T021070	629-59-4	Tetradecane	NGS	87	<12	14	e/u	-	ala ala	a la	0.1	
S16T021070	126-73-8	Tributyl phosphate	NGS	110	<6.0	< B D	ala	ala	PAL	11/2	71	Na J
S16T021070	629-50-5	Tridecane	NCC	90	02.01	2.0	011	PAI	E/1	Na	6.0	n/a
		21000011	2001	Ca	nc:ns	0.0	n/a	n/a	n/a	n/a	0.46	n/aJ
S16T021070	629-78-7	Heptadecane	NGS	100	<5.2	<5.2	n/a	n/a	n/a	alu	5.2	nfo
S16T021070	629-62-9	Pentadecane	NGS	88	<2.8	<2.8	alu	ola	ola	ole	4.0	-1-

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Cartridge Evaluation Data Summary Report

05 - Dec - 2016 14:45:37 DSRHardcopyWOLimits 3.0.13 DSR.Jar v. 3.0.12

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

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TDU SVOA #2 3891-98-3 2.6, 10-Trimethyldodecane NGS 88 95-48-7 2-Methylphenol NGS 86 95-48-7 2-Methylphenol NGS 90 92-52-4 Biphenyl NGS 90 92-52-4 Biphenyl NGS 97 92-52-4 Biphenyl NGS 83 78-46-6 Dibutyl butylphosphonate NGS 87 84-66-2 Dibutyl butylphosphonate NGS 87 84-66-3 Dibutyl butylphosphonate NGS 83 112-40-3 Dodecane NGS 88 629-56-4 Tetradecane NGS 88 629-50-5 Tridecane NGS 90 629-50-5 Tridecane NGS 95 629-76-7 Heptadecane NGS 95 629-76-7 Heptadecane NGS 96 629-76-7 Heptadecane NGS 96 629-76-7 Heptadecane NGS 96	Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD % Spk Rec %		Det Limiti	Det Limit Cnt Err % Oual Flaos
3891-98-3 2.6, 10-Trimethyldodecane NGS 88 95-48-7 2-Methylphenol NGS 86 108-39-4M Cresol (m & p) NGS 90 92-52-4 Biphenyl NGS 93 92-52-4 Biphenyl NGS 97 92-52-4 Biphenyl NGS 83 78-46-5 Dibutyl butylphosphonate NGS 87 84-66-2 Dibutyl butylphosphonate NGS 83 112-40-3 Dodecane NGS 83 629-56-4 Tetradecane- NGS 88 629-56-5 Tridecane NGS 90 629-50-5 Tridecane NGS 91 629-76-7 Heptadecane NGS 95 629-76-7 Heptadecane NGS 95	VAPOR-TDI	J SVOA #2	S							-			
95-48-7 2-Methylphenol NGS 86 108-39-4M Cresol (m & p) NGS 90 92-52-4 Biphenyl NGS 90 92-52-4 Biphenyl NGS 97 84-66-5 Dibutyl butylphosphonate NGS 83 78-46-6 Dibutyl butylphosphonate NGS 83 84-66-2 Dibutyl butylphosphonate NGS 83 84-66-3 Dibutyl butylphosphonate NGS 83 84-66-4 Dibutyl butylphosphonate NGS 83 629-56-4 Tetradecane NGS 88 629-56-5 Tridecane NGS 110 629-50-5 Tridecane NGS 95 <	5T021072	3891-98-3		NGS	88	<1.1	1.1>	n/a	n/a	n/a	n/a	1.1	n/a
108-39-4M Cresol (m & p) NGS 90 92-52-4 Biphenyi NGS 83 92-52-4 Biphenyi NGS 83 78-46-6 Dibutyi butyiphosphonate NGS 83 84-66-2 Dibutyi butyiphosphonate NGS 87 84-66-3 Dibutyi butyiphosphonate NGS 83 112-40-3 Dodecane NGS 83 544-76-3 Haxadecane- NGS 88 629-56-4 Tetradecane NGS 88 629-50-5 Tridecane NGS 90 <	ST021072	95-48-7	2-Methylphenol	NGS	86	<3.4	<3.4	n/a	n/a	n/a	n/a	3.4	n/a
92-52-4 Biphenyl NGS 83 78-46-6 Dibutyl butylphosphonate NGS 87 84-66-2 Dibutyl butylphosphonate NGS 87 84-66-3 Dibutyl butylphosphonate NGS 83 112-40-3 Dodecane NGS 83 544-76-3 Hexadecane- NGS 88 629-56-4 Tetradecane NGS 88 629-50-5 Tridecane NGS 90 <	ST021072	108-39-4M		NGS	90	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a
78-46-6 Dibutyl butylphosphonate NGS 97 84-66-2 Dibutyl butylphosphonate NGS 83 112-40-3 Dodecane NGS 83 544-76-3 Hexadecane- NGS 90 <	ST021072	92-52-4	Biphenyl	NGS	83	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0	n/a
84-66-2 Diethylphthalate NGS 83 112-40-3 Dodecane NGS 90 <	T021072	78-46-6	Dibutyl butylphosphonate	NGS	16	<2.9	<2.9	n/a	n/a	n/a	n/a	2.9	n/a
I12-40-3 Dodecane NGS 90 < 544-76-3 Hexadecane- NGS 98 629-56-4 Tetradecane NGS 88 126-73-8 Thutyl phosphate NGS 87 629-50-5 Tridecane NGS 95 629-50-5 Tridecane NGS 95 629-50-5 Tridecane NGS 95 629-50-5 Teleptadecane NGS 95	T021072	84-66-2	Diethylphthalate	NGS	83	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	n/a
544-76-3 Hexadecane- NGS 88 629-59-4 Tetradecane NGS 87 126-73-8 Tributyl phosphate NGS 87 629-50-5 Tridecane NGS 95 629-78-7 Heptadecane NGS 100 629-78-7 Antodocane NGS 100	ST021072	112-40-3	Dodecane	NGS	06	<0.81	37	n/a	n/a	n/a	n/a	0.81	n/a
629-59-4 Tetradecane NGS 87 126-73-8 Tributyl phosphate NGS 110 629-50-5 Tridecane NGS 95 629-78-7 Heptadecane NGS 100 629-78-3 Denindecane NGS 100	ST021072	544-76-3	Hexadecane-	NGS	88	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a
126-73-8 Tributyl phosphate NGS 110 629-50-5 Tridecane NGS 95 <	1021072	629-59-4	Tetradecane	NGS	87	<1.2	2.3	n/a	n/a	n/a	n/a	12	l n/a J
629-50-5 Tridecane NGS 95 629-78-7 Heptadecane NGS 100 629-78-0 Daniedocane NGS 100	ST021072	126-73-8	Tributyl phosphate	NGS	110	<6.0	<6.0	n/a	n/a	n/a	n/a	6.0	n/a
629-78-7 Heptadecane NGS 100	ST021072	629-50-5	Tridecane	NGS	95	<0.50	14	n/a	n/a	n/a	n/a	0.46	n/a
820.62-0 Bontadonno	T021072	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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T - Tentatively Identified Compound

N - Named TIC

05 - Dec - 2016 14:45:37 DSRHardcopyWOLimits 3.0.13 DSR.Jar v. 3.0.12

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 % Sok Rec %	Det Limit	Det Limiti Cat Ear & Ount Eland
VAPOR-TDU SVOA #2	NS N	(OA #2											כוורבוו שלממו בומ
S16T021073		3891-98-3	2,6,10-Trimethyldodecane	NGS	98	11	41	n/n	ala	101-	111		
S16T021073		95-48-7	2-Methylphenol	NGS	U	23.4	121	of o	-t-	PAL	11/1	1	
S16T021073		108-30-4M	Creent (m 2 m)	0014	00	1.0	1.0	ING	B/U	D/3	n/a	3.4	n/a
	1	Mit on one	creati (iii a p)	NGS	30	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a
S161021073		92-52-4	Biphenyl	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	20	nla
S16T021073	_	78-46-6	Dibutyl butylphosphonate	NGS	100	<2.9	<2.9	n/a	n/a	e/u	alu	00	
S16T021073		84-66-2	Diethylphthalate	NGS	78	<2.8	<2.8	n/a	a/u	slu	ela	0.7	
S16T021073		112-40-3	Dodecane	NGS	60	10	10	ola.	a la	-1-	001	0.7	
S16T021073		544-76-3	Hexadecane-	NCC	8	0.11	1		201	ING	P/U	18.0	n/a B
CAPTOMOTO				2021	70	2.1.	2.12	n/a	n/a	n/a	n/a	1.9	n/a
\$101701019		+-AC-A70	l etradecane	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	alu	e o	
S16T021073		629-50-5	Tridecane	NGS	68	1.8	8.0	n/a	e/u	elu	ele	0.46	1001
S16T021073		629-78-7	Heptadecane	NGS	120	<5.2	<5.2	nla	e/u	ola ola	ala	04-70	
S16T021073		629-62-9	Pentadecane	NGS	96	<2.8	<2.8	n/a	e/u	e/u	on of a	200	
										200	541	0.9	PAI

T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected

J - Estimated

N - Named TIC

05 - Dec - 2016 14:45:37 DSRHardcopyWOLimits 3.0.13 DSR.Jar v. 3.0.12

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 %	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	LDU S	VOA #2												ľ
S16T021203	\vdash	3891-98-3	2,6,10-Trimethyldodecane	NGS	86	<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	nía	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	7
S16T021203		629-59-4	Tetradecane	NGS	26	<12	6.0	n/a	n/a	n/a	n/a	1.2	n/a	,
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	8
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	,

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T - Tentatively Identified Compound

N - Named TIC

Cartridge Evaluation Data Summary Report

Sample Group: 20162089 SDG Number:

Customer Sample ID: 16-05982-1-A1 Customer Sample ID: 16-05082-1-A1

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Sample# R	A#	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	SVOA	#2						
16T021061			Ethylene Glycol	107-21-1	3.38	NGS	2.7E+03 JNT	INT
S16T021061			Undecanal, 2-methyl-	110-41-8	4.18	NGS	TNL 53	INT
S16T021061			Unknown-1	1	4.27	NGS	39 JT	15
S16T021061			Cyclotetrasiloxane, octamethyl	556-67-2	4.39	NGS	300 JNT	INT
S16T021061			Phenol	108-95-2	4.46	NGS	37 JNT	INT
S16T021061			1-Hexene, 3,5-dimethyl-	7423-69-0	4.85	NGS	INL 63	INT
S16T021061			Tetrasiloxane, decamethyl-	141-62-8	5.00	NGS	48 JNT	INT
S16T021061			Undecane	1120-21-4	5.07	NGS	1NL 82 JNT	INT
S16T021061			Hydroxylamine, O-decyl-	29812-79-1	5.12	NGS	TNL 48	INT
S16T021061			N-Benzyloxy-2,2-bis(trifluorom	55734-40-2	5.21	NGS	TNL 64	INT
S16T021061			2-Hexyl-1-octanol	19780-79-1	5.39	NGS	48 JNT	INT
\$16T021061			2,6-Dimethyldecane	13150-81-7	5.46	NGS	150 JNT	INT
S16T021061			Decane, 2,4,6-trimethyl-	62108-27-4	5.51	NGS	TNL 91	INT
16T021061			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	TNL 56 JNT	INT
16T021061			Ethanol, 2-phenoxy-	122-99-6	6.57	NGS	TNL 27	INT
S16T021061	2		Benzothiazole	95-16-9	6.63	NGS	62 JNT	INT
S16T021061			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	48 JNT	INT
16T021061			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	TNL 43	INT
316T021061			Dodecane, 2,6,11-trimethyt-	31295-56-4	7.27	NGS	32 JNT	INT
S16T021061			Dodecane, 2,6,10-trimethyl-	3891-98-3	7.35	NGS	TNL 28 JNI	INT
S16T021061			Propanoic acid. 2-methyl- 1-/	74381-40-1	0.0	NCC	1111 00	ALT.

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E - Outside Calibration Range N - Named TIC

B - Blank Contamination

J - Estimated T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation Data Summary Report

Sample Group: 20162089 SDG Number:

Customer Sample ID: 16-05982-1-A2 Ciretomer Sample ID: 16-05082-1-A2

Samplo# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	SVOA	#2						
S16T021062			Formamide	75-12-7	2.65	NGS	200 JNT	JNT
S16T021062			Tetrachloroethene	127-18-4	2.83	NGS	110	110 JNT
316T021062			Propanoic acid, 2,2-dimethyl-	75-98-9	3.26	NGS	120	120 JNT
\$16T021062			2,5,6-Trimethyldecane	62108-23-0	3.66	NGS	28	28 JNT
S16T021062			Decane, 2,6,8-trimethyl-	62108-26-3	3.72	NGS	72	72 JNT
316T021062			2,2,7,7-Tetramethyloctane	1071-31-4	4.22	NGS	26	26 JNT
16T021062			Cyclotetrasiloxane, octamethyl	556-67-2	4.39	NGS	520 JNT	JNT
16T021062			Phenol	108-95-2	4.43	NGS	100	100 JNT
16T021062			I-lexane, 2,2-dimethyl-	590-73-8	4.51	NGS	INL 500	JNT
S16T021062			1-Octanol, 2-butyl-	3913-02-8	4.60	NGS	29	29 JNT
S16T021062			Heptane, 4-ethyl-2,2,6,6-tetra	62108-31-0	4.78	NGS	72	72 JNT
16T021062			1-Pentanol, 2-ethyl-4-methyl-	106-67-2	4.85	NGS	130	INL DUT
16T021062			3,3-Dimethylhexane	563-16-6	4.89	NGS	300	300 JNT
16T021062			1.1.1.3.5.5.5-Heptamethyitrisi	1873-88-7	5.00	NGS	43	43 JNT
16T021062			Decane, 2,5,9-trimethyl-	62108-22-9	5.15	NGS	93	93 JNT
16T021062			Acetophenone	98-86-2	5.20	NGS	40	40 JNT
S16T021062			2-Hexyl-1-octanol	19780-79-1	5.38	NGS	52	52 JNT
S16T021062			2,6-Dimethyldecane	13150-81-7	5.45	NGS	200 JNT	JNT
16T021062			Undecane, 2,6-dimethyl-	17301-23-4	5.51	NGS	15	15 JNT
16T021062			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	65	65 JNT
S16T021062			Heptanoic acid, 2-ethyl-	3274-29-1	5.82	NGS	27	27 JNT
S16T021062			Benzothiazole	95-16-9	6.62	NGS	80	TNL 08
S16T021062			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	55	55 JNT
\$16T021062			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	43	43 JNT
S16T021062			Dodecane, 2,6,11-trimethyl-	31295-56-4	7.27	NGS	34	34 JNT
S16T021062			Propanoic acid, 2-methyl-, 1-(74381-40-1	9.20	NGS	45	45 JNT

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B - Blank Contamination

Cartridge Evaluation Data Summary Report

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Sample Group: 20162089 SDG Number:

Customer Sample ID: 16-05982-1-B1

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Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Oual Flaos
VAPOR-TDU SVOA #2	SVOA	#2						
S16T021063			Propanoic acid, 2,2-dimethyl-	75-98-9	3.30	NGS	31 JNT	4
\$16T021063			Cyclotetrasitoxane, octamethyl	556-67-2	4.39	NGS	210 JNT	17
S16T021063			Phenol	108-95-2	4,45	NGS	49 JNT	Ę
\$16T021063			1-Pentanol, 2-ethyl-4-methyl-	106-67-2	4.51	NGS	TNL 08	11
S16T021063			Isooctanol	26952-21-6	4.86	NGS	TNL 17	41
16T021063			1-Octene, 3,7-dimethyl-	4984-01-4	4.91	NGS	TNL 73	11
16T021063			5-Methyl-1-heptanol	7212-53-5	4.98	NGS	TNL 25 JNT	17
S16T021063			Tetrasiloxane, decamethyl-	141-62-8	5.00	NGS	32 JNT	17
:16T021063			Acetophenone	98-86-2	5.20	NGS	TNL 27 JNT	17
S16T021063			2-Hexyl-1-octanol	19780-79-1	5.38	NGS	TNL 14	17
16T021063			2,6-Dimethyldecane	13150-81-7	5.45	NGS	TAU JNI	. 17
16T021063			Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	16 JNT	5
S16T021063			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	TNL 05	5
16T021063			Benzothiazole	95-16-9	6.63	NGS	TNL 17	5
S16T021063			Unknown-1	1	6.68	NGS	28 JT	
16T021063			Octane, 2,3,6,7-tetramethyl-	52670-34-5	6.91	NGS	TNL 74	5
S16T021063			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	TNL 36 JNT	17
S16T021063			Decane, 2,4,6-trimethyl-	62108-27-4	7.23	NGS	6.1 JNT	17
S16T021063			Dodecane, 2,7,10-trimethyl-	74645-98-0	7.27	NGS	33 JNT	5

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

B - Blank Contamination

E - Outside Calibration Range N - Named TIC

Cartridge Evaluation Data Summary Report

Sample Group: 20162089 SDG Number:

Customer Sample ID: 16-05982-1-C1

Custo	mer	Sample ID:	Customer Sample ID: 16-05982-1-C1					
Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flaos
VAPOR-TDU SVOA #2	SVOA	#2						0
S16T021065			Propanoic acid, 2,2-dimethyl-	75-98-9	3.23	NGS	30 JNT	INT
S16T021065			Cyclotetrasiloxane, octamethyl	556-67-2	4.39	NGS	240 JNT	INT
S16T021065			Phenol	108-95-2	4.44	NGS	46 JNT	INT
S16T021065			Isooctanol	26952-21-6	4.85	NGS	42 JNT	INT
S16T021065			Decane, 2,4,6-trimethyl-	62108-27-4	5.07	NGS	36 JNT	INT
S16T021065			Undecane	1120-21-4	5,45	NGS	110 JNT	INT
S16T021065			Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	14 JNT	INT
S16T021065			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	58 JNT	INT
S16T021065			Benzothiazole	95-16-9	6.63	NGS	94 JNT	INT
S16T021065			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	INL 56 JNT	INT
S16T021065			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	TNL 04	INT
S16T021065			Undecane, 3,7-dimethyl-	17301-29-0	7.27	NGS	39 JNT	INT
S16T021065			2,6-Dimethyldecane	13150-81-7	7.35	NGS	26 JNT	INT

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B - Blank Contamination

Cartridge Evaluation Data Summary Report

Sample Group: 20162089 SDG Number:

Customer Sample ID: 16-05982-1-D1 Customer Sample ID: 16-05982-1-D1

Qual Flags

Result

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	
VAPOR-TDU SVOA #2	SVOA	#2					ļ
S16T021066			Propanoic acid, 2,2-dimethyl-	75-98-9	3.26	NGS	
S16T021066			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	
S16T021066			Phenol	108-95-2	4.44	NGS	
S16T021066			2,2-Dimethylpropionic acid, de	215667-91-7	4.51	NGS	
S16T021066			Isooctanol	26952-21-6	4.86	NGS	
S16T021066			2,6-Dimethyldecane	13150-81-7	5.07	NGS	
S16T021066			Decane, 2,4,6-trimethyl-	62108-27-4	5,45	NGS	
S16T021066			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	
S16T021066			Benzothiazolo	95-16-9	6.62	NGS	
S16T021066			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	
S16T021066			Decane, 2,3,5,8-tetramethyl-	192823-15-7	7.08	NGS	
S16T021066			2,2,4-Trimethyl-1,3-pentanedio	6846-50-0	9.20	NGS	

32 JNT 79 JNT TNL 17

37 JNT 31 JNT

43 JNT

58 JNT

35 JNT

43 JNT 180 JNT 39 JNT NA = Not Analyzed, ND = Not Detected J - Estimated T - Tentatively Identified Compound

B - Blank Contamination

Cartridge Evaluation Data Summary Report

Sample Group: 20162089 SDG Number:

Customer Sample ID: 16-05982-1-E1

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Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flaos
VAPOR-TDU SVOA #2	NOA	#2						0
S16T021067			Formamide	75-12-7	2.67	NGS	1NL 94 JNT	INT
S16T021067			Propanoic acid, 2,2-dimethyl-	75-98-9	3.23	NGS	34 JNT	INT
S16T021067			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	150 JNT	INT
S16T021067			Phenol	108-95-2	4.43	NGS	Z8 JNT	INT
S16T021067			2-Octyn-1-ol	20739-58-6	4.87	NGS	30 JNT	INT
S16T021067			2,6-Dimethyldecane	13150-81-7	5.45	NGS	TNL 59 JNT	INT
S16T021067			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	58 JNT	INT
S16T021067			Benzothiazole	95-16-9	6.61	NGS	TNL 23	INT
S16T021067			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.90	NGS	35 JNT	INT

 NA = Not Analyzed, ND = Not Detected

 T - Tentatively Identified Compound
 J - Estimated

B - Blank Contamination

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	Oual Flags
VAPOR-TDU SVOA #2	NOA	#2						00
S16T021069			Cyclotetrasiloxane, octamethyl	556-67-2	4.39	NGS	TAU JNT	JNT
S16T021069			Phenol	108-95-2	4.43	NGS	36 JNT	JNT
S16T021069			1-Hexene, 3,5-dimethyl-	7423-69-0	4.85	NGS	32 JNT	UNT
S16T021069			1-Octene, 3,7-dimethyl-	4984-01-4	4.91	NGS	29 JNT	UNT
S16T021069			Decane, 2,4,6-trimethyl-	62108-27-4	5.07	NGS	20 JNT	UNT
S16T021069			2,6-Dimethyldecane	13150-81-7	5,45	NGS	TNL 50	INT
S16T021069			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	37 .	JNT
S16T021069			Benzothiazole	95-16-9	6.62	NGS	TNL 43 JNT	INT
S16T021069		t.	Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	32 JNT	TNL
S16T021069			Undecane, 2-methyl-	7045-71-8	7.27	NGS	TNI, 10	INT

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

B - Blank Contamination

Cartridge Evaluation Data Summary Report

Sample Group: 20162089 SDG Number:

Customer Sample ID: 16-05982-1-F1

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Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	SVOA	#2						
S16T021070			Formamide	75-12-7	2.69	NGS	31	31 JNT
S16T021070			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	120 JNT	JNT
S16T021070			Phenol	108-95-2	4.43	NGS	45	45 JNT
S16T021070			2,2,7,7-Tetramethyloctane	1071-31-4	4.50	NGS	TNL 001	JNT
S16T021070			1-Pentanol, 2-ethyl-4-methyl-	106-67-2	4.85	NGS	38	38 JNT
S16T021070			3,3-Dimethylhexane	563-16-6	4.89	NGS	82	82 JNT
S16T021070			Heptadecane, 2,6-dimethyl-	54105-67-8	5.06	NGS	46	46 JNT
S16T021070			Decane, 2,6,8-trimethyl-	62108-26-3	5.15	NGS	17	17 JNT
S16T021070			2,6-Dimethyldecane	13150-81-7	5.45	NGS	25	57 JNT
S16T021070			Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	15	15 JNT
S16T021070			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	52	52 JNT
S16T021070			Benzothiazole	95-16-9	6.61	NGS	59	59 JNT
S16T021070			Dichloroacetic acid, 2-tetrahy	4697-00-1	9.19	NGS	28	28 JNT

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

B - Blank Contamination

Cartridge Evaluation Data Summary Report

Sample Group: 20162089 SDG Number:

Customer Sample ID: 16-05982-1-H1

CUSTOR	ner	sample ID:	Customer Sample IU: 16-US882-1-H1					
Sample# R	\$	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flaos
VAPOR-TDU SVOA #2	SVOA	#2						
S16T021072			Butane, 1-(ethenyloxy)-3-methy	39782-38-2	2.65	NGS	32 JNT	INT
S16T021072			Undecanal, 2-methyl-	110-41-8	3.58	NGS	Z8 JNT	JNT
S16T021072			2-Heptanone, 6-methyl-	928-68-7	4.16	NGS	TNL 27 JNT	JNT
S16T021072			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	TNL 180 JNT	INT
S16T021072			Phenol	108-95-2	4.43	NGS	TNL 49 JNT	JNT
S16T021072			1-Hexene, 3,5-dimethyl-	7423-69-0	4.84	NGS	27 JNT	JNT
S16T021072			1-Octene, 3,7-dimethyl-	4984-01-4	4.90	NGS	TNL 30 JNT	JNT
S16T021072			2,6-Dimethyldecane	13150-81-7	5.06	NGS 0	Z6 JNT	INT
S16T021072			Decane, 2,4,6-trimethyl-	62108-27-4	5.45	NGS	INL 88	INT
S16T021072			Decamethlycyclopentasiloxane	541-02-6	5,72	NGS	45 JNT	INT
S16T021072			Benzothiazole	95-16-9	6.61	NGS	51 JNT	INT

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

B - Blank Contamination

Cartridge Evaluation Data Summary Report

Sample Group: 20162089 SDG Number:

Customer Sample ID: 16-05982-1-H2 Customer Sample ID: 16-05982-1-H2

Result Qual Flags		99 JT	11 JNT	48 JNT	56 JNT	43 JNT	16 JNT	TNI CF
		s	s	s	s	s	s	
Retention Time (Minutes) Unit		4.36 NGS	5,19 NGS	5.45 NGS	5.72 NGS	6.60 NGS	6.90 NGS	2 DR NGC
CAS No.			98-86-2	1120-21-4	541-02-6	95-16-9	31295-56-4	3801-08-3
Analyte		Unknown-1	Acetophenone	Undecane	Decamethlycyclopentasiloxane	Benzothiazole	Dodecane, 2,6,11-trimethyl-	Dodecane 2.6.10-trimethul-
QC Type	#2							
A#	NOA							
Sample# R	VAPOR-TDU SVOA #2	S16T021073	S16T021073	S16T021073	S16T021073	S16T021073	S16T021073	S16T021073

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

B - Blank Contamination

E - Outside Calibration Range N - Named TIC

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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	##	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	NOA :	42						
S16T021203			Propanoic acid, 2,2-dimethyl-	75-98-9	3.22	NGS	TNL 38 JNT	NT
S16T021203			2-Butoxyethanol	111-76-2	3.72	NGS	TNL 23 JNI	NT
S16T021203			Unknown-1		4.39	NGS	7L 230 JT	E
S16T021203			Phenol	108-95-2	4.44	NGS	TNL 43 JNT	NT
S16T021203			Decane, 2,4,6-trimethyl-	62108-27-4	5.12	NGS	TNL 5.9 JNT	NT
S16T021203			Acetophenone	98-86-2	5.20	NGS	TNL 14 JNT	NT
16T021203			Undecane, 3,7-dimethyl-	17301-29-0	5.45	NGS	1NL 85 JNT	NT
S16T021203			Undecane, 2,6-dimethyl-	17301-23-4	5.51	NGS	TNL 27 JNT	NT
S16T021203			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	INL 53	NT
S16T021203			Benzothiazole	95-16-9	6.63	NGS	TNL 88	NT
S16T021203			Unknown-2		6.68	NGS	29 JT	E
S16T021203			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.91	NGS	48 JNT	NT
S16T021203			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	INL 05	INT
S16T021203			Dodecane, 2,7,10-trimethyl-	74645-98-0	7.27	NGS	36 JNT	INT

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

B - Blank Contamination

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 % S	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	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	11	<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

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J - Estimated E - Outside Calibration Range

N - Named TIC

Q - Qualitative

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

Cartridge Evaluation Data Summary of All Results

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

Sample# R A# CAS # VAPOR-TDU SVOA #2													
VAPOR-TD	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	al Flags
	U 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	11	<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	25	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	L a/n	

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

Q - Qualitative

N - Named TIC

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	Det Limit Ont Err % Qual Flags	al Flags
VAPOR-TDU SVOA #2	U 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	11	<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	l a/u	
S16T021078	629-62-9	Pentadecane	NGS	110	<3.0	4.9	n/a	n/a	n/a	n/a	3.0	n/a J	

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

N - Named TIC

Q - Qualitative

J - Estimated E - Outside Calibration Range

Page: 3

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

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Sample# K	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	I Flags
VAPOR-TDU SVOA #2	U 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	37.	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021079	108-39-4M	Cresol (m & p)	NGS	11	<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	L al	
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	a/u	e/u	30	ala	

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

N - Named TIC

Q - Qualitative

J - Estimated E - Outside Calibration Range

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Qual Flags
VAPOR-TDU SVOA #2	U SVO	A #2												
S16T021080	3	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	6	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	11	<5.6	<5.6	n/a	n/a	n/a	e/u	5.6	n/a	
S16T021080	5	92-52-4	Biphenyl	NGS	100	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021080	4	78-46-6	Dibutyl butylphosphonate	NGS	110	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021080	80	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	2	544-76-3	Hexadecane-	NGS	110	<3.3	5.6	n/a	n/a	n/a	n/a	3.3	n/a	
S16T021080	9	629-59-4	Tetradecane	NGS	110	<3.9	7.3	n/a	n/a	n/a	n/a	3.9	n/a	
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	0	629-50-5	Tridecane	NGS	93	<1.6	41	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021080	0	629-78-7	Heptadecane	NGS	94	<2.4	5.6	n/a	n/a	n/a	n/a	2.4	n/a	
S16T021080	9	629-62-9	Pentadecane	NGS	110	<3.0	9.1	n/a	n/a	n/a	n/a	3.0	n/a J	

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

Q - Qualitative

N - Named TIC

.

Cartridge Evaluation Data Summary of All Results

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

1		and into an into an											
Sample# R	A#	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Cut Err % Qual Flags
VAPOR-TDU SVOA #2	U SV	'OA #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	11	<5.6	<5.6	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		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	Tributy! phosphate	NGS	98	<5.6	<5.6	n/a	n/a	n/a	e/u	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	e/u	n/a	n/a	n/a	3.0	n/a J

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

Q - Qualitative

N - Named TIC

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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

22		and international and international											
Sample# R	A	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	U SV	'OA #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	11	<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	0.7>	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	1	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	La/u
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

N - Named TIC

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

Q - Qualitative

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 %	RPD % Spk Rec %	Det Limit	Cnt Err %	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	# YOA #	2												
S16T021083	3891	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	100
S16T021083	95-48-7	8-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a	n/a	4.9	n/a	
S16T021083	108-3	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	2-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a	n/a	4.0	n/a	
S16T021083	78-46-6	9-9	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a	n/a	3.6	n/a	
S16T021083	84-66-2	6-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a	n/a	7.0	n/a	
S16T021083	112-40-3	40-3	Dodecane	NGS	98	<0.55	52	n/a	n/a	n/a	n/a	0.55	n/a E	w
S16T021083	544-76-3	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	59-4	Tetradecane	NGS	95	<3.9	6.6	n/a	n/a	n/a	n/a	3.9	n/a	-
S16T021083	126-73-8	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	50-5	Tridecane	NGS	90	<1.6	15	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021083	629-78-7	78-7	Heptadecane	NGS	94	<2.4	2.8	n/a	n/a	n/a	n/a	2.4	n/a	7
S16T021083	629-62-9	62-9	Pentadecane	NGS	96	<3.0	6.0	n/a	n/a	n/a	n/a	3.0	n/a	7

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

N - Named TIC

Q - Qualitative

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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

3	STOR	ner sampl	Customer Sample ID: 16-05983-1-F1										
Sample# R	A#	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	_	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	VS UC	OA #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	e/u	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	66	<1.6	12	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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NA = Not Analyzed, ND = Not Detected T - Tentatively Identified Compound

Q - Qualitative

N - Named TIC

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

4												
Samples K	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	I 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	A 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	06	<1.6	9.6	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	l a/u

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

Q - Qualitative

N - Named TIC

J - Estimated E - Outside Calibration Range

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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

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Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD % Spk Rec %		Det Limit Cnt Err % Qual Flags
VAPOR-TDU SVOA #2	I SVOA #2	7									
S16T021086	3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a r	n/a 3.9	9 n/a
S16T021086	95-48-7	2-Methylphenol	NGS	93	<4.9	<4.9	n/a	n/a	n/a r	n/a 4.9	9 n/a
S16T021086	108-39-4M	Cresol (m & p)	NGS	98	<5.6	<5.6	n/a	n/a	n/a r	n/a 5.6	6 n/a
S16T021086	92-52-4	Biphenyl	NGS	87	<4.0	<4.0	n/a	n/a	n/a n	n/a 4.0	0 n/a
S16T021086	78-46-6	Dibutyl butylphosphonate	NGS	96	<3.6	<3.6	n/a	n/a	n/a r	n/a 3.6	6 n/a
S16T021086	84-66-2	Diethylphthalate	NGS	91	<7.0	<7.0	n/a	n/a	n/a r	n/a 7.0	0 n/a
S16T021086	112-40-3	Dodecane	NGS	98	<0.55	64	n/a	n/a	n/a r	n/a 0.55	5 n/a E
S16T021086	544-76-3	Hexadecane-	NGS	95	<3.3	<3.3	n/a	n/a	n/a n	n/a 3.3	3 n/a
S16T021086	629-59-4	Tetradecane	NGS	95	<3.9	4.4	n/a	n/a	n/a n	n/a 3.9	9 n/a J
S16T021086	126-73-8	Tributyl phosphate	NGS	92	<5.6	<5.6	n/a	n/a	n/a r	n/a 5.6	6 n/a
S16T021086	629-50-5	Tridecane	NGS	90	<1.6	24	n/a	n/a	n/a n	n/a 1.1	1.6 n/a
S16T021086	629-78-7	Heptadecane	NGS	94	<2.4	<2.4	n/a	n/a	n/a n	n/a 2.4	4 n/a
S16T021086	629-62-9	Pentadecane	NGS	96	<3.0	4,0	n/a	n/a	n/a n	n/a 3.0	l n/a J

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

Q - Qualitative

N - Named TIC

Cartridge Evaluation Data Summary of All Results

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

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Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	KPD %	KPD % Spk Kec %	Det Limit	Det Limit ont Err % Qual Fiags
VAPOR-TDU SVOA #2	J SVOA #2											
S16T021087	3891-98-3	2,6,10-Trimethyldodecane	NGS	91	<3.9	<3.9	n/a	n/a	n/a	ŋ/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

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

N - Named TIC

Q - Qualitative

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

L	A4	Analida	Init	CTD 0/	Blank	Result	Duplicate	Average	RPD %	RPD % Sok Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
sample# K	K AF CAS#	Analyte	NIIIO	210%	union of	1000L	amoudan	official		a sounds		
VAPOR-TDU SVOA #2	J SVOA #2											
S16T021088	3891-98-3	2,6,10-Trimethyldodecane	NGS	16	<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	96	<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	06	<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

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

N - Named TIC

Q - Qualitative

J - Estimated E - Outside Calibration Range

Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090 SDG Number:

Customer Sample ID: 16-05983-1-A1

S167021076 Ethylene Glycol S167021076 2,5,5,10methyl-2-octanol S167021076 3,5,5,10methyl-2-octanol S167021076 2,4,6,8,-Tetramethyl-1-undecene S167021076 1-Budanol, 3,3-dimethyl- S167021076 1+Budanol, 3,3-dimethyl- S167021076 1+Budanol, 3,3-dimethyl- S167021076 1+bydroperoxide, hexyl S167021076 1+bydroperoxide, hexyl S167021076 1+bydroperoxide, hexyl	107-21-1 19781-09-0 ene 59920-26-2 111-65-9			TIMEAU	Qual Flags
		2.50	NGS	66	39 JNT
		2.63	NGS	54	54 JNT
	111-65-9	2.75	NGS	53	53 JNT
		2.79	NGS	TNL 011	JNT
	624-95-3	3.22	NGS	200 JNT	JNT
	4312-76-9	3.41	NGS	160	160 JNT
	29812-79-1	3.55	NGS	51	51 JNT
	27944-79-2	3.58	NGS	61	61 JNT
S16T021076 2-Ethyl-1-dodecanol	19780-33-7	3.67	NGS	230 JNT	JNT
S16T021076 1-Octanol, 2-butyl-	3913-02-8	3.99	NGS	130 JNT	JNT
S16T021076 2-Heptanone, 6-methyl-	928-68-7	4.16	NGS	TNL 140 JNT	JNT
S16T021076 2-Dodecanol	10203-28-8	4.25	NGS	TNL 011	JNT
S16T021076 1-Octene, 3,7-dimethyl-	4984-01-4	4.31	NGS	TNL 190	JNL
S16T021076 Cyclotetrasiloxane, octamethyl	iyi 556-67-2	4.38	NGS	TNL 0001	JNT
S16T021076 Phenol	108-95-2	4.44	NGS	83	83 JNT
S16T021076 Unknown-1		4.49	NGS	110 JT	JT
S16T021076 Unknown-2		4.57	NGS	TL 001	5
S16T021076 Decane, 2,6,7-trimethyl-	62108-25-2	4.77	NGS	100	100 JNT
S16T021076 Acetic acid, trifluoro-, 3,7-d	28745-07-5	4.84	NGS	130	130 JNT
S16T021076 Cyclopentane, 1-methyl-2-(4-me	-me 66553-50-2	4.91	NGS	97	37 JNT
S16T021076 10-Heneicosene (c,t)	95008-11-0	4.93	NGS	57	57 JNT
S16T021076 Trimethyl[4-(1,1,3,3,-tetramet	t 78721-87-6	5.01	NGS	62	TNL 97
S16T021076 Decane, 2,4,6-trimethyl-	62108-27-4	5.07	NGS	220	220 JNT
S16T021076 2.6-Dimethyldecane	13150-81-7	5.12	NGS	180	180 JNT
S16T021076 2-Hexyl-1-octanol	19780-79-1	5.15	NGS	54	54 JNT
S16T021076 2-Methyl-1-undecanol	10522-26-6	5.22	NGS	240 JNT	JNT
S16T021076 1,15-Pentadecanediol	14722-40-8	5.29	NGS	44	44 JNT
4			1.000	NA = Not Analyzed, ND = Not Detected	D = Not [
J - Estimated	Q - Qualitative	litative		T - Tentat	T - Tentatively Identified Compound

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

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

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

4

N - Named TIC

J - Estimated E - Outside Calibration Range

Page: 2

Q - Qualitative

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

					Retention Time			
Sample# R	A#	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	NOA	#2						
S16T021077			Propanoic acid, 2,2-dimethyl-	75-98-9	3.16	NGS	Z8 JNT	NT
S16T021077			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	340 JNT	NT
S16T021077			?-Ethyl-?-methylbenzyl alcohol	1565-75-9	5.37	NGS	43 JNT	NT
S16T021077			Undecane	1120-21-4	5.45	NGS	TNL 001	NT
S16T021077			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	TNL 160 JNT	NT
S16T021077			Benzothiazole	95-16-9	6.61	NGS	TNL 25	NT
S16T021077			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.90	NGS	51 J	JNT
S16T021077			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	81 J	TNL
S16T021077			Undecane, 3,7-dimethyl-	17301-29-0	7.27	NGS	38 JNT	NT

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

N - Named TIC

Q - Qualitative

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	¥#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	SVOA	#2						
\$16T021078			Propanoic acid, 2,2-dimethyl-	75-98-9	3.21	NGS	68	68 JNT
\$16T021078			Cyclotetrasiloxane, octamethyl	556-67-2	4.38	NGS	260 JNT	JNT
S16T021078	1		3-Ethylheptanoic acid	14272-47-0	4.55	NGS	31	31 JNT
S16T021078			Isooctanol	26952-21-6	4.85	NGS	35	35 JNT
S16T021078			1-Octene, 3,7-dimethyl-	4984-01-4	4.90	NGS	45	45 JNT
S16T021078			Decane, 2,4,6-trimethyl-	62108-27-4	5.06	NGS	43 JNT	JNT
S16T021078			Undecane	1120-21-4	5.11	NGS	19	19 JNT
S16T021078			Acetophenone	98-86-2	5.19	NGS	25 JNT	JNT
S16T021078			Benzenemethanol, 7,7-dimethyl-	617-94-7	5.37	NGS	55	55 JNT
S16T021078			Undecane, 4-methyl-	2980-69-0	5.45	NGS	130 JNT	JNT
16T021078			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	150 JNT	JNT
167021078			Undecane, 2,6-dimethyl-	17301-23-4	6.41	NGS	5.2 JNT	JNT
\$16T021078			Benzothiazole	95-16-9	6.62	NGS	INL 82	JNT
16T021078			Ethylene diacrylate	2274-11-5	6.68	NGS	TNL SS	JNT
16T021078			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	56 JNT	JNT
316T021078			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	INC 12	JNT
\$16T021078			Dodecane,4,6-dimethyl	61141-72-8	7.27	NGS	44 JNT	JNT
16T021078			Undecane, 3,7-dimethyl-	17301-29-0	7.34	NGS	Z8 JNT	INT

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

J - Estimated E - Outside Calibration Range

N - Named TIC

Q - Qualitative

Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090 SDG Number:

Customer Sample ID: 16-05983-1-BLANK

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Customer		

imple# R	A#	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Result Qual Flaos
/APOR-TD	NOVS	#2						
021079			Cyclotrisiloxane, hexamethyl-	541-05-9	2.85	NGS	25 JNT	NT
021079			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	JNL 30 JNT	NT

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

N - Named TIC

Q - Qualitative

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	SVOP	1#2						
S16T021080			Propanoic acid, 2,2-dimethyl-	75-98-9	3.23	NGS	INC 22	INT
S16T021080			Propanedioic acid, propyl-	616-62-6	3.67	NGS	26 JNT	INT
S16T021080			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	7NL 280 JNT	INT
S16T021080			Phenot	108-95-2	4.43	NGS	TNL 30 JNT	INT
S16T021080			Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	6.1 JNT	INT
S16T021080			3-Isopropyl-2-phenyl-pent-4-en	344332-17-8	5.37	NGS	TNL 14	INT
S16T021080			Undecane	1120-21-4	5.45	NGS	TNL 83	INT
S16T021080			Undecane, 2,6-dimethyl-	17301-23-4	5.50	NGS	TNL 71	NT
S16T021080			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	TNL 170	NT
S16T021080			Benzothiazole	95-16-9	6.62	NGS	TNL 78	NT
S16T021080			Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	TNL 65	NT
S16T021080			Undecane, 3,7-dimethyl-	17301-29-0	7.02	NGS	TNL 14	NT
S16T021080			Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	TNL 001	NT
S16T021080			Tetradecane, 1-iodo-	19218-94-1	7.27	NGS	TNL 34	NT
S16T021080			2,6-Dimethyldecane	13150-81-7	7.34	NGS	TNL 29	NT

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

N - Named TIC

Q - Qualitative

Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090 SDG Number:

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Customer Sample ID: 16-05983-1-D1 Customer Sample ID: 16-05983-1-D1

ample# R	#W	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	SVOA	42						
S16T021081			Cyclotetrasiloxane, octamethyl	556-67-2	4.36	NGS	390	TNL 005
316T021081			Undecane	1120-21-4	5.45	NGS	40	TNL 01
16T021081			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	190	TNL 00
\$16T021081			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.90	NGS	23	23 JNT
316T021081			Dodecane,4,6-dimethyl	61141-72-8	7.26	NGS	17	7 JNT

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

N - Named TIC

Q - Qualitative

Cartridge Evaluation Data Summary of All Results

Sample Group: 20162090 SDG Number:

Customer Sample ID: 16-05983-1-E1

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Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Oual Flane
VAPOR-TDU SVOA #2	SVOA	#2						L
S16T021082			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	250 JNT	JNT
S16T021082			Undecane	1120-21-4	5.45	NGS	89	1NL 89
S16T021082			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	150	TNL 001
S16T021082			Decane, 2,4,6-trimethyl-	62108-27-4	6.00	NGS	5.8 JNT	JNT
S16T021082		-	Benzothiazole	95-16-9	6.61	NGS	80	TNL 08
S16T021082			Tetradecane, 1-iodo-	19218-94-1	6.90	NGS	44	44 JNT
S16T021082			Dodecamethylcyclohexasiloxane	540-97-6	70.7	NGS	59	59 JNT
S16T021082			Undecane, 3,7-dimethyl-	17301-29-0	7.26	NGS	31	31 JNT

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

N - Named TIC

Q - Qualitative

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	Oual Flans
VAPOR-TDU SVOA #2	VOA #2	11				inone.	L
S16T021083		Ethylene Glycol	107-21-1	2.65	NGS	1.3E+03 JNT	JNT
S16T021083		Heptane, 2-bromo-	1974-04-5	3.27	NGS	180 JNT	JNT
S16T021083		2-Heptanone, 6-methyl-	928-68-7	4.16	NGS	TNL 150 JNT	JNT
S16T021083		2-Nonadecanol	26533-36-8	4.25	NGS	82	82 JNT
S16T021083		1-Hexanol, 5-methyl-	627-98-5	4.31	NGS	91	10 JNT
S16T021083		Cyclotetrasiloxane, octamethyl	556-67-2	4.38	NGS	1NL 830 JNT	JNT
S16T021083		Phenol	108-95-2	4.44	NGS	79	TNL 97
S16T021083		Oxirane, [(tetradecyloxy)methy	38954-75-5	4.49	NGS	50	TNL 05
S16T021083		2-Hexyl-1-octanol	19780-79-1	4.58	NGS	30	30 JNT
S16T021083		1-Octanol, 2-butyl-	3913-02-8	4.60	NGS	50	50 JNT
S16T021083		Hydroxylamine, O-decyl-	29812-79-1	4.77	NGS	50	50 JNT
S16T021083		1-Hexanol, 2-ethyl-	104-76-7	4.84	NGS	130 JNT	JNT
S16T021083		1-Heptanol, 6-methyl-	1653-40-3	4.90	NGS	TNL 49 JNT	JNT
S16T021083		Methyltris(trimethylsiloxy)sil	17928-28-8	5.00	NGS	31	31 JNT
S16T021083		2,6-Dimethyldecane	13150-81-7	5.06	NGS	TNL 1001	JNT
S16T021083		2,3-Dimethyldecane	17312-44-6	5.11	NGS	LNL 09	JNT
S16T021083		Acetophenone	98-86-2	5.20	NGS	44 JNT	JNT
S16T021083		2-Methyl-1-undecanol	10522-26-6	5.21	NGS	49 JNT	JNT
S16T021083		Cyclopentadecanone, 4-methyl-	34894-60-5	5.38	NGS	TNL 87	JNT
S16T021083	01	Undecane	1120-21-4	5.45	NGS	370 JNT	JNT
S16T021083		Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	TNL 001	INT
S16T021083		Undecane, 2,6-dimethyl-	17301-23-4	6.41	NGS	TNL 9.7	INT
\$16T021083		Benzothiazole	95-16-9	6.62	NGS	62 JNT	UNT
\$16T021083		Dodecane, 2,7,10-trimethyl-	74645-98-0	6.91	NGS	41 JNT	INT
S16T021083		Dodecane, 2,6,11-trimethyl-	31295-56-4	6.97	NGS	TNL 9.6	INT
S16T021083		Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	TNL 9.5 JNT	INT
S16T021083		Dodecamethylcyclohexasiloxane	540-97-6	7.08	NGS	57 INT	INT

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

Q - Qualitative

N - Named TIC

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-FFF-PASF

ample# R A# QC Type Analyte CAS No. Retention Time Unit Result Qual VAPOR-TDU SVOA #2 1670021083 Dodecane,4,6-dimethyl 61141-72-8 7.27 NGS 30 JNT										
VAPOR-TDU \$VOA #2 Dodecane,4,6-dimethyl B1141-72-8 7.27 NGS 30_JNT	Sample#	R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
3161021083 Dodecane,4,6-dimethyl 81141-72-8 7.27 NGS 30_JNT 30_JNT	VAPOF	R-TDU	SVOA	#2						
	16T02108	33			Dodecane,4,6-dimethyl	61141-72-8	7.27	NGS	30	INT

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

N - Named TIC

Q - Qualitative

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

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Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	NOA	#2						L
S16T021084			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	180 JNI	JNT
S16T021084			Decane, 2,4,6-trimethyl-	62108-27-4	5.06	NGS	23	23 JNT
S16T021084			Acetophenone	98-86-2	5.18	NGS	14	14 JNT
S16T021084			Undecane	1120-21-4	5.45	NGS	69	59 JNT
S16T021084			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	TAU JNT	JNT
S16T021084			Benzothiazole	95-16-9	6.61	NGS	16	76 JNT
S16T021084		2	Dodecane,4,6-dimethyl	61141-72-8	6.90	NGS	34	34 JNT
S16T021084			Dodecamethylcyclohexasiloxane	540-97-6	70.7	NGS	39	39 JNT
S16T021084			Dodecane, 2,6,11-trimethyl-	31295-56-4	7.26	NGS	28	28 JNT

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

N - Named TIC

Q - Qualitative

J - Estimated E - Outside Calibration Range

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Cartridge Evaluation Data Summary of All Results

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

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Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	SVOA	#2						
S16T021085			Propane, 2-methyl-1-nitro-	625-74-1	3.12	NGS	INL 89	NT
S16T021085			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	310 JNT	INT
S16T021085			2.6-Dimethyldecane	13150-81-7	5.06	NGS	TNL 34 JNT	NT
S16T021085			Acetophenone	98-86-2	5.18	NGS	15 JNT	NT
S16T021085			Undecane	1120-21-4	5.45	NGS	TNL 001	NT
S16T021085			Decane, 2,4,6-trimethyl-	62108-27-4	5.50	NGS	TNL 15	NT
S16T021085			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	140 JNT	NT
S16T021085			Benzothiazole	95-16-9	6.60	NGS	TNL 40 JNT	NT
S16T021085			Decane, 3,7-dimethyl-	17312-54-8	6.90	NGS	TNL 33 JNT	NT
S16T021085			Dodecane, 2,6,11-trimethyl-	31295-56-4	6.97	NGS	TNL 3.7	NT
S16T021085			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	TNL 64	NT
S16T021085			Dodecane, 4,6-dimethyl	61141728	7.26	NGS	Z4 JNT	NT
S16T021085			Undecane, 3,7-dimethyl-	17301-29-0	7.34	NGS	1NL 8.6 JNT	NT

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

N - Named TIC

Q - Qualitative

Cartridge Evaluation Data Summary of All Results

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Sample Group: 20162090 SDG Number:

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Customer Sample ID: 16-05983-1-H1

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Sample# R	₩¥	QC Type	Analyte	CAS No.	Ketention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	VOA	#2						
S16T021086			Heptane, 2-bromo-	1974-04-5	3.24	NGS	110	110 JNT
S16T021086			Hydroperoxide, hexyl	4312-76-9	3.37	NGS	50	50 JNT
\$167021086			2-Methyl-1-undecanol	10522-26-6	3.98	NGS	48	48 JNT
S16T021086	Γ		2-Heptanone, 6-methyl-	928-68-7	4.16	NGS	64	64 JNT
16T021086			1-Octanol, 2-butyl-	3913-02-8	4.25	NGS	36	36 JNT
S16T021086			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	560	560 JNT
S16T021086			1-Hexanol, 2-ethyl-	104-76-7	4.83	NGS	64	54 JNT
S16T021086			1-Heptanol, 2,4-dimethyl-, (2S	18450-74-3	4.90	NGS	49	49 JNT
16T021086			2,6-Dimethyldecane	13150-81-7	5.06	NGS	57	57 JNT
S16T021086			2.3-Dimethyldecane	17312-44-6	5.11	NGS	26	26 JNT
S16T021086			Acetophenone	98-86-2	5.19	NGS	19	19 JNT
16T021086			Unknown-1	1	5.37	NGS	26 JT	JT
16T021086			Undecane	1120-21-4	5.45	NGS	180	180 JNT
16T021086			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	180	TNL 081
16T021086			Undecane, 2,6-dimethyl-	17301-23-4	6.40	NGS	6.7	6.7 JNT
16T021086			Benzothiazole	95-16-9	6.61	NGS	76	76 JNT
16T021086			Decane, 3,7-dimethyl-	17312-54-8	6.90	NGS	43	43 JNT
16T021086			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	72	72 JNT
16T021086			Dodecane, 4,6-dimethyl-	61141728	7.26	NGS	32	32 JNT
\$16T021086			Undecane, 3,7-dimethyl-	17301-29-0	7.33	NGS	9.3	9.3 JNT

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

Q - Qualitative

N - Named TIC

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

1					Retention Time			
Sample# R	A# QC	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VAPOR-TDU SVOA #2	OA #2							L
S16T021087			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	160	160 JNT
S16T021087			Acetophenone	98-86-2	5.19	NGS	11	I JNT
S16T021087	_		Undecane	1120-21-4	5.45	NGS	57	57 JNT
S16T021087			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	120	TNT 120
S16T021087			Benzothiazole	95-16-9	6.60	NGS	42	42 JNT
S16T021087			Undecane, 2-methyl-	7045-71-8	6.90	NGS	18	18 JNT
S16T021087			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	28	28 JNT
S16T021087			Dodecane, 4.6-diemthyl-	61141728	7.26	NGS	14	A JNT

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

N - Named TIC

Q - Qualitative

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

ple# F	A#	QC Type	Analyte	CAS No.	Retent (Mil
VAPOR-TDU SVOA #2	NOVS UC	#2			
T021088	_		Propanoic acid, 2,2-dimethyl-	75-98-9	-

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Oual Flane
VAPOR-TDU SVOA #2	SVOA	#2						000
S16T021088			Propanoic acid, 2,2-dimethyl-	75-98-9	3.21	NGS	JNI 36 JNT	INT
S16T021088			Cyclotetrasiloxane, octamethyl	556-67-2	4.35	NGS	250 JNT	INT
S16T021088			Isooctanol	26952-21-6	4.84	NGS	TNL 30	INT
S16T021088			2,6-Dimethyldecane	13150-81-7	5.06	NGS	31	JNT
S16T021088			Decane, 2,4,6-trimethyl-	62108-27-4	5.11	NGS	TNL 9.9	INT
S16T021088			Acetophenone	98-86-2	5.19	NGS	TNL 91	INT
S16T021088			Undecane	1120-21-4	5.45	NGS	TNL 97	INT
S16T021088			Decamethlycyclopentasiloxane	541-02-6	5.72	NGS	120 JNT	INT
S16T021088			Benzothiazole	95-16-9	6.61	NGS	52 JNT	INT
S16T021088			Decane, 3,7-dimethyl-	17312-54-8	6.90	NGS	TNL 43	INT
S16T021088			Undecane, 3,7-dimethyl-	17301-29-0	7.01	NGS	TNL 7.9	INT
S16T021088			Dodecamethylcyclohexasiloxane	540-97-6	7.07	NGS	TNL 49	INT
S16T021088			Dodecane,4,6-dimethyl	61141-72-8	7.26	NGS	26 JNT	INT
S16T021088			Undecane, 2-methyl-	7045-71-8	7.34	NGS	TNL 91	INT

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

Q - Qualitative

N - Named TIC

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

Sample# K A	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Ont Err % Qual Flags	Qual
VAPOR-TDU VOA #2	/OA #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	19-00-5	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	ш
S16T021090	108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	n/a	n/a	n/a	3.3		
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	ш
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	L
S16T021090	534-22-5	2-Methylfuran	NGS	89	<1.9	3.1	n/a	n/a	n/a	n/a	1.9	n/a	2
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	L
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	ш
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	e/u	
S16T021090	107-18-6	Allyl Alcohol	NGS	88	<3.9	7.0	n/a	n/a	n/a	n/a	3.9	n/a	-
L - LLS Outside Range	and	MULINY Y- Comment			J - Estimated	ited			z	NA = Not / N - Named TIC	NA = Not Analyzed, ND = Not Detected lamed TIC	ND = Not I	Deter
R - Rlank Contamination		ALV T. Tentatively Identified Communed	Compound		E. Outeid	F - Outside Calibration Rande	Rande						

VOC and VOCTIC C.3.2

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 % S	Average RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	66	<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	Methacrytonitrile	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	e/u	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	nla

L - LLS Outside Range B - Blank Contamination

Y - Comment T - Tentatively Identified Compound

J - Estimated E - Outside Calibration Range

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

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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

		ſ	al 27 20 (2000)			İ							
Sample# R	A# CAS#		Analyte	Unit	STD %	Blank	Result	Result Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA	VOA #2												
S16T021090	79-01-6	9	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a
S16T021090	75-69-4	4	Trichlorofluoromethane	NGS	84	<1.6	560	n/a	n/a	n/a	n/a	1.6	n/aE
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-	T	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a
S16T021090	142-82-6		n-Heptane	NGS	90	<1.4	1.0E+03	n/a	n/a	n/a	n/a	1.4	n/aE
S16T021090	10061-(-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a

L - LLS Outside Range B - Blank Contamination

J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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

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Sample Group: 20162091	SDG Number:	Customer Sample ID: 16-05982-2-A2	Customer Sample ID: 16-05982-2-A2
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Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	06	<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	14	<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

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

J - Estimated E - Outside Calibration Range Y - Comment T - Tentatively Identified Compound

L - LLS Outside Range B - Blank Contamination

14:40:38	-imits 3.0.11b	
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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 % S	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	Butanat	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a
S16T021091	109-74-0	Butanenitrile	NGS	06	<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	Ethytbenzene	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	Hexanenitrite	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a
S16T021091	126-98-7	Methacrylonitrile	NGS	06	<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	63	<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

L - LLS Outside Range B - Blank Contamination

J - Estimated E - Outside Calibration Range Y - Comment T - Tentatively Identified Compound

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

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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

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Sample# K	K AF CAS#	# 0	Analyte	Unit	STD %	Blank	Result	Result Duplicate		RPD %	Average RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	U VOA #2	2											
S16T021091	2-62	79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a
S16T021091	75-6	5-69-4	Trichlorofluoromethane	NGS	84	<1.6	2.0	n/a	n/a	n/a	n/a	1.6	n/a J
S16T021091	100	0061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a
S16T021091	123	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.	12-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a
S16T021091	100	0061-02-6	trans-1,3-Dichloropropene	NGS	60	<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

Y - Comment T - Tentatively Identified Compound

14:40:38	Limits 3.0.11b	
16 - Aug - 2016	DSRHardcopyWOI	DSR.Jar v. 3.0.12

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

I													
Sample# R	A# CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	I Flags
VAPOR-TDU VOA #2	I 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	11	<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	e/u	20	ola	

J - Estimated E - Outside Calibration Range

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

L - LLS Outside Range B - Blank Contamination

Y - Comment T - Tentatively Identified Compound

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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Oual Flags
VAPOR-TDU VOA #2	VOA #2											0
S16T021092	107-05-1	Allyl Chloride	NGS	68	<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	06	<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	l a/u
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	l a/u
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	<15	37	n/a	pla	ola	ala.	4	-1-

L - LLS Outside Range B - Blank Contamination

J - Estimated E - Outside Calibration Range Y - Comment T - Tentatively Identified Compound

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

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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

NGS		-		and a state	-Rannak -		or nou unice or on the	1007 100	CULER 70	Det Limit ont Err % qual Flags
NGS										
	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
NGS	84	<1.6	14	n/a	n/a	n/a	n/a	1.6	n/a	
NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	n/a	
NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
NGS	60	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a	
trans-1,3-Dichloropropene NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2		
0	NGS NGS NGS		82 82 82	85 <1.4 90 <1.4 90 <1.2	85 <1.4 <1.4 90 <1.4	85 <1,4 <1.4 n/a 90 <1,4	85 <1.4 <1.4 n/a n/a <td>85 <1.4 <1.4 n/a 90 <1.2</td> <1.2	85 <1.4 <1.4 n/a 90 <1.2	85 <1.4 <1.4 n/a 90 <1.2	85 <1.4 n/a n/a n/a n/a 1.4

L - LLS Outside Range B - Blank Contamination

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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 %	RPD % Spk Rec %	Det Limit	Cnt Err % Qual Flags
VAPOR-TDU VOA #2	J 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	
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	
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	06	<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	112	<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	Aliyi Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a

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

J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

L - LLS Outside Range B - Blank Contamination

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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 % 15	RPD % Sok Rec %	Det Limit	Det Limit Ont Frr % Oual Flage
VAPOR-TDU VOA #2	VOA #2		100	~ ~ ~	and and and and and and and and and and			0		at part und		
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	66	<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	e/u	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	Ethytbenzene	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	66	<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	e/u	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	06	<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	<15	n/a	ala	ala	ala	4	-1-

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J - Estimated E - Outside Calibration Range

L - LLS Outside Range B - Blank Contamination

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDI	U 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	60	<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	66	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a

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

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16 - Aug - 2016	DSRHardcopyWO	DSR.Jar v. 3.0.12

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 % S	RPD % Sok Rec %	Det Limit	Det Limit Cut Err % Oual Flags
VAPOR-TDU VOA #2	I 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	06	<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	11	<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	Alivi Alcohol	NGS	88	<3.0	<39	n/a	a/u	olo	ola	00	ala

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	35	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1	n/a
S16T021094	109-74-0	Butanenitrile	NGS	06	<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	u/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	60	<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

2-C1

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Customer :	4
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Sample# R	A# CAS	# 5	Analyte	Unit	STD %	Blank	Result	Result Duplicate	Average	RPD %	Average RPD % Spk Rec %	Det Limit	Cnt Err %	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	TH NOA #	2												
S16T021094)-64	79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
S16T021094	15-6	75-69-4	Trichlorofluoromethane	NGS	84	<1.6	91	n/a	n/a	n/a	n/a	1.6	n/a	
S16T021094	100	0061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3		
S16T021094	123	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	ľ	
S16T021094	142	-82-5	n-Heptane	NGS	06	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4		
S16T021094	100	61-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Dual Flags
VAPOR-TDU VOA #2	VOA #2				ĺ			1	1				ľ
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 J	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	35	<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	ľ
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	1
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	6.85
S16T021095	75-05-8	Acetonitrile	NGS	88	<1.8	680	n/a	n/a	n/a	n/a	1.8	n/a E	1
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	1
S16T021095	107-18-6	Allyl Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	30	a/a	

L - LLS Outside Range B - Blank Contamination

Y - Comment T - Tentatively Identified Compound

J - Estimated E - Outside Calibration Range

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

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16 - Aug - 2016	DSRHardcopyWO	DSR.Jar v. 3.0.12	

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	own ar	Blank	Doeult	Dunlinato	Automotio	1000	Parts Parts of	11-11-14-14	
100				% nic	-	Uneav	napiirara	AVVIAGE	% n_v	WLU % OPK KBC %	Det Filmt	Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	
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	06	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	
S16T021095	56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	
S16T021095	108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	
S16T021095	75-00-3	Chloroethane	NGS	87	<1.9	4.5	n/a	n/a	n/a	n/a	1.9	
S16T021095	67-66-3	Chloroform	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	
S16T021095	110-82-7	Cyclohexane	NGS	92	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	
S16T021095	124-18-5	Decane	NGS	92	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	
S16T021095	64-17-5	Ethanol	NGS	85	<7.4	2.4E+03	n/a	n/a	n/a	n/a	7.4	
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	Naphthatene	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	
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	66	<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.l

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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	Det Limit Cnt Err % Qual Flags
VAPOR-TDL	NU 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	06	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	
S16T021095	10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a	n/a	12	

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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 A	Average	RPD % Spk Rec %		let Limit (Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	e/u	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	06	<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	11	<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	ala	ala	-1-	00	

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NA = Not Analyzed, ND = Not Detected

N - Named TIC

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L - LLS Outside Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

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

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×	Mr CAS#	Analyte	Onit	STD %	Blank	Result	Duplicate	Average	RPD % Spk Rec %	pk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	J 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	96	<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	06	<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	06	<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

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

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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

# 222	antanha		STD %	Blank	INSON	Kesuit Duplicate	Average	RPD %	Average RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2											
79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a
75-69-4	Trichlorofluoromethane	NGS	84	<1.6	590	n/a	n/a	n/a	n/a	1.6	n/a E
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
123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a
142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a
10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a
10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a		n/a		n/a	n/a n/a

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

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Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	26	<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	96	<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	26	<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	Aliyi Alcohol	NGS	26	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a

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

J - Estimated E - Outside Calibration Range

L - LLS Outside Range B - Blank Contamination

Y - Comment T - Tentatively Identified Compound

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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 % 3	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	VOA #2											
S16T021097	107-05-1	Allyl Chloride	NGS	26	<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	l a/u
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	63	<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/all

L - LLS Outside Range B - Blank Contamination

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J - Estimated E - Outside Calibration Range

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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	Det Limit Cnt Err % Qual Flags
VAPOR-TDI	U 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
\$16T021097	75-69-4	Trichlorofluoromethane	NGS	86	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9	n/a
\$16T021097	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
\$16T021097	123-86-4	n-Butyl acetate	NGS	26	<2.4	<2.4	n/a	n/a	n/a	n/a	2.4	n/a
\$16T021097	142-82-5	n-Heptane	NGS	110	<1.6	3.4	n/a	n/a	n/a	n/a	1.6	n/a J
\$16T021097	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	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	67	<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	67	<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	67	<2.3	<2.3	n/a	n/a	ala	nla	23	nla

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J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

Cartridge Evaluation Data Summary Report

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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	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	VOA #2											
S16T021099	107-05-1	Allyl Chloride	NGS	26	<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	l a/u
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	Toltiene	NGS	120	000	007	ola	-1-	•	3	0	

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Y - Comment T - Tentatively Identified Compound

J - Estimated E - Outside Calibration Range

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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	Det Limit Cnt Err % Qual Flags	ual Flags
VAPOR-TDU VOA #2	NU 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	26	<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	

L - LLS Outside Range B - Blank Contamination

J - Estimated E - Outside Calibration Range

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

Cartridge Evaluation Data Summary Report

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

Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Cnt Err %	Det Limit Ont Err % Qual Flags
VAPOR-TDU VOA #2	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		2.3	n/a	- -
S16T021100	75-34-3	1,1-Dichloroethane	NGS	26	<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	1
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		
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	L L
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	U/a/J	ſ
S16T021100	71-23-8	1-Propanol	NGS	110	<8.9	2.3E+03	n/a	n/a	n/a		8.9	n/a E	ш
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	ш
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	26	<1.3	4.8	n/a	n/a	n/a	n/a	1.3	n/a	2
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	ш
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		ш
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	Allyt Alcohol	NGS	07	001	202	olo	ala		-1-	00	-	

L - LLS Outside Range B - Blank Contamination

Y - Comment T - Tentatively Identified Compound

J - Estimated E - Outside Calibration Range

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

Cartridge Evaluation Data Summary Report

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

Sample# R	A# CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD % Spk Rec %	Rec %	Det Limit	Cnt Err % Qual Flags
VAPOR-TDU VOA #2	VOA #2											
S16T021100	107-05-1	Allyl Chloride	NGS	26	<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	l alu
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	86	<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

L - LLS Outside Range B - Blank Contamination

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

J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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	Result Duplicate	Average	RPD %	Average RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	J 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	-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	4-9	n-Butyl acetate	NGS	26	<2.4	18	n/a	n/a	n/a	n/a	2.4	
S16T021100	142-82-5	2-5	n-Heptane	NGS	110	<1.6	830	n/a	n/a	n/a	n/a	1.6	
S16T021100	10061-	0061-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	4.7	n/a	n/a	n/a	n/a	10	n/a.l

L - LLS Outside Range B - Blank Contamination

J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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

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Cartridge Evaluation Data Summary Report

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Qual Flags
VAPOR-TDU VOA #2	J 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	26	<1.7	3.8	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021101	75-35-4	1.1-Dichloroethene	NGS	91	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021101	107-06-2	1,2-Dichloroethane	NGS	100	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a	
S16T021101	542-75-6	1.3-Dichioropropene (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	
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	96	<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	26	<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	SEY .
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	26	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a	

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J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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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 %	RPD % Spk Rec %	Det Limit	Cnt Err % Qual Flags
VAPOR-TDU VOA #2	VOA #2											
S16T021101	107-05-1	Allyl Chloride	NGS	26	<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	
S16T021101	100-47-0	Benzonitrile	NGS	110	<4.2	<4.2	n/a	n/a	n/a	n/a	4.2	
S16T021101	123-72-8	Butanal	NGS	100	<3.0	<3.0	n/a	n/a	n/a	n/a	3.0	
S16T021101	109-74-0	Butanenitrile	NGS	110	<2.1	3.4	n/a	n/a	n/a	n/a	2.1	
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	
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	
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	a/u	nla	ala	ala	00	-1- 1

L - LLS Outside Range B - Blank Contamination

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

J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDL	U 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	86	<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	21	n/a	n/a	n/a	n/a	2.1	n/a

L - LLS Outside Range B - Blank Contamination

J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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

Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	J 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	2-00-62	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	67	<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	26	<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 Alcohot	NGS	26	<2.3	<2.3	n/a	n/a	n/a	n/a	2.3	n/a

L - LLS Outside Range B - Blank Contamination

Y - Comment T - Tentatively Identified Compound

J - Estimated E - Outside Calibration Range

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

Cartridge Evaluation Data Summary Report

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

Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD % S	RPD % Spk Rec %	Det Limit	Cnt Err % Qual Flags	I Flags
VAPOR-TDU VOA #2	VOA #2												
S16T021102	107-05-1	Allyl Chloride	NGS	67	<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	l a/u	
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	l n/a	
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	l a/u	
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	l a/u	
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	L a/u	

L - LLS Outside Range B - Blank Contamination

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J - Estimated E - Outside Calibration Range

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

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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

ample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU V(J VOA #2											
16T021102	79-01-6	Trichloroethene	NGS	100	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a
16T021102	75-69-4	Trichlorofluoromethane	NGS	86	<1.9	9.5	n/a	n/a	n/a	n/a	1.9	
16T021102	10061-01-5	cis-1,3-Dichloropropene	NGS	100	<1.8	<1.8	n/a	n/a	n/a	n/a	1.8	
16T021102	123-86-4	n-Butyl acetate	NGS	97	<2.4	<2.4	n/a	n/a	n/a	n/a	24	
16T021102	142-82-5	n-Heptane	NGS	110	<1.6	7.3	n/a	n/a	n/a	n/a	91	
16T021102	10061-02-6	trans-1,3-Dichloropropene	NGS	110	<2.1	<2.1	n/a	n/a		n/a	2.1	n/a

L - LLS Outside Range B - Blank Contamination

J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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

ID: 16-05982-2-A1	
Sample ID: 1	
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Samilati D				Retention Time	2 Michael	Torrest of the second s	
1 00	CC 1ype	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VALOR-1 DU VOL #2							
S16T021090		1,3-Butadiene	106-99-0	5.05	NGS	TNL 8.3 JNT	JNT
S16T021090		2-Methyl-1-butene	563-46-2	5.27	NGS	230 JNT	JNL
S16T021090		5-Methyloxazolidine	58328-22-6	5.35	NGS	180 JNT	JNT
S16T021090		Butane, 2-methyl-	78-78-4	5.61	NGS	TNL 057	JNL
S16T021090		Oxirane, trimethyl-	5076-19-7	6.24	NGS	2.0E+03 JNT	JNL
S16T021090		2-Pentene	109-68-2	6.55	NGS	130 JNT	JNT
S16T021090		2-Pentene, (E)-	646-04-8	6.80	NGS	75	75 JNT
S16T021090	×.,	Cyclobutanone, 2,2,3-trimethyl	1449-49-6	6.92	NGS	300 JNT	JNT
S16T021090		1-Pentene	109-67-1	7.00	NGS	35	35 JNT
S16T021090		2-Propanol, 2-methyl-	75-65-0	7.16	NGS	7NL 280 JNT	JNT
S16T021090		Butane, 2,2-dimethyl-	75-83-2	7.51	NGS	42	42 JNT
S16T021090		1-Pentene, 4-methyl-	691-37-2	8.41	NGS	7NL 280 JNT	JNT
S16T021090		Cyclopentane	287-92-3	8.75	NGS	TNL 001	JNL
S16T021090		Pentane, 2-methyi-	107-83-5	8.88	NGS	1.4E+03 JNT	JNT
S16T021090		Pentane, 3-methyl-	96-14-0	9.54	NGS	270 JNT	JNT
S16T021090		1-Hexene	592-41-6	9.91	NGS	530 JNT	JNT
S16T021090		Acetic acid	64-19-7	10.23	NGS	10	10 JNT
S16T021090		2-Hexene	592-43-8	10.66	NGS	64	64 JNT
S16T021090		3-Hexen-1-ol	544-12-7	11.09	NGS	38	38 JNT
S16T021090		3-Hexene, (Z)-	7642-09-3	11.16	NGS	27	27 JNT
S16T021090		Cyclopropane, 1-ethyl-2-methyl	19781-68-1	11.42	NGS	60	50 JNT
S16T021090	7.	Isobutanol	78-83-1	11.62	NGS	11	TNL 77
S16T021090		Hexane, 2,4-dimethyl-	589-43-5	11.71	NGS	80	1NL 08
S16T021090		Cyclobutane, ethyl-	4806-61-5	11.89	NGS	120 JNT	JNT
S16T021090	-	Tetrahydrofuran	109-99-9	11.94	NGS	1NL 088	INL
S16T021090		3-Buten-1-ol	627-27-0	12.11	NGS	39	39 JNT
S16T021090		2-Methyl-5-hexen-3-ol	32815-70-6	12.36	NGS	88	88 JNT
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Contamination	11011	T - Tentatively Identified Compound	E - Outs	E - Outside Calibration Range	Je		

L - LLS Outside Range B - Blank Contamination

Cartridge Evaluation Data Summary Report

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

16-05982-2-A1	
Sample ID:	
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Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	/OA #.							
16T021090			(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.58	NGS	25	25 JNT
S16T021090			1-Hexene, 3-methyl-	3404-61-3	12.91	NGS	110	110 JNT
S16T021090			Hexane, 2-methyl-	591-76-4	13.42	NGS	630	530 JNT
S16T021090			Pentane, 2,3-dimethyl-	565-59-3	13.54	NGS	42	42 JNT
S16T021090			Hexane, 3-methyl-	589-34-4	13.73	NGS	980	380 JNT
16T021090			1-Heptene	592-76-7	14.19	NGS	280	590 JNT
S16T021090			Ethylene Glycol	107-21-1	14.62	NGS	2.0E+03 JNT	TNL
S16T021090			Formamide	75-12-7	14.81	NGS -	140	140 JNT
S16T021090			Propane, 2-methyl-1-nitro-	625-74-1	14,93	NGS	48	48 JNT
S16T021090			Cyclopentane, 1.2-dimethyl-, c	1192-18-3	15.04	NGS	63	53 JNT
S16T021090			2,4-Azetidinedione, 3,3-diethy	69315-91-9	15.19	NGS	450	450 JNT
16T021090			Oxirane, 2-(1,1-dimethylethyl)	53897-30-6	15.27	NGS	53	53 JNT
S16T021090			2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15.32	NGS	120	120 JNT
16T021090			Cyclopentane, ethyl-	1640-89-7	15.42	NGS	87	1NL 78
16T021090			Carbamic acid, methyl ester	598-55-0	15.52	NGS	29	29 JNT
16T021090			Unknown-1	4	15.82	NGS	55	55 JT
16T021090			1-Heptene, 6-methyl-	5026-76-6	15.91	NGS	280	280 JNT
16T021090			1-Pentanol	71-41-0	15.98	NGS	81	81 JNT
16T021090			Heptane, 2-methyl-	592-27-8	16.08	NGS	280	280 JNT
16T021090			Heptane, 4-methyl-	589-53-7	16.13	NGS	26	37 JNT
16T021090			Heptane, 3,4,5-trimethyl-	20278-89-1	16.25	NGS	66	1NL 66
16T021090			2-Hexene, 5,5-dimethyl-, (Z)-	39761-61-0	16.52	NGS	140	140 JNT
S16T021090			1-Octene	111-66-0	16.60	NGS	62	62 JNT
S16T021090			1-Octene, 6-methyl-	13151-10-5	16.71	NGS	25	25 JNT
16T021090			Octane	111-65-9	16.77	NGS	250	250 JNT
S16T021090			Cyclohexane, 1,2-dimethyl-, tr	6876-23-9	16.94	NGS	31	31 JNT
S16T021090			Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	70	TUL DY

L - LLS Outside Range B - Blank Contamination

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Y - Comment T - Tentatively Identified Compound

Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

Customer Sample ID: 16-05982-2-A1

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					Retention Time			
Sample# R	A#	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	/OA #2							
16T021090			Pyridine, 4-methyl-	108-89-4	17.33	NGS	28	28 JNT
S16T021090			Octane, 2-methyl-	3221-61-2	17.41	NGS	96	96 JNT
S16T021090			Cyclohexane, ethyl-	1678-91-7	17.68	NGS	50	50 JNT
16T021090			1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	94	94 JNT
16T021090		-	Heptane, 4-propyl-	3178-29-8	18.27	NGS	45	45 JNT
16T021090			Nonane	111-84-2	18.83	NGS	59	59 JNT
S16T021090			Octane, 3,6-dimethyl-	15869-94-0	19.66	NGS	27	27 JNT
S16T021090			2-Heptanone, 6-methyl-	928-68-7	20.27	NGS	100	TNL 001
S16T021090			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	260	260 JNT
S16T021090			Cyclohexane, 1,1,2,3-tetrameth	6783-92-2	20.84	NGS	37	37 JNT
S16T021090			Cyclohexene, 1-methyl-5-(1-met	1461-27-4	22.61	NGS	31	31 JNT
16T021090			3,3-Dimethylhexane	563-16-6	22.71	NGS	37	37 JNT
16T021090			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	150	150 JNT
16T021090			2,6-Dimethyldecane	13150-81-7	23.14	NGS	66	66 JNT
16T021090			Undecane	1120-21-4	23.73	NGS	33	33 JNT
16T021090			2,3-Dimethyldecane	17312-44-6	23.79	NGS	28	28 JNT
16T021090			Unknown-2	ī	23.85	NGS	120 JT	JT.
16T021090			Dodecane	112-40-3	23.95	NGS	57	57 JNT
16T021090			Hydroxylamine, O-decyl-	29812-79-1	24.06	NGS	32	32 JNT
16T021090			Unknown-3	-	24.26	NGS	250 JT	JT
16T021090			Undecane, 3-methyl-	1002-43-3	24.90	NGS	15	15 JNT
16T021090			Tridecane	629-50-5	25.27	NGS	55	55 JNT
\$16T021090	_		Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	32	32 JNT
S16T021090			Ethanol, 2-phenoxy-	122-99-6	25.82	NGS	110	110 JNT
16T021090			1,2-Benzisothiazole	272-16-2	26.31	NGS	96	95 JNT
\$16T021090			Undecane, 2-methyl-	7045-71-8	26.43	NGS	64	64 JNT
S16T021090			1.2.3.4.5-Cvclopentanepentol	56772-25-9	26.63	NGS	28	TNT DB

L - LLS Outside Range B - Blank Contamination

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N - Named TIC

J - Estimated
 E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

Customer Sample ID: 16-05982-2-A1 Customer Sample ID: 16-05982-2-A1

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Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Result Oual Flags
VAPOR-TDU	VOA #2	~						-
S16T021090			1-lodo-2-methylundecane	73105-67-6	27.01	NGS	TNL 28 JNT	INT
S16T021090	<u> </u>	3LNK	Unknown-1	1	8.24	NGS	30	

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

> J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

Customer Sample ID: 16-05982-2-A2 Customer Sample ID: 16-05982-2-A2

Nono								
Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	VOA #2							
S16T021091			Formamide	75-12-7	14.05	NGS	44	44 JNT
S16T021091			Propane, 2-methyl-1-nitro-	625-74-1	16.50	NGS	31	31 JNT
S16T021091			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	540 JNT	JNT
S16T021091			Heptane, 2,2,4,6,6-pentamethyl	13475-82-6	21.52	NGS	TNL 011	JNT
S16T021091			2,2,7,7-Tetramethyloctane	1071-31-4	22.16	NGS	37	37 JNT
S16T021091			3,3-Dimethylhexane	563-16-6	22.71	NGS	82	82 JNT
S16T021091			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	76	76 JNT
S16T021091			Heptane, 5-ethyl-2,2,3-trimeth	62199-06-8	23.15	NGS	69	69 JNT
S16T021091			Decane, 2,5,9-trimethyl-	62108-22-9	23.22	NGS	37	37 JNT
S16T021091			Hydroxylamine, O-decyl-	29812-79-1	23.55	NGS	40	40 JNT
S16T021091			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	32	32 JNT
S16T021091			2,6-Dimethyldecane	13150-81-7	23.85	NGS	76	76 JNT
S16T021091			Undecane	1120-21-4	23.94	NGS	50	50 JNT
S16T021091			Unknown-1	-	24.26	NGS	520 JT	JT
S16T021091			Dodecane	112-40-3	25.27	NGS	47	47 JNT
S16T021091			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	45	45 JNT
S16T021091			Unknown-2		25.99	NGS	61 JT	JT
S16T021091			Methenamine	100-97-0	26.19	NGS	32	32 JNT
S16T021091		19	1,2-Benzisothiazole	272-16-2	26.30	NGS	170	TNL 071
S16T021091			Unknown-3		26,43	NGS	57 JT	JT
S16T021091		1.04	Propanoic acid, 2-methyl-, 1-(74381-40-1	26.55	NGS	47	47 JNT
S16T021091		j s	Silane, trimethyl-3-penten-2-y	53264-56-5	26.63	NGS	44	44 JNT
S16T021091			Tetradecane, 1-iodo-	19218-94-1	27.01	NGS	28	28 JNT
S16T021091	B	BLNK	Unknown-1	1	8.24	NGS	30	

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> J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

Customer Sample ID: 16-05982-2-B1 Customer Sample ID: 16-05982-2-B1

					Retention Time			
Sample# R	₩¥	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	# YON	2						
16T021092			Formamide	75-12-7	14.07	NGS	74	74 JNT
16T021092			Propane, 2-methyl-1-nitro-	625-74-1	16.51	NGS	36	36 JNT
16T021092			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	420 JNT	JNT
16T021092			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	TNL 001	JNL
16T021092			2,6-Dimethyldecane	13150-81-7	23.14	NGS	42	42 JNT
16T021092			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	41	41 JNT
S16T021092			3,3-Dimethylhexane	563-16-6	23.85	NGS	98	98 JNT
S16T021092			Undecane, 5,7-dimethyl-	17312-83-3	23.94	NGS	74	74 JNT
S16T021092			Unknown-1		24.26	NGS	490 JT	71
16T021092			1-Octanol, 2-butyl-	3913-02-8	24.85	NGS	44	44 JNT
S16T021092			Dodecane	112-40-3	25.28	NGS	56	56 JNT
S16T021092			1-Octene, 3,7-dimethyl-	4984-01-4	25.41	NGS	84	84 JNT
S16T021092			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.96	NGS	31	31 JNT
S16T021092			Unknown-2	i.	26.01	NGS	100 JT	71
S16T021092			1,2-Benzisothiazole	272-16-2	26.32	NGS	150 JNT	JNT
16T021092			Unknown-3	1	26.45	NGS	62 JT	11
S16T021092			Propanoic acid, 2-methyl-, 1-(74381-40-1	26.57	NGS	52	52 JNT
S16T021092			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.65	NGS	36	36 JNT
S16T021092			Undecane, 2-methyl-	7045-71-8	27.03	NGS	28	28 JNT
S16T021092		BLNK	Unknown-1		8.24	NGS	30	

L - LLS Outside Range B - Blank Contamination

Y - Comment T - Tentatively.Identified Compound

J - Estimated E - Outside Calibration Range

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

Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

Customer Sample ID: 16-05982-2-BLANK Customer Sample ID: 16-05982-2-BLANK

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	o
VAPOR-TDU VOA #2	VOA #2							
S16T021093			Unknown-1	1	8.28	NGS	TU 17	5
S16T021093			2,2,7,7-Tetramethyloctane	1071-31-4	21.52	NGS	75	75 JNT
S16T021093			3,3-Dimethylhexane	563-16-6	22.71	NGS	29	29 JNT
S16T021093			Undecane, 3-methyl-	1002-43-3	23.54	NGS	TNL 0.0	IN
S16T021093			Propanoic acid, 2-methyl-, 1-(74381-40-1	26.58	NGS	26	26 JNT
S16T021093	8	BLNK	Unknown-1	1	8.24	NGS	30	

Qual Flags

L - LLS Outside Range B - Blank Contamination

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

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Y - Comment T - Tentatively Identified Compound

J - Estimated E - Outside Calibration Range

Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

Customer Sample ID: 16-05982-2-C1 Customer Sample ID: 16-05982-2-C1

					Retention Time			
Sample# R	₩	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	# YON	2						
16T021094			Cyclobutylamine	2516-34-9	5.28	NGS	33 JNT	INT
16T021094			2-Butene	107-01-7	5.35	NGS	27 JNT	JNT
\$16T021094			Formamide	75-12-7	14.09	NGS	INL 96	INT
16T021094			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	TNL 004	INT
S16T021094			2,6-Dimethyldecane	13150-81-7	23.00	NGS	TNL 84 JNT	INT
16T021094			Decane, 2,4,6-trimethyl-	62108-27-4	23.14	NGS	31 JNT	INT
S16T021094			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	TNL 50 JNT	INT
S16T021094			Unknown-1	L.	23.85	NGS	84 JT	5
S16T021094			3,3-Dimethylhexane	563-16-6	23.95	NGS	LNC 05	INT
S16T021094			Unknown-2		24.26	NGS	530 JT	15
S16T021094			Dodecane	112-40-3	25.27	NGS	TNL 001	INT
16T021094			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	TNL 50 JNT	INT
S16T021094			Unknown-3	1	26.00	NGS	94 JT	11
16T021094			1,2-Benzisothiazole	272-16-2	26.32	NGS	220 JNT	INT
S16T021094			Octane, 2,3,6,7-tetramethyl-	52670-34-5	26.44	NGS	INL 54 JNI	INT
16T021094			Undecane, 2-methyl-	7045-71-8	26.57	NGS	TNL 13 JNT	INT
16T021094			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.59	NGS	TNL 81	INT
16T021094			Silane, trimethyl[2-methylene-	97778-15-9	26.65	NGS	TNL 44 JNT	INT
S16T021094			Tetradecane, 1-iodo-	19218-94-1	27.03	NGS	31 JNT	INT
S16T021094		BLNK	Unknown-1	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

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Sample# R	₩#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Oual Flage
VAPOR-TDU VOA #2	VOA #	2						-
167021095			Cyclobutylamine	2516-34-9	5.28	NGS	34	34 JNT
S16T021095			Hydroxyacetic acid, hydrazide	3530-14-1	8.27	NGS	27	27 JNT
16T021095			Formamide	75-12-7	14.09	NGS	TNL 011	JNL
16T021095			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	280 JNT	INL
16T021095			Dodecane, 2,6,10-trimethyl-	3891-98-3	22.71	NGS	21	21 JNT
16T021095			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	58	58 JNT
S16T021095			2,6-Dimethyldecane	13150-81-7	23.14	NGS	31	31 JNT
S16T021095			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	27	27 JNT
S16T021095			3.3-Dimethythexane	563-16-6	23.85	NGS	62	62 JNT
S16T021095			Undecane	1120-21-4	23.95	NGS	26	26 JNT
S16T021095			Unknown-1	-	24.26	NGS	410 JT	71
S16T021095			Tetradecane, 1-iodo-	19218-94-1	25.27	NGS	41	41 JNT
S16T021095			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	30	30 JNT
S16T021095			2-Propenoic acid, octyl ester	2499-59-4	26.00	NGS	46	46 JNT
S16T021095			Methenamine	100-97-0	26.20	NGS	16	16 JNT
S16T021095			1,2-Benzisothiazole	272-16-2	26.32	NGS	140 JNT	JNT
S16T021095			Undecane, 2-methyl-	7045-71-8	26.45	NGS	50	50 JNT
S16T021095			Silane, trimethyl[2-methylene-	97778-15-9	26.65	NGS	47	47 JNT
S16T021095			Decane, 2,6,8-trimethyl-	62108-26-3	27.03	NGS	27	27 JNT
S16T021095	_	BLNK	Unknown-1		8.24	NGS	30	

Y - Comment T - Tentatively Identified Compound

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

N - Named TIC

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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	Decent	Ound Floor
VAPOR-TDU VOA #2	1 VOA #	2						
S16T021096			1,3-Butadiene	106-99-0	5.05	NGS	11	11 JNT
16T021096			2-Butene	107-01-7	5.35	NGS	26	26 JNT
S16T021096			Formamide	75-12-7	14.12	NGS	150	150 JNT
S16T021096			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	230 JNT	JNL
S16T021096			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	54	54 JNT
16T021096			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	25	25 JNT
S16T021096			2.6-Dimethyldecane	13150-81-7	23.85	NGS	60	60 JNT
S16T021096			Hexyl octyl ether	17071-54-4	23.94	NGS	39	39 JNT
16T021096			Unknown-1		24.26	NGS	340 JT	JT
16T021096			Tetradecane, 1-iodo-	19218-94-1	25.27	NGS	40	40 JNT
S16T021096			Methenamine	100-97-0	26.19	NGS	39	39 JNT
16T021096			1,2-Benzisothiazole	272-16-2	26.32	NGS	96	36 JNT
16T021096			Unknown-2	£	26.44	NGS	40 JT	JT
16T021096			Propanoic acid, 2-methyl-, 1-(74381-40-1	26.58	NGS	53	53 JNT
16T021096			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.64	NGS	28	28 JNT
16T021096			Undecane, 2-methyl-	7045-71-8	27.02	NGS	17	17 JNT
S16T021096	_	BLNK	Unknown-1	1	8.24	NGS	30	

Y - Comment T - Tentatively Identified Compound

J - Estimated E - Outside Calibration Range

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

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Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

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

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Dual Flace
VAPOR-TDU VOA #2	A A #	2						200
16T021097			Cyclotrisiloxane, hexamethyl-	541-05-9	16.88	NGS	34	34 JNT
S16T021097			Cyclotetrasiloxane, octamethyl	556-67-2	20.20	NGS	530 JNT	JNT
16T021097			Decane, 2,4,6-trimethyl-	62108-27-4	22.78	NGS	93	93 JNT
S16T021097			2,6-Dimethyldecane	13150-81-7	22.93	NGS	35	35 JNT
S16T021097			Undecane	1120-21-4	23.55	NGS	28	28 JNT
16T021097			3,3-Dimethylhexane	563-16-6	23.66	NGS	66	66 JNT
16T021097		c 1	Dodecane	112-40-3	23.77	NGS	61	61 JNT
S16T021097			Unknown-1	Ē	24.07	NGS	380 JT	11
S16T021097			Undecane, 2,6-dimethyl-	17301-23-4	25.11	NGS	TNL 49 JNT	JNL
S16T021097			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.26	NGS	TNL 33 JNT	JNT
S16T021097			1,2-Benzisothiazole	272-16-2	26.17	NGS	TNL 88	JNT
S16T021097			Undecane, 2-methyl-	7045-71-8	26.29	NGS	TNL 42	JNT
S16T021097			1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.49	NGS	53	53 JNT

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J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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	Recuit	Ouel Blace
VAPOR-TDU VOA #2	4 YOA #	2						
16T021099			2-Butene, 2-methyl-	513-35-9	5.18	NGS	TNL 064	INL
S16T021099			2-Pentene	109-68-2	5.36	NGS	120 JNT	JNL
16T021099			Butane, 2-methyl-	78-78-4	5.52	NGS	1.1E+03 JNT	JNT
16T021099			2-Pentene, (E)-	646-04-8	6.48	NGS	130 JNT	JNT
16T021099			1,4-Pentadiene	591-93-5	6.61	NGS	38	38 JNT
16T021099			2-Methyl-1-butene	563-46-2	6.74	NGS	27	27 JNT
S16T021099			1-Pentene	109-67-1	6.84	NGS	480 JNT	JNT
16T021099			Hydrogen azide	7782-79-8	7.14	NGS	110 JNT	JNT
16T021099			2,3-Diazabicyclo[2.2.1]-hept-2	2721-32-6	8.33	NGS	59	TNL 59
16T021099			Cyclopentane	287-92-3	8.69	NGS	510 JNT	JNT
S16T021099			Pentane, 2-methyl-	107-83-5	8.81	NGS	49	49 JNT
S16T021099			Tetrahydrofuran	109-99-9	11.93	NGS	120 JNT	JNT
16T021099			Cyclotetrasiloxane, octamethyl	556-67-2	20.20	NGS	270 JNT	JNT
S16T021099			Decane, 2,4,6-trimethyl-	62108-27-4	22.78	NGS	TNL 001	JNT
16T021099		0	2,6-Dimethyldecane	13150-81-7	22.92	NGS	67	67 JNT
16T021099			Undecane	1120-21-4	23.54	NGS	17	17 JNT
16T021099			3,3-Dimethylhexane	563-16-6	23.66	NGS	120 JNT	JNT
16T021099			Dodecane	112-40-3	23.75	NGS	52	52 JNT
16T021099			Unknown-1	1	24.05	NGS	270 JT	1
S16T021099			Undecane, 2,6-dimethyl-	17301-23-4	25.10	NGS	TNL 28 JNT	JNT

L - LLS Outside Range B - Blank Contamination

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J - Estimated E - Outside Calibration Range

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

Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

Customer Sample ID: 16-05982-2-H1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	VOA #.	N						
16T021100			2-Pentene, (E)-	646-04-8	5.19	NGS	130	130 JNT
S16T021100			Butane, 2-methyl-	78-78-4	5.53	NGS	490	490 JNT
S16T021100			2-Butene, 2-methyl-	513-35-9	6.49	NGS	87	87 JNT
S16T021100			Cyclobutanone, 2,2,3-trimethyl	1449-49-6	6.75	NGS	58	58 JNT
S16T021100			Hydroxylamine, O-(2-methylprop	5618-62-2	7.45	NGS	40	40 JNT
16T021100			1-Pentene, 4-methyl-	691-37-2	8.34	NGS	320	320 JNT
S16T021100			Cyclopentane	287-92-3	8.69	NGS	98	98 JNT
16T021100			Pentane, 2-methyl-	107-83-5	8.81	NGS	1.3E+03 JNT	JNT
16T021100			Pentane, 3-methyl-	96-14-0	9.48	NGS	230	230 JNT
16T021100			Cyclopropane, 1-ethyl-2-methyl	19781-68-1	10.62	NGS	33	33 JNT
16T021100			Cyclobutane, ethyl-	4806-61-5	11.39	NGS	54	54 JNT
16T021100			2H-Pyran-2-one, tetrahydro-6,6	2610-95-9	11.61	NGS	53	53 JNT
S16T021100			Cyclopentane, methyl-	96-37-7	11.84	NGS	100	TNL 001
16T021100			Tetrahydrofuran	109-99-9	11.95	NGS	550	550 JNT
16T021100			Hydroperoxide, hexyl	4312-76-9	12.34	NGS	130	130 JNT
\$16T021100			(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.86	NGS	50	50 JNT
S16T021100			Hexane, 3-methyl-	589-34-4	13.66	NGS	TNL 065	JNT
16T021100			Cyclopentane, 1,2-dimethyl-, c	1192-18-3	14.05	NGS	35	35 JNT
16T021100			1-Heptene	592-76-7	14.12	NGS	550	550 JNT
16T021100			DL-2,3-Butanediol	6982-25-8	14.26	NGS	53	53 JNT
16T021100			(Z)-3-Heptene	7642-10-6	14.55	NGS	30	30 JNT
S16T021100			Ethylene Glycol	107-21-1	14.64	NGS	36	36 JNT
16T021100			Formamide	75-12-7	14.74	NGS	61	61 JNT
16T021100			2.4-Azetidinedione, 3.3-diethy	69315-91-9	15.10	NGS	240 JNT	JNT
S16T021100			2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15.22	NGS	39	39 JNT
S16T021100			Cyclopentane, ethyl-	1640-89-7	15.34	NGS	33	33 JNT
S16T021100			1-Heptene, 6-methyl-	5026-76-6	15.80	NGS	1001	TOD JNT

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> J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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	Oual Flage
VAPOR-TDU VOA #2	VOA #	2					incost.	
\$16T021100			1-Pentanol	71-41-0	15.87	NGS	39	39 JNT
\$16T021100			Heptane, 2-methyl-	592-27-8	15.97	NGS	240 JNT	JNT
316T021100			Heptane, 4-methyl-	589-53-7	16.02	NGS	73	73 JNT
316T021100			Octane, 4-ethyl-	15869-86-0	16.40	NGS	57	57 JNT
16T021100			Octane	111-65-9	16.64	NGS	180	180 JNT
16T021100			Cyclotrisiloxane, hexamethyl-	541-05-9	16.89	NGS	30	30 JNT
S16T021100			Octane, 2-methyl-	3221-61-2	17.25	NGS	52	52 JNT
16T021100			Cyclohexane, ethyl-	1678-91-7	17.52	NGS	26	26 JNT
16T021100			Cyclooctane, butyl-	16538-93-5	17.66	NGS	56	56 JNT
16T021100			Heptane, 3-ethyl-	15869-80-4	18.09	NGS	25	25 JNT
S16T021100			Nonane	111-84-2	18.63	NGS	25	25 JNT
S16T021100			Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	260 JNT	TNL
S16T021100			Decane, 2,4,6-trimethyl-	62108-27-4	22.78	NGS	TNL 1001	TNL
16T021100			2,6-Dimethyldecane	13150-81-7	22.92	NGS	32	32 JNT
S16T021100			Undecane	1120-21-4	23.54	NGS	33	33 JNT
S16T021100			Undecane, 5,7-dimethyl-	17312-83-3	23.66	NGS	58	58 JNT
S16T021100			Hydroxylamine, O-decyl-	29812-79-1	23.75	NGS	38	38 JNT
S16T021100			Unknown-1	1	24.05	NGS	130 JT	11
S16T021100			Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	32	32 JNT
S16T021100			1,2-Benzisothiazole	272-16-2	26.15	NGS	53	53 JNT

Y - Comment T - Tentatively Identified Compound

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L - LLS Outside Range B - Blank Contamination

J - Estimated E - Outside Calibration Range

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

Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

Customer Sample ID: 16-05982-2-H2 Customer Sample ID: 16-05982-2-H2

Sample# R	A# QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Oual Flage
VAPOR-TDU VOA #2	VOA #2						
S16T021101		2-Pentene, (E)-	646-04-8	5.16	NGS	440	440 JNT
S16T021101		2(3H)-Furanone, dihydro-3,5-di	5145-01-7	5.34	NGS	38	38 JNT
S16T021101		Butane, 2-methyl-	78-78-4	5.50	NGS	1.5E+03 JNT	INL
S16T021101		1,2-Pentadiene	591-95-7	5.68	NGS	30	30 JNT
S16T021101		Unknown-1	1	6.18	NGS	4.0E+03 JT	11
S16T021101		2-Pentene	109-68-2	6.48	NGS	410 JNT	JNT
S16T021101		Cyclopropane, ethylidene-	18631-83-9	6.60	NGS	56	56 JNT
S16T021101		2-Butene, 2-methyl-	513-35-9	6.74	NGS	200 JNT	JNL
S16T021101		Cyclopropane, 1,2-dimethyl-, c	930-18-7	6.84	NGS	530	530 JNT
S16T021101		1-Pentene	109-67-1	6.93	NGS	31	31 JNT
S16T021101		2-Methyl-1-butene	563-46-2	7.02	NGS	43	43 JNT
S16T021101		1,4-Pentadiene	591-93-5	7.28	NGS	75	75 JNT
S16T021101		Butane, 2,2-dimethyl-	75-83-2	7.44	NGS	73	73 JNT
S16T021101		1,3-Pentadiene	504-60-9	7.70	NGS	26	26 JNT
S16T021101		Cyanic acid, 2-methylpropyl es	1768-25-8	8.35	NGS	370	370 JNT
S16T021101		Cyclopentane	287-92-3	8.69	NGS	430 JNT	JNT
S16T021101		Pentane, 2-methyl-	107-83-5	8.81	NGS	840 JNT	JNT
S16T021101		Pentane, 3-methyl-	96-14-0	9.48	NGS	130	130 JNT
S16T021101		Cyclopentane, methyl-	96-37-7	11.85	NGS	260 JNT	JNT
S16T021101		Tetrahydrofuran	109-99-9	11.93	NGS	540 JNT	JNT
S16T021101		Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	190	190 JNT
S16T021101		Undecane, 4-methyl-	2980-69-0	22.49	NGS	47	47 JNT
16T021101		Decane, 2,4,6-trimethyl-	62108-27-4	22.79	NGS	67	67 JNT
16T021101		2,6-Dimethyldecane	13150-81-7	22.96	NGS	57	57 JNT
S16T021101		Heptane, 5-ethyl-2,2,3-trimeth	62199-06-8	23.02	NGS	28	28 JNT
S16T021101		Undecane, 5,7-dimethyl-	17312-83-3	23.66	NGS	48	48 JNT
S16T021101	1	Decane, 2,3,5,8-tetramethyl-	192823-15-7	23.76	NGS	32	32 JNT

L - LLS Outside Range B - Blank Contamination

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

J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

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Cartridge Evaluation Data Summary Report

Sample Group: 20162091 SDG Number:

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Customer Sample ID: 16-05982-2-H2

16-05982-2-H2	Analyte	
ustomer sample ID: 16-05982-2	QC Type	
ner	A#	
Instol	R	all southing doors
	Sample#	10011

ample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	that	Decet	Contraction of the
VAPOR-TDU VOA #2	VOA #	2					lineav	Kuai riags
316T021101			Unknown-2	_	24.05	NGS	1901	L
\$16T021101		с: 	Undecane, 2,6-dimethyt-	17301-23-4	25.09	NGS	27 J	TNL 7
16T021101			1,2-Benzisothiazole	272-16-2	26.16	NGS	34 JNT	INT
316T021101			Undecane, 2-methyl-	7045-71-8	26.25	NGS	13 J	3 JNT

L - LLS Outside Range B - Blank Contamination

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

J - Estimated E - Outside Calibration Range

(4)

Y - Comment T - Tentatively Identified Compound

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	Oual Flans
VAPOR-TDU VOA #2	OA #2						200
S16T021102		Hexanal	66-25-1	16.70	NGS	INL 34 JNI	JNT
S16T021102		Cyclotetrasiloxane, octamethyl	556-67-2	20.21	NGS	390 JNT	JNT
S16T021102		Octane, 2,3,6,7-tetramethyl-	52670-34-5	22.49	NGS	35 JNT	JNT
S16T021102		Decane, 2,4,6-trimethyl-	62108-27-4	22.79	NGS	130 JNT	JNT
S16T021102		2,6-Dimethyldecane	13150-81-7	22.93	NGS	INI 23	JNT
S16T021102		3,3-Dimethylhexane	563-16-6	23.66	NGS	TNL 84 JNT	JNT
S16T021102		Dodecane	112-40-3	23.75	NGS	TNL 63	JNT
S16T021102		Benzaldehyde, 2,5-bis[(trimeth	56114-69-3	24.05	NGS	330 JNT	JNT
S167021102		Undecane, 2,6-dimethyl-	17301-23-4	25.09	NGS	TNL 48	TNL
S16T021102		Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.23	NGS	55 JNT	JNT
S16T021102		Unknown-1	1	25.83	NGS	37	15
S16T021102		1,2-Benzisothiazole	272-16-2	26.15	NGS	160 JN1	JNT
S16T021102		Undecane, 2-methyl-	7045-71-8	26.25	NGS	TNL 58 JNT	JNT
S16T021102		1,2,3,4,5-Cyclopentanepentol	56772-25-9	26.43	NGS	TNL 04	JNT
S16T021102	-	Hexadecane, 2,6,11,15-tetramet	504-44-9	26.81	NGS	31 JNT	INT

L - LLS Outside Range B - Blank Contamination

N - Named TIC

J - Estimated E - Outside Calibration Range

Y - Comment T - Tentatively Identified Compound

NA = Not Analyzed, ND = Not Detected

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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

WARPOR-TIDU MAN #2 Matche Filteration for the			NGS NGS NGS NGS NGS NGS NGS NGS NGS NGS	93 94 82 92 1/a	<1.3	<1.3	n/a	n/a		n/a	1.3		-		
78-34-5 1,1,2.2-Tetracthoroethane NGS 93 <1.3 <1.3 Na Na 75-34-5 1,1,2.2-Tetracthoroethane NGS 94 <1.5			NGS NGS NGS NGS NGS NGS NGS NGS NGS NGS	93 94 82 82 92 82	<1.3	<1.3	n/a	n/a	L		1.3				
79-00-5 11,1,2-Trichloreethane NGS 94 <1.5 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.6 <1.			NGS NGS NGS NGS NGS NGS NGS NGS NGS	94 89 82 92 n/a	14 41						The second second second second second second second second second second second second second second second se	n/a			
75-34-3 1,1-Dichloroefhane NGS 88 <1.2 <1.2 <1.2 n/a n/a <th a<="" th=""> <th a<="" th=""> n/a</th></th>	<th a<="" th=""> n/a</th>	n/a			NGS NGS NGS NGS NGS NGS NGS NGS	89 82 92 n/a	015	<1.5	n/a	n/a			1.5	n/a	
T5-55-4 11-Dichloroethene NGS 82 <1.3 nla nla <thnla< th=""> nla nla</thnla<>			NGS NGS NGS NGS NGS NGS NGS	82 92 n/a	<1.2	<1.2	n/a	n/a	n/a		1.2	n/a			
			NGS NGS NGS NGS NGS NGS	92 n/a	<1.3	<1.3	n/a	n/a			1.3	n/a			
542.75-6 1,3-Dichloropene (Total) NGS na <			NGS NGS NGS NGS NGS NGS	n/a	<1.6	<1.6	n/a	n/a			1.6	n/a			
			NGS NGS NGS NGS NGS		n/a	<1.2	n/a	n/a			1.2	n/a			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			NGS NGS NGS	93	<2.0	<2.0	n/a	n/a	n/a		2.0	n/a			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			NGS NGS NGS	92	<1.7	5.4	n/a	n/a	n/a		1.7	n/a J			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			NGS	93	<8.9	1.0E+04	n/a	n/a	n/a		8.9	n/a ELY			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			NGS	85	<5.6	<5.6	n/a	n/a	n/a		5.6	n/a			
				89	<3.0	1.8E+03	n/a	n/a			3.0	n/a E			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			NGS	95	<3.3	17	n/a	n/a			3.3	n/a			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		o Distances	NGS	94	<2.8	<2.8	n/a	n/a			2.8	n/a			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			NGS	83	<1.9	1.2E+03	n/a	n/a	n/a		1.9	n/a E			
S91-78-6 2-Hexanone NGS 86 <1.2 280 n/a	-		NGS	88	<1.6	110	n/a	n/a			1.6	n/a			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		2-Hexanone	NGS	86	<1.2	280	n/a	n/a	22		1.2	n/a			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		2-Methylfuran	NGS	89	<1.9	4.4	n/a	n/a			1.9	n/a J			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		3-Buten-2-one	NGS	87	<1.7	<1.7	n/a	n/a			1.7	n/a			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		3-Heptanone	NGS	89	<1.5	94	n/a	n/a	n/a		1.5	n/a			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a		2.4	n/a			
108-10-1 4-Methyl-2-Pentanone NGS 88 <1.9 100 n/a n/a <th a<="" th=""> n/a</th>	n/a		4-Methyl-2-hexanone	NGS	06	<1.3	20	n/a	n/a	n/a		1.3	n/a		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		4-Methyl-2-Pentanone	NGS	88	<1.9	100	n/a	n/a	n/a		1.9	n/a			
75-05-8 Accetonitrile NGS 88 <1.8 990 n/a		Acetone	NGS	11	<4.3	4.1E+03	n/a	n/a	n/a		4.3	n/a EY			
98-86-2 Acetophenone NGS 93 <2.6 5.2 n/a		Acetonitrile	NGS	88	<1.8	066	n/a	n/a	n/a		1.8	n/a E			
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		Acetophenone	NGS	93	<2.6	5.2	n/a	n/a			2.6	n/a J			
107-18-6 Allyl Alcohol NGS 88 <3.9 <3.9 n/a n/a n/a γ γ Comment J - Estimated T N N N γ γ γ Comment J - Estimated N N N γ <td></td> <td>Acryfonitrile</td> <td>NGS</td> <td>89</td> <td><1.7</td> <td><1.7</td> <td>n/a</td> <td>n/a</td> <td></td> <td></td> <td>1.7</td> <td>n/a</td> <td></td>		Acryfonitrile	NGS	89	<1.7	<1.7	n/a	n/a			1.7	n/a			
M Y - Comment 7 - Festimated 7 - Tentatively Identified Compound E - C	_	Ally! Alcohol	NGS	88	<3.9	<3.9	n/a	n/a			3.9	n/a			
J U V - Comment J L Dily Q Q - Qualitative T Tentatively Identified Compound	WV	M. M.								NA = Not	Analyzed, N	JD = Not Deter	cted		
T - Tentatively Compound	5	' (// () Y - Comment			J - Estimat	ed			z	- Named TIC	122				
	5	1,1,1,1,0,1 Q - Qualitative			T - Tentativ	vely Identifie	d Compound		ш	- Outside Ca	libration Rat	nge			

L - LLS Outside Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

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

Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	% Uda	Average RPD % Set Bac %	Dat 1 imit	Det I imit Cat Ear & Oust Flags	I Elano
ICL-ROC	VOA #2			2 2 2				DRoman	2	er annuda			al Lidge
S16T021105	107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	- nla	n/a	alu	0/0	9.0	n/a	Τ
S16T021105	71-43-2	Benzene	NGS	93	<1.2	53	n/a	n/a	n/a	n/a	12	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	06	<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	Γ
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	4.7>	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	u/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	06	<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	e/u	n/a	1.5	n/a	

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

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

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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

ample# R	A# CAS #	Analyte	Chit	STD %	Blank	Result	Result Duplicate	Average	Average RPD % Spk Rec %	k Rec %	Det Limit	Det Limit Cut Err % Qual Flags
VAPOR-TDU V	U VOA #2											
16T021105	79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	15	nla
16T021105	75-69-4	Trichlorofluoromethane	NGS	84	<1.6	430	n/a	n/a	n/a	n/a	1.6	
16T021105	10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	nla	alu	2 6	
16T021105	123-86-4	n-Butyl acetate	NGS	85	<1.4	<14	a/u	ela	0/0	ala.	2.4	140
16T021105	142-82-5	n-Heptane	NGS	06	<1.4	910	n/a	nla	n/a	D/a	4.4	n/a E
16T021105	10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a	n/a	10	

J - Estimated
 T - Tentatively Identified Compound

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

Y - Comment Q - Qualitative

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Cartridge Evaluation Data Sumnary 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 %	Shk Rec %	Det Limit	Det I imit Cut Err & Oual Elans
VAPOR-TDU VOA #2	VOA #2							,				
S16T021106	79-34-5	1,1,2,2-Tetrachioroethane	NGS	93	<1.3	<1.3	n/a	n/a	n/a	n/a	13	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	12	nla
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/aLY
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	12	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	15	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	06	<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	19	n/a
S16T021106	67-64-1	Acetone	NGS	71	<4.3	64	n/a	n/a	n/a	n/a	43	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.l
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	Ally! Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a

NA = Not Analyzed, ND = Not Detected

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

Cartridge Evaluation Data Summary Report

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

Samplett R	Att CAC #	Analuto	1 laite		Dista							
	1 040	and formant	1110	S1D %	DIGIN	Unsau	uupiicate	Average		KPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	VOA #2			þ								
S16T021106	107-05-1	Allyl Chloride	NGS	88	<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	66	<1.2	<1.2	n/a	n/a	n/a	n/a	12	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	l a/u
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	Methacrytonitrile	NGS	06	<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	06	<1.4	3.0	n/a	n/a	n/a	n/a	1.4	n/a.1
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	15	I alu

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

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

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

ample# R	A# CAS #	Analyte	Unit	STD %	Blank	Result	Result Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TD	DU VOA #2											•
I6T021106	79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a
6T021106	75-69-4	Trichlorofluoromethane	NGS	84	<1.6	6.7	n/a	n/a	n/a	n/a	1.6	n/a J
I6T021106	10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	
6T021106	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	
I6T021106	142-82-5	n-Heptane	NGS	06	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	1
I6T021106	10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a		12	

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

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

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Ial Flags
VAPOR-TDU VOA #2	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		
S16T021107	75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2		
S16T021107	75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3		
S16T021107	107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6		
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		
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	l a/u	
S16T021107	110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6		
S16T021107	591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	nla	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	80	<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	11	<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	e/u	

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

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

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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 % S	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Flags
VAPOR-TDU VOA #2	I 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	Γ
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	06	<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	l al	Γ
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	la J	Γ
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	06	<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	Γ
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	06	<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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Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

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

ample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Result Duplicate	1.22	RPD %	Average RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Qual Flag:
VAPOR-TDU V	NU VOA #2												
16T021107	79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
167021107	75-69-4	Trichlorofluoromethane	NGS	84	<1.6	8.9	n/a	n/a	n/a	n/a	1.6		-
16T021107	10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	13	n/a	
167021107	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	14	n/a	
316T021107	142-82-5	n-Heptane	NGS	06	<1.4	<1.4	n/a	n/a	n/a		1.4	n/a	
16T021107	10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a		1.2		

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

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

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 %	RPD % Spk Rec %	Det Limit	Cnt Err % Qual Flags	I Flags
VAPOR-TDU VOA #2	I 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		
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		
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		
S16T021108	106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	n/a	n/a	n/a	2.0		
S16T021108	123-91-1	1.4-Dioxane	NGS	92	<1.7	<1.7	n/a	e/u	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		
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		
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		
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	68	<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	06	<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		
S16T021108	67-64-1	Acetone	NGS	71	<4.3	7.6	n/a	n/a	n/a	n/a	4.3	l a/u	
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	

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

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

J - Estimated T - Tentatively Identified Compound

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	VOA #2											
S16T021108	107-05-1	Allyl Chloride	NGS	68	<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	06	<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	96	<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	06	<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 N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

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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	Result Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VO/	NU 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
\$16T021108	75-69-4	Trichlorofluoromethane	NGS	84	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	n/a
\$16T021108	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
\$16T021108	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a
316T021108	142-82-5	n-Heptane	NGS	66	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	n/a
16T021108	10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a

L - LLS Outside Range B - Blank Contamination

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

Y - Comment Q - Qualitative

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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	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	J 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/all Y
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	l al
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	66	<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	Acetonitrite	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

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

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

1													
Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Flags
VAPOR-TDU VOA #2	I VOA #2												
S16T021109	107-05-1	Allyl Chloride	NGS	88	<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	06	<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	Γ
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	U/a J	Γ
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	06	<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	Naphthatene	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	Γ
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	06	<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	1
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	alu	ole.	ala	4	1 10	Γ

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

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

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

Sample# R	A# CAS #	Analyte	Cuit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA	DU 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	
S16T021109	10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	13	
S16T021109	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	14	
S16T021109	142-82-5	n-Heptane	NGS	06	<1.4	<1.4	n/a	n/a	n/a	n/a	14	
S16T021109	10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a	n/a	12	

E. ÷ T -1

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

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

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

Sample# R	A# CAS#	Analyte	Cuit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	I VOA #2											n
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	na	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	06	<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	14	<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	e/u	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	39	n/a

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

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

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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 #	Analyto	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	ual Flags
VAPOR-TDU VOA #2	VOA #2												
\$16T021110	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	06	<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	l a/n	
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	ľ
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	06	<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	06	<1.4	6.0	n/a	n/a	n/a	n/a	1.4	Ua 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	15	I alu	

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

J - Estimated
 T - Tentatively Identified Compound

Y - Comment Q - Qualitative

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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	Result Duplicate	Average	RPD %	Average RPD % Spk Rec %	Det Limit	Det Limit Cut Err % Dual Flags	Inal Flane
VAPOR-TDI	IU VOA #2												20
16T021110	79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	15	nla	
167021110	75-69-4	Trichlorofluoromethane	NGS	84	<1.6	130	n/a	n/a	e/u	n/a	1	pla	
16T021110	10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	e/u	e/u	1.0	pla	
16T021110	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	a/a	ala	2. 4	olo olo	
16T021110	142-82-5	n-Heptane	NGS	90	<1.4	<1.4	n/a	e/u	n/a	e/u	14	p/u	
16T021110	10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	12		

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

NA = Not Analyzed, ND = Not Detected

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	J 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	68	<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	e/u	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/aJ
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	60	<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	88	<1.7	1.9	n/a	n/a	n/a	n/a	1.7	n/aJ
S16T021111	107-18-6	Ally! Alcohol	NGS	88	<3.9	<3.9	n/a	n/a	n/a	n/a	3.9	n/a

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

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

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

			Curit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	ual Flao
VAPOR-TDU VOA #2	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 O	
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	60	<1.2	<1.2	n/a	n/a	n/a	n/a	12	nla	
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	L te/u	
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 O	
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	2
S16T021111	110-00-9	Furan	NGS	82	<1.6	3.3	n/a	n/a	n/a	n/a	1.6	n/a J	ľ
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	06	<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	
										NA = Not J	Analyzed, N	NA = Not Analyzed, ND = Not Detected	ected
L - LLS Outside Range B - Blank Contamination		Y - Comment O - Oualitative			J - Estimated T - Technicity Montified Community	ba	(ż	N - Named TIC			

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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	Result Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDI	U 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	
S16T021111	10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	
\$16T021111	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	
\$16T021111	142-82-5	n-Heptane	NGS	06	<1.4	<1.4	n/a	n/a	n/a	n/a	1.4	
\$16T021111	10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	

J - Estimated T - Tentatively Identified Compound

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

Y - Comment Q - Qualitative

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16-	DSF	DSF

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

Sample# R	R A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Oual Flans	Flans
VAPOR-TDU VOA #2	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	2-00-52	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	06	<1.3	8.6	n/a	n/a	n/a	n/a	1.3	l al	
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	e/u	n/a	2.6	n/a	
S16T021112	107-13-1	Acrytonitrile	NGS	88	<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	

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

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

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

			-	210%		VIDEOLI	anbuided	AVELAGE	NPU N	KPD % Spk Rec %	Det Limit	Det Limit Cht Err % Qual Flags
VAPOR-TDU VOA #2	J 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		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	06	<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	4.7>	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	06	<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	0.7	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	0.7	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

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

16 - Aug - 2016 15:41:25 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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	Result Duplicate	Average	RPD %	Average RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Qual Flag
VAPOR-TL	/APOR-TDU VOA #2												
\$16T021112	79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
\$16T021112	75-69-4	Trichlorofluoromethane	NGS	84	<1.6	8.6	n/a	n/a	n/a	n/a	1.6		_
\$16T021112	10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3		
316T021112	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	14		
\$16T021112	142-82-5	n-Heptane	NGS	06	<1.4	180		n/a	n/a	n/a	14		
\$16T021112	10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a		12		

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

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

6 - Aug - 2016 15:41:25	SRHardcopyWOLimits 3.0.11b	SR.Jar v. 3.0.12
16-	DSF	DSF

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 %	RPD % Spk Rec %	Det Limit	Det Limit Cut Err % Qual Flage
VAPOR-TDU VOA #2	VOA #2							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	
S16T021113	75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	
S16T021113	75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	n/a	n/a	n/a	1.3	
S16T021113	107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1.6	
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	e/u	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	
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	e/u	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	06	<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	11	<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 JO
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

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

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

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-91	DSR	SSR

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

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z	AVF CAS#	Analyte	nut	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	VOA #2											
S16T021113	107-05-1	Allyl Chloride	NGS	88	<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	66	<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	34	<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	la/u
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	06	<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	Tetrachioroethene	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

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

NA = Not Analyzed, ND = Not Detected

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

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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

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Sample# R	R A# CAS #	Analyte	Cuit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Qual Flags
VAPOR-TDU VOA #2	J 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		
S16T021113	10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	n/a	13	e/u	
S16T021113	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	n/a	14		
S16T021113	142-82-5	n-Heptane	NGS	06	<1.4	<1.4	n/a	n/a	n/a	e/u	14		
S16T021113	10061-02-6	trans-1,3-Dichloropropene	NGS	06	<1.2	<1.2	n/a	n/a	n/a	n/a	12		

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

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

J - Estimated T - Tentatively Identified Compound

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

	- 10 / 02 M 10	MIRINE	Curit	STD %	DIATIK	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	J 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	06	<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	11	<4.3	3.9E+03	n/a	n/a	n/a	n/a	4.3	n/aEY
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

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

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Sample Group: 20162092 SDG Number: Customer Sample ID: 16-05983-2-61 Customer Sample ID: 16-05983-2-61

Sample# R	All CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	al Flags
VAPOR-TDU VOA #2	VOA #2												ľ
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		
S16T021114	100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	n/a	n/a	1.9		
S16T021114	123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	n/a	n/a	n/a	2.1		
S16T021114	109-74-0	Butanenitrile	NGS	06	<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		
S16T021114	108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5		
S16T021114	75-00-3	Chloroethane	NGS	87	<1.9	4.2	n/a	n/a	n/a	n/a	1.9		
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		
S16T021114	124-18-5	Decane	NGS	92	<2.8	3.1	n/a	n/a	n/a	n/a	2.8		
S16T021114	64-17-5	Ethanol	NGS	85	4.7>	2.4E+03	n/a	n/a	n/a	n/a	7.4		
S16T021114	141-78-6	Ethyl acetate	NGS	84	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5		
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	l a/u	
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	06	<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	66	<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	15	1 6/0	

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

NA = Not Analyzed, ND = Not Detected

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

Sample Group: 20162092

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

ample# R	A# CAS #	Analyte	Unit	STD %	Blank	Result	Result Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cut Err % Qual Flags	al Flaos
VAPOR-TDI	U VOA #2												
\$16T021114	79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	n/a	n/a	1.5	n/a	
\$16T021114	75-69-4	Trichlorofluoromethane	NGS	84	<1.6	1.3E+03	n/a	n/a	n/a	n/a	16		
\$16T021114	10061-01-5	cis-1,3-Dichloropropene	NGS	92	<1.3	<1.3	n/a	n/a	n/a	nla	13		
\$16T021114	123-86-4	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	e/u	elu	14		
\$16T021114	142-82-5	n-Heptane	NGS	06	<1.4	<1.4	n/a	n/a	e/u	n/a	14		
\$16T021114	10061-02-6	trans-1,3-Dichloropropene	NGS	90	<1.2	<1.2	n/a	n/a	n/a	n/a	1.2	n/a	

L - LLS Outside Range B - Blank Contamination

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

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

- Aug - 2016 15:41:25	RHardcopyWOLimits 3.0.11b	R.Jar v. 3.0.12
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Sample Group: 20162092 SDG Number: Customer Sample ID: 16-05983-2-H1 Customer Sample ID: 16-05983-2-H1

		And the second sec										
Sample# R	A# CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	nla
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	60	<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	11	<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	39	n/a

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

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

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

Sample# R	A# CAS #	Analyte	Cuit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Cnt Err % Qual Flags
VAPOR-TDU VOA #2	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	e/u	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	66	<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	06	<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

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

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

L - LLS Outside Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

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

 <1.5 <1.5 <1.5 <1.5 <1.6 280 <1.3 <1.3 <1.3 <1.4 	le# R A# CA.	#S#	Analyte	Unit	STD %	Blank	Result	Result Duplicate	Average	Average RPD % Snk Rec %	nk Rac %	Dat I imit Cat East Out Start	and Durit Charl
79-01-6 Trichloroethene NGS 92 <1.5	/APOR-TDU VOA #	12						•			a north		
75-69-4 Trichloroffuoromethane NGS 84 <16 280 n/a 10061-01-5 cis-1,3-Dichloropropene NGS 92 <1.3		-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	e/u	ola	15	-10
10061-01-5 cis-1,3-Dichloropropene NGS 92 <1.3 ria 123-86-4 n-Butyl acetate NGS 85 <1.4		-69-4	Trichlorofluoromethane	NGS	84	<1.6	280	n/a	e/u	e/c	ola	2.4	Dil Dil
123-86-4 n-Butyl acetate NGS 85 <1.4 <1.3 Na 142-82-5 n-Heptane NGS 90 <1.4	_	061-01-5	cis-1.3-Dichloropropene	NGS	92	<13	<12	ola	0/0	-1-	-1-	0.1	1/3
1/2-00-4 n-butyl acetate NGS 85 <1.4 <1.4 n/a 142-82-5 n-Heptane NGS 90 <1.4		1 00 0				2	211	100	PAL	BUI	n/a	1.3	n/a
142-82-5 n-Heptane NGS 90 <1.4 960 n/a		4-00-0	n-Butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	nla	n/a	14	n la
22	-	2-82-5	n-Heptane	NGS	06	<1.4	960	nla	ain	ola	ala		L
16T021115 10061-02-6 Itrans-1,3-Dichloropropene NGS 90 <1.2 <1.9 n/s n/s		061-02-6	trans-1,3-Dichloropropene	NGS	06	<12	<12	ela	on a	ala ala	PAI	4.1	na E

L - LLS Outside Range B - Blank Contamination

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

Y - Comment Q - Qualitative

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16 - Aug - 2016	DSRHardcopyWOI	DSR.Jar v. 3.0.12

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

campie# K	HH CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Sok Rec %	Det 1 imit	Det I imit Cat Err & Ount Flam
VAPOR-TDU VOA #2	I VOA #2				1					~ ~ ~ ~		AILER / MARI LIAS
S16T021116	79-34-5	1,1,2,2-Tetrachloroethane	NGS	63	<1.3	<1.3	n/a	nta	ala	nia	. *	ala
S16T021116	79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<1.5	n/a	ala	ola	ala ala	2 4	1/4
S16T021116	75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<12	a/u	ala	o/u	DA1	0.1	E/U
S16T021116	75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<13	e/u	ela.	olo	Put -	2.1	n/a
S16T021116	107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<16	elu	ola	Date of the	Pal	2. 4	n/a
S16T021116	542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<12	olu	PAL	BUI	BA	1.0	n/a
S16T021116	106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<002	alu alu	on of a	DVI DV	P/U	1.4	n/a
S16T021116	123-91-1	1,4-Dioxane	NGS	92	<17	<17	ola	e)e	DVI -	P/1	2.0	Na
S16T021116	71-36-3	1-Butanol	NGS	93	<8.9	<8 Q	on o	19Al	DI0	n'a	1.1	n/a
S16T021116	111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	alu	e/u	Date of the	11/2	0.0	na LY
S16T021116	71-23-8	1-Propanol	NGS	89	<3.0	<30	o/u	e la	DAI	EV1	0.0	n/a
S16T021116	108-47-4	2,4-Dimethylpyridine	NGS	95	33	<3.3	alu	old.	a la	pli de	0.0	n'a
S16T021116	1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	e/u	pla	p/1	0.0	Na -1-
S16T021116	78-93-3	2-Butanone	NGS	83	<1.9	76	alu	c/u	- la	ale ale	0.2	D/B
S16T021116	110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	nla	e lu	Pla Pla	ala ala	2.0	L PA
S16T021116	591-78-6	2-Hexanone	NGS	86	<12	<12	e/u	old.	ofe	ole.	0.0	144
S16T021116	534-22-5	2-Methylfuran	NGS	80	40	1 0 1	-1-	571	P/II	PN1	7	IVA
S16T021116	78-94-4	3-Buten-2-one	NGS	87	247	212	PAL	1/3	u/a	n/a	1.9	n/a
S16T021116	106-35-4	3-Heptanone	NGS	80	12	14.5	Dale ale	B/U	Na	n/a	1.1	n/a J
S16T021116	106-68-3	3-Octanone	NGS	5	101	2.0	201	PAN .	n/a	D/3	1.5	n/a
S16T021116	105-42-0	4-Methvl-2-hexanone	NGS	0	14.2	4.74 0	D/a	n/a	n/a	n/a	2.4	n/a
S16T021116	108-10-1	4-Methvl-2-Pentanone	NGS	000	0.11	2.0	IV3	Na.	n/a	n/a	1.3	n/a
S16T021116	67-64-1	Acetone	NGS	74	2.1	2.1.	n'a	D/3	n/a	n/a	1.9	n/a
S16T021116	76.05.8	Acotocitate	001		2.42	0.0E+U3	n/a	n/a	n/a	n/a	4.3	n/a EY
C16T021116	0 00 00		SON	88	<1.8	0/1	n/a	n/a	n/a	n/a	1.8	n/a E
011170101	7-00-06	Acetophenone	NGS	63	<2.6	7.8	n/a	n/a	n/a	n/a	2.6	n/a J
9111201910	10/-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a
S161021116	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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L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

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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	DDD %	DDD % Call Dag %	Dat I imit	Dot I imit Cat Face O La Fr
VAPOR-TDU VOA #2	VOA #2			~ ~ ~ ~				oRecord	2 2 2 2	er nav vde		CULER % QUBIT
S16T021116	107-05-1	Allvi Chloride	NGS	89	802	802	ola	-10	100	414	00	1000
S16T021116	71-43-2	Benzene	NGS	93	<12	<12	ala	D'I C	p/s	PAL	0.2	n/a
S16T021116	100-47-0	Benzonitrile	NGS	93	419	1012	alu	ala	p/u	Phi	10,	1/3
S16T021116	123-72-8	Butanal	NGS	95	<2.1	<2.1	n/a	e/u	ola ola	phi	5. C	PAL
S16T021116	109-74-0	Butanenitrile	NGS	96	<1.2	<1.2	n/a	n/a	e/u	n/a	1.2	elu
S16T021116	56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	n/a	1 9	ola
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	L a/u
S16T021116	124-18-5	Decane	NGS	92	<2.8	3.4	n/a	n/a	n/a	n/a	2.8	n/a.l
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	1.7	n/a	n/a	n/a	n/a	1.7	L all
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	06	<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	06	<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	e/u	n/a	15	0/0

L - LLS Outside Range B - Blank Contamination

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.

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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	Result Duplicate	Average	RPD %	Averade RPD % Spk Rec %	Det Limit	Det Limit Cat err & Oust Blace	Elane -
VAPOR-TDU VO	U VOA #2												che
S16T021116	79-01-6	Trichloroethene	NGS	92	<1.5	<1.5	n/a	n/a	nla	ela	1 5	-10	
S16T021116	75-60-4	Trichlorofficeromothono	0014	2				5	0.0	Dat 1	0.1	n/a	
	1 22 2		NG0	64	s1.6	1000	n/a	nia	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	nia	alu	olo.		-1-	
C1CTO3111C	1 00 001								Dat	011	0.1	PAL	
0111701010	123-00-4	n-butyl acetate	NGS	85	<1.4	<1.4	n/a	n/a	n/a	a/u	14	nta	
S16T021116	142-82-5	n-Heptane	NGS	0	111	1 1	-1-			3	t	2	
			2021	3	4.1.	t	194	n/a	Na	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	10	e/e	ľ
							1000		1	222	2.1	1001	

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J - Estimated T - Tentatively Identified Compound

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Cartridge Evaluation Data Summary Report

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

				2 2 2 2		TINCOL	alphicate	Average	-	NDK NOC VAL	Tat Intel	Cat Day Of the Other
VAPOR-TDU VOA #2	J VOA #2							0	-			Containing on terr 76 Quali Frags
S16T021117	79-34-5	1,1,2,2-Tetrachloroethane	NGS	93	<1.3	<1.3	nla	nla	ala	ola	4.2	-1-
S16T021117	79-00-5	1,1,2-Trichloroethane	NGS	94	<1.5	<15	a/u	ola	ala	o ala	2. 4	114
S16T021117	75-34-3	1,1-Dichloroethane	NGS	89	<1.2	<1.2	n/a	a)u	clu	D/I	<u>n</u>	n/a
S16T021117	75-35-4	1,1-Dichloroethene	NGS	82	<1.3	<1.3	n/a	e/u	alu	ola	40.4	n/a
S16T021117	107-06-2	1,2-Dichloroethane	NGS	92	<1.6	<1.6	n/a	alu	a)u	old.	3 4	-1-
S16T021117	542-75-6	1,3-Dichloropropene (Total)	NGS	n/a	n/a	<1.2	n/a	e/u	e/u	elu	0.1	e/u
S16T021117	106-46-7	1,4-Dichlorobenzene	NGS	93	<2.0	<2.0	n/a	e/u	alu alu	elu	4100	D/D
S16T021117	123-91-1	1,4-Dioxane	NGS	92	<1.7	<1.7	n/a	n/a	e/u	a/u	17	D/D
S16T021117	71-36-3	1-Butanol	NGS	93	<8.9	<8.9	n/a	n/a	a/u	ala	a	V I VI
S16T021117	111-70-6	1-Heptanol	NGS	85	<5.6	<5.6	n/a	a/u	e/u	ala	0.0	olo olo
S16T021117	71-23-8	1-Propanol	NGS	89	<3.0	8.7	n/a	nia.	alu	e/u	0.0	1010
S16T021117	108-47-4	2,4-Dimethylpyridine	NGS	95	<3.3	<3.3	n/a	aju.	elu	ola	0.0	11/4 0
S16T021117	1708-29-8	2,5-Dihydrofuran	NGS	94	<2.8	<2.8	n/a	a/a	a/u	ala	000	144
S16T021117	78-93-3	2-Butanone	NGS	83	<1.9	4.1	n/a	nia n	n/a	ola	4 0	1 of a
S16T021117	110-43-0	2-Heptanone	NGS	88	<1.6	<1.6	n/a	n/a	n/a	n/a		0/0
S16T021117	591-78-6	2-Hexanone	NGS	86	<1.2	<1.2	n/a	n/a	n/a	n/a	10	e/u
S16T021117	534-22-5	2-Methylfuran	NGS	68	<1.9	<1.9	n/a	n/a	n/a	n/a	101	ala
S16T021117	78-94-4	3-Buten-2-one	NGS	87	<1.7	4.3	n/a	n/a	n/a	n/a	17	1 0/0
S16T021117	106-35-4	3-Heptanone	NGS	89	<1.5	<1.5	n/a	n/a	n/a	n/a	15	n/a
S16T021117	106-68-3	3-Octanone	NGS	91	<2.4	<2.4	n/a	n/a	n/a	n/a	24	nla
S16T021117	105-42-0	4-Methyl-2-hexanone	NGS	90	<1.3	<1.3	n/a	n/a	n/a	n/a	13	ala ala
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	11	<4.3	120	n/a	n/a	n/a	n/a	43	n/a
S16T021117	75-05-8	Acetonitrile	NGS	88	<1.8	55	n/a	n/a	n/a	n/a	18	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 l
S16T021117	107-13-1	Acrylonitrile	NGS	89	<1.7	<1.7	n/a	n/a	n/a	n/a	1.7	n/a
1111201915	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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Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Snk Bac %	Dot I imit Cat	Cat Early Out Fland
VAPOR-TDU VOA #2	VOA #2											
S16T021117	107-05-1	Allyl Chloride	NGS	89	<2.8	<2.8	n/a	n/a	n/a	n/a	2.8	nla
S16T021117	71-43-2	Benzene	NGS	93	<1.2	<1.2	n/a	n/a	e/u	nla	10	ala ala
S16T021117	100-47-0	Benzonitrile	NGS	93	<1.9	<1.9	n/a	n/a	e/u	n/a	10	o/a
S16T021117	123-72-8	Butanal	NGS	95	<2.1	2.6	n/a	n/a	n/a	a/u	10	1 0/0
S16T021117	109-74-0	Butanenitrile	NGS	60	<1.2	<1.2	n/a	n/a	n/a	n/a	10	o bar
S16T021117	56-23-5	Carbon tetrachloride	NGS	92	<1.6	<1.6	n/a	n/a	n/a	e/u	19	on of u
S16T021117	108-90-7	Chlorobenzene	NGS	94	<1.5	<1.5	n/a	n/a	n/a	n/a	15	e/u
S16T021117	75-00-3	Chloroethane	NGS	87	<1.9	<1.9	n/a	n/a	n/a	n/a	19	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	L a/n
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	60	<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
S161021117	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
S161021117	110-59-8	Pentanenitrile	NGS	91	<1.6	<1.6	n/a	nia	n/a	n/a	1.6	n/a
S161021117	107-12-0	Propanenitrile	NGS	96	<1.4	6.4	n/a	nia	n/a	n/a	1.4	la J
S161021117	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 R A# Loss # Lanalyto

# Protection Unit STD % Blank Result Duplicate Average RPD % Spk Rec % Det Limit Cartie -6 Trichloroethene NGS 92 <1.5 <1.5 n/a n/a n/a 1.5 0.4 1.5 n/a n/a n/a 1.5 1.5 1.5 n/a 1.6 1.5 1.5 n/a 1.6 1.5 1.5 n/a 1.6 1.5 1.6 1.5 1.6 1.5 1.6 1.5 1.6 1.5 1.6 1.5 1.6 1.5 1.6 1.5 1.6 <td< th=""><th>Samplett R</th><th>AT DAD</th><th>And A.</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>	Samplett R	AT DAD	And A.									
JVOA #2 Average RPD % Spk Rec % 79-01-6 Trichloroethene NGS 92 <1.5 <1.5 n/a <	-	TAS #	Analyte	Unit	STD %	Blank	Baeult	Duntionet	[- 8	
79-01-6 Trichloroethene NGS 92 <1.5	VAPOR-TC	U VOA #2			2 2 12	-	VIDEAN	nplicate	Average	RPD % Spk Rec %		Cnt Err % Qual Fla
Trichloroethene NGS 92 <1.5												
Interviouentatie NGS 92 <1.5 r/a r/a <thr a<="" th=""> r/a <t< td=""><td>S16T021117</td><td>79-01-6</td><td>Tricklosothone</td><td>1111</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<></thr>	S16T021117	79-01-6	Tricklosothone	1111								
Trichlorofluoromethane NGS 84 <1.6 1.2 na na na na 1.5 1-5 cls-1.3-Dichloropropene NGS 92 <1.3		0-10-0-	ananioi oemene	NGS	92	<15	<1 F	ala		-		
Internoronorometrane NGS 84 <1.6 12 N/a n/a n/a n/a 1/a	S16T021117	75.60 4	Trickland			211	2.1.	1/3	n/a	2	15	
1-5 cis-1.3-Dichloropropene NGS 92 <1.3 <1.4 na na na na na na 1.6 n-Butyl acetate NGS 92 <1.3	1111901010	+-00-01	1 richiorofiuoromethane	NGS	84	<1 B		-	Ī		2	
1-3 cls-1.3-Dichloropropene NGS 92 <1.3 <1.3 n/a n/a n/a n/a 1.3 1.4 1.3 1.4 <th1.4< th=""> <th1.4< th=""> 1.4</th1.4<></th1.4<>	216T031117	1 10 10001				2.1.	2	D/a	n/a		4	
n-Butyl acetate NGS 85 <1.3 n/3 n/3 n/3 n/3 n/3 1.3 1.3 n-Heptane NGS 85 <1.4	111201010	C-In-Ionni	cis-1,3-Dichloropropene	NON NOS	00	C *1		1	Ī		2	
n-Butyl acetate NGS 85 <1.4 <1.4 n/a n/a n/a n/a 1/a	CIETODIAT			>>	30	2.12	\$1.3	n/a	n/a	ľ	4.0	
n-Heptane NGS 90 <1.4 <1.4 n/a n/a n/a 1/a 1/a <th1 a<="" th=""> 1/a <th1 a<="" th=""> <th1 a<="" td=""><td>1111701010</td><td>123-80-4</td><td>n-Butyl acetate</td><td>NGS</td><td>22</td><td>1 1</td><td>1</td><td>ŀ</td><td></td><td></td><td>0.1</td><td></td></th1></th1></th1>	1111701010	123-80-4	n-Butyl acetate	NGS	22	1 1	1	ŀ			0.1	
In-Heptane NGS 90 <1.4 <1.4 n/a n/a n/a n/a 1.4 1.4 trans-1,3-Dichloropropene NGS 90 <1.2	TTO SAAT			2	2	t	4.12	n/a	n/a		4.4	
trans-1,3-Dichloropropene NGS 90 <1.2 <1.2 <1.2 n/a n/a n/a n/a 1.4	111701010	C-72-761	In-Heptane	NGS	00	1 1	1	1	Ī		t.	
Irans-1,3-Dichloropropene NGS 90 <1.2 <1.2 n/a n/a n/a 1.4	246T024447				~	5.1.	4.12	n/a	n/a		ĺ	
	1111701010	9-20-19001	Itrans-1,3-Dichloropropene	NGS	0	0 11	1		Ī			
					20	2.1.2	2.12	n/a	n/a	n/a n/a	C +	ala a

L - LLS Outside Range B - Blank Contamination

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

Y - Comment Q - Qualitative

J - Estimated T - Tentatively Identified Compound

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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.	(Minutes)	Unit	Result	Qual Flaos
VAPOR-TDU VOA #2	~						
S16T021105		2-Methyl-1-butene	563-46-2	5.27	NGS	140 JNT	INT
S16T021105		5-Methyloxazolidine	58328-22-6	5.33	NGS	51 JNT	INT
S16T021105		Butane, 2-methyl-	78-78-4	5.61	NGS	720 JNT	INT
S16T021105		Cyclopropane, ethyl-	1191-96-4	6.02	NGS	2.1E+03 JNT	INT
S16T021105		Pentane	109-66-0	6.26	NGS	1.7E+03 JNT	INT
S16T021105		2-Pentene	109-68-2	6.55	NGS	TNL 200	INT
S16T021105		2-Pentene, (E)-	646-04-8	6.81	NGS	TNL 011	INT
S16T021105		Cyclobutanone, 2,2,3-trimethyl	1449-49-6	6.92	NGS	340 JNT	INT
S16T021105		1-Pentone	109-67-1	7.00	NGS	INC 92	INT
S16T021105		2-Propanol, 2-methyl-	75-65-0	7.16	NGS	7NL 290 JNT	INT
S16T021105		1-Pentene, 4-methyl-	691-37-2	8.41	NGS	480 JNT	INT
S16T021105		1-Pentene, 3-methyl-	760-20-3	8.45	NGS	140 JNT	INT
S16T021105		Cyclopentane	287-92-3	8.75	NGS	240 JNT	INT
S16T021105		Pentane, 2-methyl-	107-83-5	8.88	NGS	2.3E+03 JNT	INT
S16T021105		2,4-Hexadiene, (Z,Z)-	6108-61-8	9.17	NGS	37 JNT	INT
S16T021105		Pentane, 3-methyl-	96-14-0	9.54	NGS	520 JNT	INT
S16T021105		1-Hexene	592-41-6	9.92	NGS	1NL 050	INT
S16T021105		2-Hexene	592-43-8	10.66	NGS	TNL 67	INT
S16T021105		4-Penten-1-ol, 3-methyl-	51174-44-8	11.09	NGS	TNL 65	INT
S16T021105		2-Hexene, (E)-	4050-45-7	11.17	NGS	TNL 47	NT
S16T021105		Cyclopropane, 1-ethyl-2-methyl	19781-68-1	11.43	NGS	TNL 041	INT
S16T021105		Isobutanoi	78-83-1	11.62	NGS	TNL 87	INT
S16T021105		5-Methyl-5-hexen-3-ol	67760-89-8	11.71	NGS	TNL 001	NT
S16T021105		Cyclopentane, methyl-	96-37-7	11.90	NGS	210 JNT	NT
S16T021105	Ĩ	Tetrahydrofuran	109-99-9	11,94	NGS	1NL 080	NT
S16T021105		3-Buten-1-ol	627-27-0	12.11	NGS	35 JNT	NT
S16T021105		Amylene Hydrate	75-85-4	12.36	NGS	130 JNT	NT
Dutside Ranne	1 have	V. Comment			N = N	NA = Not Analyzed, ND = Not Detected	= Not Deter
/ VI	1.11		0 - Esumated	alea		N - Named TIC	C H

L-LLS Outside Range B-Blank Contamination B-Llank Contamination B-Llup Ol 19 B-Llup Ol 19

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Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

Customer Sample ID: 16-05983-2-A1 Customer Sample ID: 16-05083-2-A1

				Retention Time			
Sample# R	A# QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	'OA #2						
S16T021105		Cyclopentane, 1,2-dimethyl-, c	1192-18-3	12.58	NGS	22	22 JNT
S16T021105		(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.91	NGS	110 JNT	JNT
S16T021105		Hexane, 2-methyl-	591-76-4	13.42	NGS	480 JNT	. TNL
S16T021105		Pentane, 2,3-dimethyl-	565-59-3	13.54	NGS	95	95 JNT
S16T021105		Hexane, 3-methyl-	589-34-4	13.73	NGS	850 JNT	JNT
S16T021105		Ethylidenecyclobutane	1528-21-8	13.93	NGS	52	52 JNT
S16T021105		Ethylene Glycol	107-21-1	14.02	NGS	TNL 490 JNT	JNT
S16T021105		Cyclopentane, 1,3-dimethyl-	2453-00-1	14.12	NGS	150 JNT	JNT
S16T021105		Hydroxylamine, O-(3-methylbuty	19411-65-5	14.19	NGS	1.1E+03 JNT	JNL
S16T021105		2-Pentanol	6032-29-7	14.35	NGS	150 JNT	JNT
S16T021105		(Z)-3-Heptene	7642-10-6	14.52	NGS	39	39 JNT
S16T021105		3-Hexene, 2-methyl-, (Z)-	15840-60-5	14.62	NGS	54	54 JNT
S16T021105		Tetrahydrofuran, 2,2-dimethyl-	1003-17-4	14.80	NGS	75	75 JNT
S16T021105		1-Hexene, 3,5-dimethyl-	7423-69-0	14.86	NGS	42 JNT	JNT
S16T021105		Unknown-1	 -	14.92	NGS	51 JT	11
S16T021105		Butane, 2-cyclopropyl-	5750-02-7	15.04	NGS	52	52 JNT
S16T021105		2,4-Azetidinedione, 3,3-diethy	69315-91-9	15.19	NGS	470 JNT	JNT
16T021105		Oxirane, 2-(1,1-dimethylethyl)	53897-30-6	15.25	NGS	TNL 13	JNT
S16T021105		2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15.31	NGS	180 JNT	JNT
S16T021105		Hexane, 2,4-dimethyl-	589-43-5	15.37	NGS	45 JNT	JNT
S16T021105		Cyclopropane, 1,1-diethyl-	1003-19-6	15.42	NGS	TNL 94 JNT	JNT
S16T021105		Unknown-2	1	15.82	NGS	55 JT	1
S16T021105		1-Heptene, 6-methyl-	5026-76-6	15.91	NGS	210 JNT	JNT
S16T021105		1-Pentanol	71-41-0	15.97	NGS	120 JNT	JNT
S16T021105		Heptane, 2-methyl-	592-27-8	16.08	NGS	270 JNL	JNT
S16T021105		Heptane, 4-methyl-	589-53-7	16.13	NGS	TAL 72 JNT	JNT
S16T021105		Heptane, 3,4,5-trimethyl-	20278-89-1	16.25	NGS	TNL 73 JNT	JNT

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

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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	Oual Flams
VAPOR-TDU VOA #2							
S16T021105		2-Hexene, 5,5-dimethyl-, (Z)-	39761-61-0	16.51	NGS	180 JNL	JNT
S16T021105		Octane	111-65-9	16.77	NGS	TNL 071	JNL
16T021105		Cyclohexane, 1,2-dimethyl-	583-57-3	16.95	NGS	56	56 JNT
S16T021105		Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	74	74 JNT
16T021105		Octane, 2-methyl-	3221-61-2	17.41	NGS	72	72 JNT
16T021105		Cyclohexane, ethyl-	1678-91-7	17.68	NGS	82	82 JNT
S16T021105		1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	120 JNT	JNL
S16T021105		Ether, hexyl pentyl	32357-83-8	18.07	NGS	27	27 JNT
S16T021105		Cyclohexane, 1,2,4-trimethyl-	2234-75-5	18.14	NGS	28	28 JNT
S16T021105		Heptane, 4-propyl-	3178-29-8	18.27	NGS	29	29 JNT
S16T021105		Cyclooctane, butyl-	16538-93-5	18.69	NGS	39	39 JNT
S16T021105		Nonane	111-84-2	18.83	NGS	29	29 JNT
S16T021105		Cyclohexane, 1-ethyl-2-methyl-	3728-54-9	18.89	NGS	51.	51 JNT
S16T021105		cis-1-Ethyi-3-methyl-cyclohexa	19489-10-2	18.95	NGS	30.	30 JNT
S16T021105		Cyclooctane, methyl-	1502-38-1	19.13	NGS	29	29 JNT
S16T021105		Cyclohexane, 1-methyl-2-propyl	4291-79-6	19.37	NGS	26	26 JNT
S16T021105		10-Heneicosene (c,t)	95008-11-0	19.42	NGS	44	44 JNT
S16T021105		2,6-Dimethyldecane	13150-81-7	19.67	NGS	27	27 JNT
\$16T021105		1-Methylcyclooctene	933-11-9	19.72	NGS	32	32 JNT
16T021105		Cyclohexane, propyl-	1678-92-8	19.87	NGS	37	37 JNT
S16T021105		Heptane, 3-ethyl-2-methyl-	14676-29-0	19.90	NGS	TNL 57 JNT	JNT
S16T021105		2-Heptanone, 6-methyl-	928-68-7	20.27	NGS	130 JNT	JNT
S16T021105		Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	220 JNT	JNT
S16T021105		Cyclohexane, 1,1,2,3-tetrameth	6783-92-2	20.84	NGS	TNL 27	JNT
\$16T021105		1-Cyclohexylnonene	114614-84-5	21.18	NGS	INC 09	JNT
16T021105		1-Octanol, 2-butyl-	3913-02-8	21.26	NGS	TNL 23 JNT	JNT
S16T021105		Unknown-3	1	21.38	NGS	28 JT	5

Y - Comment Q - Qualitative

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

J - Estimated T - Tentatively Identified Compound

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 Flaos
VAPOR-TDU VOA #2	OA #2						0
16T021105		m-Menthane, (1S,3R)-(+)-	13837-66-6	21.72	NGS	Z8 JNT	JNT
S16T021105		Decane, 2,6,7-trimethyl-	62108-25-2	22.00	NGS	TNL 16	JNT
S16T021105		3-Octene, 2,2-dimethyl-	86869-76-3	22.26	NGS	38 JNT	JNT
S16T021105		1-Cyclohexylheptene	114614-83-4	22.67	NGS	43 JNT	JNT
S16T021105		Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	150 JNT	JNT
S16T021105		Undecane	1120-21-4	23.14	NGS	75 JNT	JNT
S16T021105		2-Methyl-1-undecanol	10522-26-6	23.20	NGS	26 JNT	JNT
S16T021105		1-Ethyl-2,2,6-trimethylcyclohe	71186-27-1	23.31	NGS	TNL 56 JNT	JNT
S16T021105		Decahydro-naphthalene	493-02-7	23.56	NGS	TNL 001	INT
S16T021105		2-Hexyl-1-octanol	19780-79-1	23.74	NGS	TNL 16	JNT
S16T021105		Unknown-4	1	23.79	NGS	64 JT	15
S16T021105		2,3-Dimethyldecane	17312-44-6	23.85	NGS	TNL 150 JNT	JNT
S16T021105		1-Decanol, 2-hexyl-	2425-77-6	23.94	NGS	TUC 110	JNT
\$16T021105		Unknown-5		24.26	NGS	320 JT	15
S16T021105		1-Heptadecyne	26186-00-5	24.45	NGS	26 JNT	JNT
\$16T021105		Unknown-6	_	24.58	NGS	88 JT	11
16T021105		Cyclotridecane	295-02-3	24.64	NGS	45 JNT	JNT
S16T021105		Unknown-7	1	24.85	NGS	110 JT	T.
16T021105		Dichloroacetic acid, tetradecy	83005-02-1	24.90	NGS	INL 63	INT
S16T021105		Unknown-8		25.02	NGS	7L 08	11
S16T021105		7-Octadecyne, 2-methyl-	35354-38-2	25.13	NGS	54 JNT	INT
S16T021105		2-Piperidinone, N-[4-bromo-n-b	195194-80-0	25.28	NGS	45 JNT	INT
16T021105		4-Chloro-3-n-hexyltetrahydropy	66555-66-6	25.36	NGS	35 JNT	INT
S16T021105		Unknown-9	-	25.41	NGS	29 JT	1
S16T021105		Undecane, 2,6-dimethyl-	17301-23-4	25.49	NGS	44 JNT	INT
S16T021105		Cyclohexane, 2-butyl-1,1,3-tri	54676-39-0	26.07	NGS	TNL 63	INT
S16T021105		Undecane, 2-methyl-	7045-71-8	26.45	NGS	TNL 92	INT

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

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Cartridge Evaluation Data Summary Report

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Sample Group: 20162092 SDG Number:

Customer Sample ID: 16-05983-2-A1

Customer Sample ID: 16-05983-2-A1

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

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

Y - Comment Q - Qualitative

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)	Cnit	Result	Oual Flags
VAPOR-TDU VOA #2	# VOV	2						-
16T021106			Formamide	75-12-7	14.02	NGS	32 JNT	UNT
16T021106			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	550 JNT	INT
S16T021106			Decane, 2,4,6-trimethyl-	62108-27-4	23.01	NGS	TNL 32	INT
16T021106			3,3-Dimethylhexane	563-16-6	23.14	NGS	TNL 40	INT
S16T021106			2,3-Dimethyldecane	17312-44-6	23.79	NGS	TNL 27 JNT	JNT
316T021106			Undecane	1120-21-4	23.85	NGS	TNL 001	UNT
16T021106			Dodecane	112-40-3	23.95	NGS	54 JNT	INT
S16T021106			1-Octanol, 2-butyl-	3913-02-8	24.06	NGS	TNL 28 JNT	JNT
16T021106			Unknown-1	1	24.26	NGS	830 JT	JT
16T021106			Unknown-2	1	24.85	NGS	25 JT	11
16T021106			2,6-Dimethyldecane	13150-81-7	25.28	NGS	TNL 28	INT
16T021106			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	TNL 19	INT
16T021106			4-Undecene, 4-methyl-	61142-40-3	26.01	NGS	LNF 66	INT
16T021106			Methenamine	100-97-0	26.22	NGS	35 JNT	INT
S16T021106			1,2-Benzisothiazole	272-16-2	26.33	NGS -	42 JNT	INT
16T021106			Undecane, 2-methyl-	7045-71-8	26.46	NGS	INL 68	INI
16T021106			1-lodo-2-methylundecane	73105-67-6	26.58	NGS	Z8 JNT	INT
S16T021106			Silane, trimethyl[2-methylene-	97778-15-9	26.66	NGS	LNC 29	INT
16T021106			Octane, 2,3,6,7-tetramethyl-	52670-34-5	27.04	NGS	TNL 40	INT
S16T021106	_	BLNK	Unknown-1		8.24	NGS	30	

L - LLS Outside Range B - Blank Contamination

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

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

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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	Oual Flanc
VAPOR-TDU VOA #2	VOA #	2						1
\$16T021107			Formamide	75-12-7	14.05	NGS	. 57	57 JNT
16T021107			Propane, 2-methyl-1-nitro-	625-74-1	16.49	NGS	29	29 JNT
16T021107			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	260 JNT	TNL
S16T021107			Decane, 2,4,6-trimethyl-	62108-27-4	23.01	NGS	75	75 JNT
S16T021107			3.3-Dimethylhexane	563-16-6	23.14	NGS	32	32 JNT
S16T021107			Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	34	34 JNT
S16T021107			Undecane	1120-21-4	23.85	NGS	85	85 JNT
16T021107			Hexyl octyl ether	17071-54-4	23.95	NGS	72	72 JNT
16T021107			2,3-Dimethyldecane	17312-44-6	24.07	NGS	28	28 JNT
316T021107			Unknown-1	ť	24.26	NGS	430 JT	JT
\$16T021107			1-Octanol, 2-butyl-	3913-02-8	24.85	NGS	37	37 JNT
316T021107			Dodecane	112-40-3	25.28	NGS	61	61 JNT
316T021107			1-Octene, 3,7-dimethyl-	4984-01-4	- 25.41	NGS	11	71 JNT
16T021107			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.96	NGS	30	30 JNT
16T021107			Unknown-2	1	26.01	NGS	7L 98	JT 1
16T021107			1,2-Benzisothiazole	272-16-2	26.33	NGS	130 JNT	JNT
16T021107			Unknown-3	т	26.45	NGS	TU 001	5
16T021107			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.57	NGS	37	37 JNT
16T021107			Heptadecane, 2,6,10,15-tetrame	54833-48-6	26.66	NGS	47	47 JNT
S16T021107			Tetradecane, 1-iodo-	19218-94-1	27.04	NGS	65	65 JNT
S16T021107	ω	BLNK	Unknown-1		8.24	NGS	30	

Y - Comment Q - Qualitative

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

NA = Not Analyzed, ND = Not Detected

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Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

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Customer Sample ID: 16-05983-2-BLANK

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ample# R	A#	QC Type	Analyte	CAS No.	(Minutes)	Curit	Result	Oual Flans
VAPOR-TDU VOA #2	T NOA #2	2						
S16T021108			Unknown-1	-	8.24	NGS	57 J	11
\$16T021108			2,2,7,7-Tetramethyloctane	1071-31-4	21.52	NGS	TNL 56 JNT	INT
\$16T021108			Dodecane, 2,6,10-trimethyl-	3891-98-3	22.71	NGS	TNL 26 JNT	INT
S16T021108	_		Undecane, 3-methyl-	1002-43-3	23.55	NGS	r 2.7	INT
S16T021108		BLNK	Unknown-1	1	8.24	NGS	30	

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

Y - Comment Q - Qualitative

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	Oual Flage
VAPOR-TDU VOA #2	VOA #2							
\$16T021109			Acetic anhydride	108-24-7	5.30	NGS	52	52 JNT
S16T021109			Pentane	109-66-0	5.35	NGS	110	110 JNT
16T021109			Formamide	75-12-7	14.06	NGS	71	TUL 17
316T021109			Propane, 2-methyl-1-nitro-	625-74-1	16.52	NGS	39	39 JNT
S16T021109			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	250	250 JNT
316T021109			Decane, 2,4,6-trimethyl-	62108-27-4	23.01	NGS	59	59 JNT
S16T021109			Undecane	1120-21-4	23.14	NGS	24	24 JNT
16T021109			Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	37	37 JNT
16T021109			Dodecane	112-40-3	23.85	NGS	67	57 JNT
S16T021109			Tridecane	629-50-5	23.95	NGS	57	57 JNT
16T021109			Unknown-1	1	24.26	NGS	430 JT	JT
16T021109			Tetradecane, 1-iodo-	19218-94-1	25.28	NGS	92	92 JNT
16T021109			Unknown-2	1	26.01	NGS	93 JT	JT
16T021109			1,2-Benzisothiazole	272-16-2	26.32	NGS	160	160 JNT
16T021109			Undecane, 2-methyl-	7045-71-8	26.45	NGS	90	90 JNT
16T021109			Dodecane, 2,6,11-trimethyl-	31295-56-4	26.58	NGS	17	17 JNT
16T021109			2,6-Dimethyldecane	13150-81-7	26.59	NGS	33	33 JNT
16T021109			Silane, trimethyl-3-penten-2-y	53264-56-5	26.65	NGS	62	62 JNT
16T021109			Octane, 2,3,6,7-tetramethyl-	52670-34-5	27.03	NGS	52	52 JNT
S16T021109	8	BLNK	Unknown-1	ĩ	8.24	NGS	30	

J - Estimated T - Tentatively Identified Compound

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

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Y - Comment Q - Qualitative

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 Flaos
VAPOR-TDU VOA #2	#2						0
S16T021110		Cyclobutylamine	2516-34-9	5.23	NGS	JNL 37 JNT	INI
S16T021110		2-Butene	107-01-7	5.35	NGS	JNL 08	INT
S16T021110		4-Methoxy-1-pentene	98386-09-5	7.15	NGS	TNL 64	INT
S16T021110		Formamide	75-12-7	14.05	NGS	TNL 66 JNT	INT
S16T021110		Propane, 2-methyl-1-nitro-	625-74-1	16.49	NGS	53 JNT	INT
S16T021110		Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	1.5E+03 JNT	INT
S16T021110		1,1,1,3,5,5,5-Heptamethyltrisi	1873-88-7	22.50	NGS	TNL 27 JNT	INT
S16T021110		Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	210 JNT	INT
\$16T021110		2,6-Dimethyldecane	13150-81-7	23.14	NGS	INL 06	INT
S16T021110		2-Hexyl-1-octanol	19780-79-1	23.56	NGS	44 JNT	INT
S16T021110		3,3-Dimethylhexane	563-16-6	23.85	NGS	220 JNT	INT
S16T021110	1	Undecane, 2,6-dimethyi-	17301-23-4	23.94	NGS	TNL 001	INT
S16T021110		1-Bromo-4-bromomethyldecane	61639-11-0	24.07	NGS	TNL 011	INT
S16T021110		Unknown-1	-	24.26	NGS	2.5E+03 JT	T
S16T021110		(2,2,6-Trimethyl-bicyclo[4.1.0	78996-11-9	24.85	NGS	TNL 56 JNT	INT
S16T021110		Benzoic acid, 4-ethoxy-, ethyl	23676-09-7	25.07	NGS	TNL 87	INT
S16T021110 -		(R)-(-)-14-Methyl-8-hexadecyn-	64566-18-3	25.15	NGS	33 JNT	INT
S16T021110		3,7,11,15-Tetramethyl-2-hexade	102608-53-7	25.28	NGS	33 JNT	INT
S16T021110		2,6-Dimethyl-6-trifluoroacetox	61986-67-2	25.41	NGS	TNL 80	INT
S16T021110		2-Dodecen-1-yl(-)succinic anhy	19780-11-1	25.96	NGS	43 JNT	INT
S16T021110		2-Propenoic acid, octyl ester	2499-59-4	26.00	NGS	TNL 27	INT
S16T021110		1,2-Benzisothiazole	272-16-2	26.32	NGS	TNL 50	INT
S16T021110		Undecane, 2-methyl-	7045-71-8	26.44	NGS	310 JNT	INT
S16T021110		1-lodo-2-methylundecane	73105-67-6	26.57	NGS	TNL 82 JNT	NT
S16T021110		Silane, trimethyl[2-methylene-	97778-15-9	26.65	NGS	260 JNT	INT
S16T021110		Tetracontane, 3,5,24-trimethyl	55162-61-3	26.75	NGS	44 JNT	NT
S16T021110		2-Piperidinone, N-[4-bromo-n-b	195194-80-0	26.82	NGS	TNL 60	INT

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

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Customer Sample ID: 16-05983-2-D1 Customer Sample ID: 16-05983-2-D1

50		Completion of				
Sample# R	A#	A# QC Type Analyte		CAS No.	Retention Time (Minutes)	Unit
VAPOR-TDU VOA #2	NOV U	#2				
S16T021110			Dodecane	112-40-3	27.03	NGS
S16T021110			Unknown-2		27.32	NGS
S16T021110		BLNK	Unknown-1	1	8.24	NGS

Qual Flags

Result

140 JNT 5

72 30

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

Y - Comment Q - Qualitative

J - Estimated

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	Oual Flans
VAPOR-TDU VOA #2	VOA #	2						R
S16T021111			Acetic anhydride	108-24-7	5.35	NGS	370 JNL	INT
S16T021111			Formamide	75-12-7	14.10	NGS	TUL 011	INT
S16T021111			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	460 JNT	INT
S16T021111			Urea	57-13-6	20.86	NGS	INL 97	INT
S16T021111			Decane, 2,4,6-trimethyl-	62108-27-4	23.00	NGS	TNL 99	INT
S16T021111			Undecane	1120-21-4	23.14	NGS	TNL 43	INT
S16T021111			Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	TNL 30 JNT	INT
S16T021111			2.6-Dimethyldecane	13150-81-7	23.85	NGS	120 JNT	INT
S16T021111			Octane, 2,3,6,7-tetramethyl-	52670-34-5	23.94	NGS	TNL 56 JNT	INT
S16T021111			1-Octanol, 2-butyl-	3913-02-8	24.06	NGS	TNL 04	INT
S16T021111			Unknown-1		24.26	NGS	830 JT	1
S16T021111			Hydroxylamine, O-decyl-	29812-79-1	25.28	NGS	ENL 50 JNT	INT
S16T021111			1,2-Benzisothiazole	272-16-2	26.32	NGS	R1 JNT	INT
S16T021111			Undecane, 2-methyl-	7045-71-8	26,44	NGS	110 JNT	INT
\$16T021111			1-lodo-2-methylundecane	73105-67-6	26.57	NGS	42 JNT	INT
\$16T021111			Silane, trimethyl[2-methylene-	97778-15-9	26.65	NGS	TNL 78	INT
S16T021111			Decane, 2,6,8-trimethyl-	62108-26-3	27.03	NGS	TNL 53	INT
S16T021111		BLNK	Unknown-1	1	8.24	NGS	30	

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

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

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

Sample# R	A# QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Oual Flane
VAPOR-TDU VOA #2							office - many
S16T021112		Unknown-1	1	8.23	NGS	25 JT	F
S16T021112		Pentane, 2-methyl-	107-83-5	8.88	NGS	32 JNT	NT
S16T021112		Tetrahydrofuran	109-99-9	11.94	NGS	TNL 20	NT
S16T021112		Hexane, 3-methyl-	589-34-4	13.72	NGS	TNL 14	NT
S16T021112		Ethylene Glycol	107-21-1	13.92	NGS	101 101	NT
S16T021112		Formamide	75-12-7	14.05	NGS	TNL 28 JNT	NT
S16T021112		(Z)-Hex-2-ene, 5-methyl-	13151-17-2	14.17	NGS	TNL 22	NT
S16T021112		2,4-Azetidinedione, 3,3-diethy	69315-91-9	15.19	NGS	30 JNT	NT
S16T021112		Fleptane, 2-methyl-	592-27-8	16.08	NGS	TNL 27	NT
\$16T021112		Octane	111-65-9	16.77	NGS	TNL 011	NT
S16T021112		Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	44 JNT	NT
S16T021112		1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	TNL 36 JNT	NT
S16T021112		Octane, 3-methyl-	2216-33-3	18.28	NGS	38 JNT	NT
S16T021112		Nonane	111-84-2	18.83	NGS	TIO JNT	NT
S16T021112		Heptanat	111-71-7	18.97	NGS	47 JNT	NT
S16T021112		Undecanal	112-44-7	19.42	NGS	29 JNT	NT
S16T021112		Octane, 3,6-dimethyl-	15869-94-0	19.67	NGS	49 JNT	NT
S16T021112		2-Heptanone, 6-methyl-	928-68-7	20.27	NGS	210 JNT	NT
S16T021112		Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	1NL 008	NT
S16T021112		Cyclohexane, 1,1,2,3-tetrameth	6783-92-2	20.84	NGS	31 JNT	NT
S16T021112		Hexadecanal, 2-methyl-	55019-46-0	21.18	NGS	TNL 73 JNT	NT
S16T021112		Decane, 2,6,7-trimethyl-	62108-25-2	22.00	NGS	TNL 18	NT
16T021112		Cyclohexene, 1-methyl-5-(1-met	1461-27-4	22.62	NGS	TNL 36 JNT	NT
S16T021112		1-Cyclohexylheptene	114614-83-4	22.67	NGS	TNL 27 JNT	11
S16T021112		Undecane	1120-21-4	23.01	NGS	130 JNT	VT
S16T021112		2,6-Dimethyldecane	13150-81-7	23.14	NGS	48 JNT	VT
S16T021112		1-Ethyl-2,2,6-trimethylcyclohe	71186-27-1	23.31	NGS	31 JNT	17

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

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

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Sample# R	A#	QC Type	Analyte	CAS No.	Ketention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	VOA #	0						
S16T021112			1,14-Tetradecanediol	19812-64-7	23.56	NGS	TNL 43 JNT	INT
S16T021112			Undecane, 2,6-dimethyl-	17301-23-4	23.74	NGS	INC 06	INT
S16T021112			Decane, 2,4,6-trimethyl-	62108-27-4	23.85	NGS	TNL 011	INT
S16T021112			Hexyl octyl ether	17071-54-4	23.94	NGS	100 JNT	INT
S16T021112			Unknown-2	E	24.26	NGS	340 JT	E
S16T021112			cis-9,10-Epoxyoctadecan-1-ol	13980-12-6	24.85	NGS	TNL 43 JNT	NT
S16T021112			Dodecane	112-40-3	25.28	NGS	TNL 23	NT
S16T021112			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	TNL 16	INT
S16T021112			Octane, 4-ethyl-	15869-86-0	25.49	NGS	25 JNT	INT
S16T021112			Unknown-3	1	25.99	NGS	62 JT	-
S16T021112			1-Octanol, 2-butyl-	3913-02-8	26.07	NGS	TNL 26 JNL	NT
S16T021112			Methenamine	100-97-0	26.19	NGS	TNL 53	INT
S16T021112			1,2-Benzisothiazole	272-16-2	26.31	NGS	180 JNT	INT
S16T021112			Unknown-4		26.43	NGS	73 JT	E
S16T021112			Heptadecane, 2,6,10,15-tetrame	54833-48-6	26.63	NGS	TNL 14	NT
S16T021112			Undecane, 2-methyl-	7045-71-8	27.02	NGS	44 JNT	NT
S16T021112	u	BLNK	Unknown-1	1	8.24	NGS	30	

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

Y - Comment Q - Qualitative

Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

Customer Sample ID: 16-05983-2-F1

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Sample# R	A# QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flace
VAPOR-TDU VOA #2	OA #2						
S16T021113		1,3-Butadiene	106-99-0	5.04	NGS	12 JNT	INT
S16T021113		Acetic anhydride	108-24-7	5.31	NGS	33 JNT	JNT
S16T021113		Acetic acid	64-19-7	9.49	NGS	TI2 JNT	UNT
S16T021113		Formamide	75-12-7	14.10	NGS	140 JNT	INT
S16T021113		Propane, 2-methyl-1-nitro-	625-74-1	16.47	NGS	25 JNT	INT
S16T021113		Cyclotetrasitoxane, octamethyl	556-67-2	20.48	NGS	1.2E+03 JNT	JNT
S16T021113		2,2,7,7-Tetramethyloctane	1071-31-4	21.51	NGS	TNL 37	UNT
S16T021113		Decane, 2,4,6-trimethyl-	62108-27-4	22.71	NGS	52 JNT	INT
S16T021113		2,6-Dimethyldecane	13150-81-7	23.01	NGS	1NL 150 JNT	INT
S16T021113		Unknown-1	1	23.14	NGS	77 JT	15
\$16T021113		2-Hexyl-1-octanol	19780-79-1	23.55	NGS	TNL 48	INT
S16T021113		2-Piperidinone, N-[4-bromo-n-b	195194-80-0	23.79	NGS	JNL 36 JNL	INT
S16T021113		Octane, 4-ethyl-	15869-86-0	23.85	NGS	110 JNT	INT
S16T021113		1-Octanol, 2-butyl-	3913-02-8	23.95	NGS	44 JNT	INT
S16T021113		Culmorin	18374-83-9	24.05	NGS	TNL 19	INT
S16T021113		Unknown-2	1	24.26	NGS	1.9E+03 JT	5
S16T021113		(2,2,6-Trimethyl-bicyclo[4.1.0	78996-11-9	24.84	NGS	54 JNT	INT
S16T021113		Unknown-3	1	25.05	NGS	35 JT	5
S16T021113		Unknown-4	1	25.14	NGS	46 JT	5
S16T021113		Unknown-5	-	25.25	NGS	25 JT	5
S16T021113		Unknown-6		25.41	NGS	30 JT	1
S16T021113		2,6,10-Dodecatrienal, 3,7,11-t	4380-32-9	25.80	NGS	30 JNT	INT
S16T021113		Unknown-7	1	25.98	NGS	JU 300	1
S16T021113		2-Dodecen-1-yl(-)succinic anhy	19780-11-1	26.04	NGS	INL 99	INT
S16T021113		Methenamine	100-97-0	26.19	NGS	220 JNT	INT
S16T021113	_	Unknown-8	1	26.30	NGS	68 JT	E E
S16T021113		1-lodo-2-methylundecane	73105-67-6	26.43	NGS	JNT 84 JNT	INT

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

Analyzeo, NU = NOt Uetected N - Named TIC E - Outside Calibration Range

> J - Estimated T - Tentatively Identified Compound

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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	VOA #							L
S16T021113			2-Octylcyclopropene-1-heptanol	54467-85-5	26.48	NGS	38	38 JNT
S16T021113			9,12,15-Octadecatrienoic acid,	55320-01-9	26.56	NGS	89	TNL 89
S16T021113			Silane, trimethyl[2-methylene-	97778-15-9	26.64	NGS	TNL 041	JNT
S16T021113			1-Bromo-4-bromomethyldecane	61639-11-0	27.01	NGS	34	34 JNT
S16T021113			Unknown-9	Ē	27.31	NGS	49 JT	5
S16T021113			11-Tetradecyn-1-ol	33925-73-4	27.62	NGS	26	26 JNT
S16T021113		BLNK	Unknown-1	F	8.24	NGS	30	

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

Y - Comment Q - Qualitative

Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

Customer Sample ID: 16-05983-2-G1

					Deteritor Time			
Sample# R	₩,	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	4 YOA #	2						
S16T021114			1,3-Butadiene	106-99-0	5.04	NGS	INL 11	INT
S16T021114			2-Methyl-1-butene	563-46-2	5.25	NGS	51 JNT	INT
316T021114			2-Butene	107-01-7	5.34	NGS	32 JNT	INT
16T021114			2-Pentene, (E)-	646-04-8	5.43	NGS	TNL 50 JNT	INT
16T021114			Butane, 2-methyl-	78-78-4	5.60	NGS	TNL 06	INT
S16T021114			1-Pentene	109-67-1	6.91	NGS	TNL 19	INT
S16T021114			2-Butene, 2-methyl-	513-35-9	7.10	NGS	33 JNT	INT
S16T021114			Cyclopentane	287-92-3	8.74	NGS	TNL 86 JNT	INT
16T021114			Tetrahydrofuran	109-99-9	11.94	NGS	TNL 28 JNT	INT
S16T021114			Formamide	75-12-7	14:21	NGS	1NL 95 JNT	INT
S16T021114			Acetonitrile, hydroxy-	107-16-4	16.10	NGS	30 JNT	INT
S16T021114			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	TNL 071	INT
S16T021114			2,2,7,7-Tetramethyloctane	1071-31-4	21.52	NGS	TNL 23	INT
\$16T021114			Dodecane, 2,6,10-trimethyl-	3891-98-3	22.71	NGS	JNL 37 JNT	INT
\$16T021114			Undecane, 4,7-dimethyl-	17301-32-5	23.00	NGS	140 JNT	INT
S16T021114			Undecane	1120-21-4	23.14	NGS	INL 69	INT
S16T021114			Heptanoic acid, 2-ethyl-	3274-29-1	23.68	NGS	45 JNT	INT
S16T021114			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	JNL 96	INT
\$16T021114			Dodecane	112-40-3	23.85	NGS	110 JNL	INT
\$16T021114			Decane, 2,4,6-trimethyl-	62108-27-4	23.95	NGS	TNL 63	INT
316T021114			2,3-Dimethyldecane	17312-44-6	24.06	NGS	26 JNT	INT
\$16T021114			Unknown-1	1	24.26	NGS	230 JT	1
S16T021114			Undecane, 3-methyl-	1002-43-3	24.90	NGS	13 JNT	INT
\$16T021114			Tetradecane, 1-iodo-	19218-94-1	25.27	NGS	42 JNT	INT
S16T021114			Methenamine	100-97-0	26.19	NGS	32 JNT	INT
S16T021114		BLNK	Unknown-1	-	8.24	NGS	30	

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

J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

Customer Sample ID: 16-05983-2-H1

Customer Samule ID: 16-05983-2-H1

Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	/OA #2	<u></u>						
S16T021115			2-Butene	107-01-7	4.70	NGS	41	41 JNT
S16T021115			2-Methyl-1-butene	563-46-2	5.30	NGS	110	110 JNT
S16T021115			Butane, 2-methyl-	78-78-4	5.64	NGS -	400	400 JNT
\$16T021115			1,4-Pentadiene	591-93-5	5.81	NGS	29	29 JNT
\$16T021115			1-Pentene	109-67-1	6.06	NGS	880	880 JNT
S16T021115			Pentane	109-66-0	6.29	NGS	3.6E+03 JNT	JNT
\$16T021115			2-Pentene, (Z)-	627-20-3	6.58	NGS	160	160 JNT
S16T021115			2-Pentene, (E)-	646-04-8	6.83	NGS	98	1NL 98
S16T021115			Cyclobutanone, 2,2,3-trimethyl	1449-49-6	6.93	NGS	160	TNL 001
16T021115			2-Butene, 2-methyl-	513-35-9	7.02	NGS	43	43 JNT
S16T021115			Oxirane, 2-(1,1-dimethylethyl	53897-30-6	7,12	NGS	81	10 JNT
S16T021115			4-Methoxy-1-pentene	98386-09-5	7.18	NGS	98	95 JNT
S16T021115			Heptane, 4-azido-	27126-22-3	7.56	NGS	36	36 JNT
S16T021115			1-Pentene, 4-methyl-	691-37-2	8.42	NGS	290	290 JNT
S16T021115			1-Pentene, 3-methyl-	760-20-3	8.46	NGS	69	59 JNT
\$16T021115			Cyclopentane	287-92-3	8.75	NGS	160	160 JNT
\$16T021115			Pentane, 2-methyl-	107-83-5	8.89	NGS	1.5E+03 JNT	JNT
S16T021115			Cyclopropane, 1-ethyl-2-methyl	19781-68-1	9.29	NGS	26	26 JNT
S16T021115	-		Cyclobutanecarbonitrile, 3,3-d	53783-86-1	9.42	NGS	66	66 JNT
S16T021115			Pentane, 3-methyl-	96-14-0	9.54	NGS	320	320 JNT
16T021115	Ē		2-Hexene	592-43-8	10.67	NGS	59	59 JNT
S16T021115			2-Hexene, (E)-	4050-45-7	11.18	NGS	28	28 JNT
\$16T021115			Cyclopropane, propyl-	2415-72-7	11.43	NGS	73	73 JNT
\$16T021115	-		Hydroperoxide, hexyl	4312-76-9	11.64	NGS	40	40 JNT
16T021115			Butane, 1-methoxy-	628-28-4	11.73	NGS	72	72 JNT
16T021115			Cyclopentane, methyl-	96-37-7	11.89	NGS	170	TNL 071
S16T021115			Tetrahydrofuran	109-99-9	11.97	NGS	640 JNT	JNT

Vot Analyzed, ND = Not Detected N - Named TIC E - Outside Calibration Range

> J - Estimated T - Tentatively Identified Compound

Y - Comment Q - Qualitative

Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

Customer Sample ID: 16-05983-2-H1

-

Sample# R	A# QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flaos
VAPOR-TDU VOA #2	/OA #2						1
16T021115		2-Methyl-5-hexen-3-ol	32815-70-6	12.38	NGS	79	TNL 97
316T021115		(Z)-Hex-2-ene, 5-methyl-	13151-17-2	12.92	NGS	110	110 JNT
S16T021115		4-Penten-2-one	13891-87-7	13.34	NGS	32	32 JNT
S16T021115		Hexane, 2-methyl-	591-76-4	13.42	NGS	310	310 JNT
16T021115		Pentane, 2,3-dimethyl-	565-59-3	13.54	NGS	32	32 JNT
S16T021115		Hexane, 3-methyl-	589-34-4	13.72	NGS	550	550 JNT
S16T021115		Cyclopentane, 1,3-dimethyl-	2453-00-1	14.02	NGS	38	38 JNT
S16T021115		Cyclopentane, 1,2-dimethyl-, c	1192-18-3	14.12	NGS	60	60 JNT
S16T021115		Hydroxylamine, O-(3-methylbuty	19411-65-5	14.18	NGS	740	740 JNT
S16T021115		2-Pentanol	6032-29-7	14.32	NGS	88	1NT 88
S16T021115		Formamide	75-12-7	14.57	NGS	160	160 JNT
S16T021115		(Z)-3-Heptene	7642-10-6	14.62	NGS	40	40 JNT
S16T021115		Tetrahydrofuran, 2,2-dimethyl-	1003-17-4	14.79	NGS	46	46 JNT
S16T021115		1-Hexene, 3,5-dimethyl-	7423-69-0	14.86	NGS	31	31 JNT
S16T021115		Unknown-1	13	14.91	NGS	33	33 JT
S16T021115		Butane, 2-cyclopropyl-	5750-02-7	15.03	NGS	43	43 JNT
16T021115		2,4-Azetidinedione, 3,3-diethy	69315-91-9	15.18	NGS	260	260 JNT
16T021115		Oxirane, 2-(1,1-dimethylethyl)	36099-44-2	15.24	NGS	35	35 JNT
\$16T021115		2-Butanone, 3-ethoxy-3-methyl-	36687-99-7	15,31	NGS	110	TIO JNT
16T021115		Hexane, 2,4-dimethyl-	589-43-5	15.37	NGS	26	26 JNT -
16T021115		Cyclopropane, 1,1-diethyl-	1003-19-6	15.42	NGS	51	51 JNT
S16T021115		1-Heptene, 6-methyl-	5026-76-6	15.90	NGS	150	TNL 001
16T021115		1-Pentanol	71-41-0	15.96	NGS	74	74 JNT
S16T021115		Heptane, 2-methyl-	592-27-8	16.08	NGS	230	230 JNT
S16T021115		Heptane, 4-methyl-	589-53-7	16.13	NGS	69	69 JNT
S16T021115		Heptane, 3,4,5-trimethyl-	20278-89-1	16.25	NGS	64	64 JNT
S16T021115		2-Hexene, 5,5-dimethyl-, (Z)-	39761-61-0	16.51	NGS	96	96 JNT

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

Customer Sample ID: 16-05983-2-H1 Customer Sample ID: 16-05983-2-H1

	L							
Sample# R	A#	QC Type	Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	VOA #	12						
\$16T021115			Acetic acid, trifluoro-, 3,7-d	28745-07-5	16.60	NGS	34	34 JNT
\$16T021115			Octane	111-65-9	16.77	NGS	160	160 JNT
S16T021115			Cyclotrisiloxane, hexamethyl-	541-05-9	17.05	NGS	11	TNL 77
\$16T021115			Octane, 2-methyl-	3221-61-2	17.41	NGS	58	58 JNT
\$16T021115			Cyclohexane, ethyl-	1678-91-7	17.68	NGS	38	38 JNT
S16T021115			1,1,4-Trimethylcyclohexane	7094-27-1	17.83	NGS	76	76 JNT
\$16T021115			Heptane, 4-propyl-	3178-29-8	18.27	NGS	31	31 JNT
S16T021115			Nonane	111-84-2	18.83	NGS	37	37 JNT
316T021115			Cyclohexane, 1-ethyl-2-methyl-	3728-54-9	18.88	NGS	36	36 JNT
S16T021115			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	330 JNT	JNT
316T021115			Undecane	1120-21-4	23.00	NGS	130	130 JNT
316T021115			3.3-Dimethylhexane	563-16-6	23.14	NGS	55	55 JNT
S16T021115			2,6-Dimethyldecane	13150-81-7	23.73	NGS	61	61 JNT
\$16T021115			Dodecane	112-40-3	23.85	NGS	100	100 JNT
S16T021115			Hexyl octyl ether	17071-54-4	23.94	NGS	63	63 JNT
316T021115			1-Octanol, 2-butyl-	3913-02-8	24.06	NGS	32	32 JNT
S16T021115			Unknown-2	-	24.26	NGS	220 JT	JT
S16T021115			Undecane, 2,6-dimethyl-	17301-23-4	25.27	NGS	64	54 JNT
316T021115			1-Octanol, 3,7-dimethyl-	106-21-8	25.41	NGS	32	32 JNT
S16T021115			2-Propenoic acid, octyl ester	2499-59-4	25.99	NGS	44	44 JNT
S16T021115			1,2-Benzisothiazole	272-16-2	26.30	NGS	78	78 JNT
316T021115			Undecane, 2-methyl-	7045-71-8	26.43	NGS	19	19 JNT
S16T021115		BLNK	Unknown-1	1	8.24	NGS	30	

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

Y - Comment Q - Qualitative

Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

Customer Sample ID: 16-05983-2-H2 Customer Sample ID: 16-05983-2-H2

ample# R	A# QC Type	e Analyte	CAS No.	Retention Time (Minutes)	Unit	Result	Qual Flags
VAPOR-TDU VOA #2	VOA #2						
S16T021116		2-Butene	107-01-7	4.73	NGS	1NL 22	INT
S16T021116		2-Methyl-1-butene	563-46-2	5.33	NGS	1NC 081	INT
\$16T021116		Cyclopropane, 1,2-dimethyl-, c	930-18-7	5.51	NGS	INL 87	INT
S16T021116		Butane, 2-methyl-	78-78-4	5.67	NGS	330 JNT	INT
S16T021116		2-Pentene, (E)-	646-04-8	6.61	NGS	TNL 43 JNT	INT
S16T021116		2-Pentene	109-68-2	6.86	NGS	26 JNT	INT
S16T021116		1-Pentene	109-67-1	6.96	NGS	280 JNT	INT
S16T021116		Cyclobutane, methyl-	598-61-8	7.03	NGS	1NL 83	INT
S16T021116		2-Pentene, (Z)-	627-20-3	7.13	NGS	INL 78	INT
S16T021116		Di(1,2,5-oxadiazolo)[3,4-b;3,4	186205-18-5	7.88	NGS	31 JNT	INT
S16T021116		1,4-Pentadiene	591-93-5	8.42	NGS	TNL 28 JNL	INT
S16T021116		Cyclopentane	287-92-3	8.78	NGS	310 JNT	INT
S16T021116		Tetrahydrofuran	109-99-9	11.96	NGS	120 JNT	INT
S16T021116		Formamide	75-12-7	14.63	NGS	120 JNT	INT
S16T021116		Cyclotetrasiloxane, octamethyl	556-67-2	20.47	NGS	TNL 140 JNL	INT
S16T021116		Urea	57-13-6	20.86	NGS	31 JNT	INT
S16T021116		2,6-Dimethyldecane	13150-81-7	23.00	NGS	52 JNT	INT
S16T021116		Octane, 2,3,6,7-tetramethyl-	52670-34-5	23.14	NGS	27 JNT	INT
S16T021116		Undecane	1120-21-4	23.73	NGS	39 JNT	INT
S16T021116		Dodecane	112-40-3	23.85	NGS	TNT 84 JNT	INT
S16T021116		Unknown-1		24.26	NGS	7L 200	1
S16T021116		Undecane, 2,6-dimethyl-	17301-23-4	25.27	NGS	37 JNT	INT
S16T021116		Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	33 JNT	NT
S16T021116		Unknown-2		25.99	NGS	51 JT	-
S16T021116		1,2-Benzisothiazole	272-16-2	26.30	NGS	INC 62	INT
S16T021116		Dodecane, 2,6,11-trimethyl-	31295-56-4	26.43	NGS	Z2 JNT	NT
S16T021116	BLNK	Unknown-1	L	8.24	NGS	30	

L - LLS Outside Range B - Blank Contamination

Y - Comment Q - Qualitative

N - Named TIC E - Outside Calibration Range

J - Estimated T - Tentatively Identified Compound

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

Cartridge Evaluation Data Summary Report
 NA = Not Analyzed, ND = Not Detected

 J - Estimated
 N - Named TiC

 T - Tentatively Identified Compound
 E - Outside Calibration Range

Y - Comment Q - Qualitative

L - LLS Outside Range B - Blank Contamination

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Cartridge Evaluation Data Summary Report

Sample Group: 20162092 SDG Number:

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

Sample# R	-				Detection Time			
	A#	QC Type	Analyte	CAS No.	(Minutes)	Unit	Result	Oual Flage
VAPOR-TDU VOA #2	VOA #	12						-
S16T021117			Unknown-1	1	7.15	NGS	27 JT	1
S16T021117			Tetrahydrofuran	109-99-9	11.95	NGS	TNL 181	INT
S16T021117			Formamide	75-12-7	14.04	NGS	36 JNT	INT
S16T021117			Propane, 2-methyl-1-nitro-	625-74-1	16.50	NGS	32 JNT	INT
S16T021117			Cyclotetrasiloxane, octamethyl	556-67-2	20.48	NGS	310 JNT	INT
S16T021117			Undecane	1120-21-4	23.00	NGS	TNL 19	INT
S16T021117			Decane, 2,4,6-trimethyl-	62108-27-4	23.14	NGS	37 JNT	INT
S16T021117			Heptanoic acid, 2-ethyl-	3274-29-1	23.68	NGS	41 JNT	INT
S16T021117			Undecane, 2,6-dimethyl-	17301-23-4	23.73	NGS	37 JNT	INT
S16T021117			Dodecane	112-40-3	23.85	NGS	TNL 82 JNT	INT
S16T021117			Hydroxylamine, O-decyl-	29812-79-1	23.95	NGS	62 JNT	INT
S16T021117			Unknown-2	1	24.26	NGS	380 JT	T
S16T021117			2,6-Dimethyldecane	13150-81-7	25.27	NGS	TNL 07	INT
S16T021117			Acetic acid, trifluoro-, 3,7-d	28745-07-5	25.41	NGS	56 JNT	INT
S16T021117			Unknown-3	1	26.00	NGS	TU 17	L
S16T021117			Methenamine	100-97-0	26.20	NGS	TNL 49	INT
S16T021117			1,2-Benzisothiazole	272-16-2	26.32	NGS	120 JNT	INT
S16T021117			Heptadecane, 2,6,10,15-tetrame	54833-48-6	26.44	NGS	TNL 72	INT
S16T021117			Undecane, 2-methyl-	7045-71-8	27.03	NGS	28 JNT	INT
S16T021117		BLNK	Unknown-1	î	8.24	NGS	30	

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

Y - Comment Q - Qualitative

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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 %	RPD % Spk Rec %	Det Limit	Cnt Err %	Det Limit Cnt Err % Qual Flags
Furans in Vapor Samples by SIM	apor Sampl	les by S	W											
S16T021032	1191-99-7	1-66-	2,3-Dihydrofuran	NGS	n/a	n/a	2.9	n/a	n/a	n/a	n/a	0.18	n/a	
S16T021032	1708-	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	-
S16T021032	625-86-5	36-5	2,5-Dimethytfuran	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	-
S16T021032	534-22-5	22-5	2-Methylfuran	NGS	n/a	n/a	1.3	n/a	n/a	n/a	n/a	0.23	n/a	-
S16T021032	3777-69-3	-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	-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	6-00	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	n/a	
S16T021032	109-99-9	6-66	Tetrahydrofuran	NGS	n/a	n/a	490	n/a	n/a	n/a	n/a	0.10	n/a	ш

8/15/1

J - Estimated

NA = Not Analyzed, ND = Not Detected

E - Outside Calibration Range

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Cartridge Evaluation Data Summary of All Results

Sample Group: 20162087 SDG Number: Customer Samola ID:

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r Sample ID: 16-05982-3-A2	Customer Sample ID: 16-05982-3-A2
Customer	Custome

Sample# R	Ŧ	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	_	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
Furans in Vapor Samples by :	apor	Samples by S	W										
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	060.0	n/a
S16T021033		109-99-9	Tetrahvdrofuran	NGS	n/a	n/a	<0.10	n/a	nla	n/a	e/u	0 10	e/u

NA = Not Analyzed, ND = Not Detected

J - Estimated

Cartridge Evaluation Data Summary of All Results

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

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Sample# R	A#	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	_	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	ual Flags
Furans in	Vapor	Furans in Vapor Samples by S	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	L 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	L_	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	L a/u	

NA = Not Analyzed, ND = Not Detected

J - Estimated

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Cartridge Evaluation Data Summary of All Results

Sample Group: 20162087 SDG Number: Customer Sample ID:

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Sample# R	A# CAS #	*	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Qual Flags
Furans in Vapor Samples by	apor Sam	ples by SIM	W											
S16T021035	119	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	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-	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	377.	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-	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	377.	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	4225	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-	110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	060.0	n/a	
S16T021035	109-	6-66-601	Tetrahydrofuran	NGS	n/a	n/a	<0.10	n/a	n/a	n/a	n/a	0.10	e/u	

NA = Not Analyzed, ND = Not Detected

J - Estimated

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Cartridge Evaluation Data Summary of All Results

Sample Group: 20162087 SDG Number: Customer Sample ID:

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Sample# R	A# CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Ont Err % Qual Flags
Furans in	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-Heptytfuran	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-Pentyifuran	NGS	n/ä	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	060.0	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/aJ

NA = Not Analyzed, ND = Not Detected

J - Estimated

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Cartridge Evaluation Data Summary of All Results

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

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Sample# R	A# C	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Qual Flags
Furans in Vapor Samples by	apor Se	amples by SIM	Σ											0
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	ŵ	625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43		
S16T021037	0	3777-71-7	2-Heptylfuran	NGS	n/a	n/a	<0.27	n/a	n/a	n/a	n/a	0.27		
S16T021037	LO.	534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23		
S16T021037	0	3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a		0.34		
S16T021037	4	4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44		
S16T021037	-	110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	060.0		
S16T021037	-	109-99-9	Tetrahydrofuran	NGS	n/a	n/a	1.3	n/a	n/a	n/a	n/a	0.10		

NA = Not Analyzed, ND = Not Detected

J - Estimated

E - Outside Calibration Range

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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

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Sample# R	A# C	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	Qual Flags
Furans in Vapor Samples by	apor Se		SIM											ľ
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	(j)	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	3	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	20	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	0	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	4	4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a		0.44		
S16T021038	-	110-00-9	Furan	NGS	n/a	n/a	0.13	n/a	n/a	n/a	n/a	060.0	n/a J	
S16T021038	_	109-99-9	Tetrahydrofuran	NGS	n/a	n/a	6.1	n/a	n/a	n/a	n/a	0.10	n/a	

NA = Not Analyzed, ND = Not Detected

J - Estimated

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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

R A# CAS # A Furans in Vapor Samples by SIM Furans in Vapor Samples by SIM 21039 1191-99-7 2 StefT021039 11708-29-8 2 2 2 2 2 StefT021039 6:25-86-5 2 2 2 2 2 2 2 1708-29-8 2 2 1708-29-8 2 2 1708-29-8 2 2 1 1708-29-8 2 2 1 1 2 1 <											
Furans in Vapor Samples \$161021039 11191-99 \$161021039 1708-29 \$161021039 625-86-5 \$161021039 53777-71	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Det Limit Ont Err % Qual Flags
	by SIM										
	-7 2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	n/a	n/a	n/a	n/a	0.18	n/a
	-8 2,5-Dihydrofuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a
	5.5-Dimethylfuran	n NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	n/a
	-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	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	-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	-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	060.0	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

J - Estimated

E - Outside Calibration Range

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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

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Sample# R	₩	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Cnt Err %	Det Limit Cnt Err % Qual Flags
Furans in	Vapor	Furans in Vapor Samples by SIM	W											
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

J - Estimated

Cartridge Evaluation Data Summary of All Results

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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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
Furans in Va	Furans in Vapor Samples by S	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	
S16T021041	625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	n/a	0.43	
S16T021041	3777-71-7	2-Heptylfuran	NGS	n/a	n/a	0.34	n/a	n/a	n/a	n/a	0.27	
S16T021041	534-22-5	2-Methylfuran	NGS	n/a	n/a	<0.23	n/a	n/a	n/a	n/a	0.23	
S16T021041	3777-69-3	2-Pentylfuran	NGS	n/a	n/a	<0.34	n/a	n/a	n/a	n/a	0.34	
S16T021041	4229-91-8	2-Propylfuran	NGS	n/a	n/a	<0.44	n/a	n/a	n/a	n/a	0.44	
S16T021041	110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	0.090	
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

J - Estimated

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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 %	RPD % Spk Rec %	Det Limit	Cnt Err %	Det Limit Cnt Err % Qual Flags
Furans in V	Furans in Vapor Samples by S	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	7
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	060.0	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	w

NA = Not Analyzed, ND = Not Detected

J - Estimated

Cartridge Evaluation Data Summary of All Results

15 - Aug - 2016 11:17:29 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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 %	Average RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
Furans in Va	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	060.0	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

J - Estimated

Cartridge Evaluation Data Summary of All Results

15 - Aug - 2016 11:17:29 DSRHardcopyWOLImits 3.0.11b DSR.Jar v. 3.0.12

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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
Furans in Va	Furans in Vapor Samples by SI	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	060.0	n/a
S16T021044	109-99-9	Tetrahydrofuran	NGS	n/a	n/a	0.18	n/a	n/a	n/a	n/a	0.10	La J

NA = Not Analyzed, ND = Not Detected

J - Estimated

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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	₩	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit		Cnt Err % Qual Flags
Furans in V	apor S	Furans in Vapor Samples by S	IM											
S16T021045	Ĺ	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	-
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	7
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	1
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	ſ
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	060.0	n/a	2
S16T021045		109-99-9	Tetrahydrofuran	NGS	n/a	n/a	430	n/a	n/a	n/a	n/a	0.10	n/a E	ш

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NA = Not Analyzed, ND = Not Detected

J - Estimated

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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	A# CAS #	Analyte	Unit	STD %	Blank	Result	Result Duplicate	Average	RPD % Spk Rec %	KRec %	Det Limit	Det Limit Cnt Err % Qual Flags
Furans in	Vapor	Furans in Vapor Samples by S	SIM										
S16T021046	\vdash	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	\vdash	625-86-5	2,5-Dimethylfuran	NGS	n/a	n/a	<0.43	n/a	n/a	n/a	e/u	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-Pentyifuran	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	060'0	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

J - Estimated

E - Outside Calibration Range

NA = Not Analyzed, ND = Not Detected

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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

	-												10 July 10 Jul	1
Sample# R	₩	CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	al Flags
Furans in V	Vapor	Furans in Vapor Samples by SIM	W											
S16T021047		1191-99-7	2,3-Dihydrofuran	NGS	n/a	n/a	<0.18	e/u	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	\vdash	110-00-9	Furan	NGS	n/a	n/a	<0.090	n/a	n/a	n/a	n/a	060.0	n/a	
S16T021047		109-99-9	Tetrahydrofuran	NGS	n/a	n/a	2.4	n/a	n/a	n/a	n/a	0.10	l a/u	

NA = Not Analyzed, ND = Not Detected

J - Estimated

Cartridge Evaluation Data Summary of All Results

15 - Aug - 2016 11:18:40 DSRHardcopyWOLImits 3.0.11b DSR.Jar v. 3.0.12

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

4													
Sample# K	₩.	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average		RPD % Spk Rec %	Det Limit	Cnt Err % Qual Flags
Furans in V	/apor	Furans in Vapor Samples by S	WI										
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	060.0	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

J - Estimated

Cartridge Evaluation Data Summary of All Results

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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	CTD 0/	Blank	Recult	Dunlicato	Augrano	70 UDD	DDD % Cat Dag %	Dat Limit	Cat Far at	Dat I imit Cat Far & Carl Flaar
				0/ 710			-		2	el nou udo		CHLETT 70	Kuai riags
Furans in V	Furans in Vapor Samples by S	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	in/a	<0.23	n/a	n/a	n/a	n/a	0.23	n/a	
S16T021049	3777-69-3	2-Pentytfuran	NGS	n/a	n/a	0.40	n/a	n/a	n/a	n/a	0.34	n/a	7
S16T021049	4229-91-8	2-Propytfuran	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	060.0	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	_

NA = Not Analyzed, ND = Not Detected

J - Estimated

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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 % S	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	ual Flags
Furans in Vapor Samples by	por S	amples by SIM	W											
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	e/u	<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	060.0	n/a	
S16T021050		109-99-9	Tetrahydrofuran	NGS	n/a	n/a	1.9	n/a	n/a	n/a	n/a	0.10	L a/n	

NA = Not Analyzed, ND = Not Detected

J - Estimated

Cartridge Evaluation Data Summary of All Results

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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

Analyte
CAS#
A#
R
-

Sample# R	¥#	R A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD % S	RPD % Spk Rec %	Det Limit	Det Limit Ont Err % Qual Flags	tal Flags
Furans in Vapor Samples by	apor		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-Heptyffuran	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	060'0	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

J - Estimated

Cartridge Evaluation Data Summary of All Results

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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 %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	tual Flags
Furans in Vapor Samples by S	apor Se	amples by S	IM											
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	0	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	0	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	2	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	0	3777-69-3	2-Pentylfuran	NGS	n/a	n/a	0.43	n/a	n/a	n/a	n/a	0.34	l a/u	
S16T021052	4	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	060.0	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	

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation Data Summary of All Results

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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 %	RPD % Spk Rec %	Det Limit	Cnt Err %	Det Limit Cnt Err % Qual Flags
Furans in Va	Furans in Vapor Samples by S	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	060.0	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

J - Estimated

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Cartridge Evaluation Data Summary of All Results

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

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Sample# R	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD % Sok Rec %	ok Rec %	Det Limit	Det Limit Cut Err % Oual Flags	lans.
Furanc in Va	4	SIM						,					2001
	~ 1				1000			0.0					
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-Dimethyffuran	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	l alu	
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	060.0	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

J - Estimated

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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

	CAS#	
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Sample# R	₩¥	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags
Furans in Vapor Samples b	por	Samples by SIM	W										
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/aJ
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	060.0	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

J - Estimated

NA = Not Analyzed, ND = Not Detected

Cartridge Evaluation Data Summary of All Results

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

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Sample# R	₹	A# CAS#	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	RPD % Spk Rec %	Det Limit	Det Limit Cnt Err % Qual Flags	I Flags
Furans in V	/apor	Furans in Vapor Samples by SI	W											T
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	Γ
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	Γ
S16T021057	1	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	Ī
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	e/u	n/a	0.44	n/a	Γ
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

J - Estimated

15 - Aug - 2016 11:18:40 DSRHardcopyWOLimits 3.0.11b DSR.Jar v. 3.0.12

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 %	RPD % Spk Rec %	Det Limit	Cnt Err % Qual Flags	Qual Flags
Furans in Va	Furans in Vapor Samples by S	SIM									1		
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	L a/u	
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	L a/u	
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	060.0	U/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	

J - Estimated

C.3.4 Amines



ANALYTICAL REPORT

Report Date: July 26, 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 20162094 Workorder: 34-1620245 Client Project ID: CARTRIDGE EVALUATION Purchase Order: 55502 Rel9 Project Manager: Rand Potter

Analytical Results			5) (ost.	
Sample ID: S16T021173				Collected: 07/15/2016
Lab ID: 1620245001	Sa	ampling Location: CA	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliphati			226-96, XAD-7 Tu 00mg [(NBD) Chlor Volume Not Provid	ide]
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	5	Sampling Location: C	ARTRIDGE EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliph			KC 226-96, XAD-7 Tub 0/100mg [(NBD) Chlori ir Volume Not Provid	ide]
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 Lab ID: 1620245003		Sampling Location:	CARTRIDGE EVAL	Collected: 07/15/2016 JATION Received: 07/20/2016
Method: Amines-VOA Alipha			SKC 226-96, XAD-7 Ti 50/100mg [(NBD) Chic Air Volume Not Provi	pride]
Analyte	Result (ug/sample)	Result (mg/m		RL (ug/sample)
Dimethylamine	<0.10	N	A NA	0.10
Ethylamine	<0.10	N	A NA	0.10
Methylamine	<0.10	N	A NA	0.10

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

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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	5	Sampling Location:	CARTRIDGE EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliphatic		1	SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlor Air Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ³		RL (ug/sample)
Dimethylamine	<0.10	NA	A NA	0.10
Ethylamine	<0.10	NA	a NA	0.10
Methylamine	<0.10	NA	NA NA	0.10

Sample ID: S16T021177				Collected: 07/15/2016
Lab ID: 1620245005		Sampling Location:	CARTRIDGE EVALU	JATION Received: 07/20/2016
Method: Amines-VOA Alipha			SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlo Air Volume Not Provi	oride]
Analyte	Result (ug/sample)	Result (mg/m ³) Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	N	A NA	0.10
Ethylamine	<0.10	N	a na	0.10
Methylamine	<0.10	N	A NA	0.10

Sample ID: S16T021178				Collected: 07/15/2016
Lab ID: 1620245006	S	ampling Location: CA	ARTRIDGE EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliph			(C 226-96, XAD-7 Tub //100mg [(NBD) Chlori r Volume Not Provid	de]
Analyte	Result (ug/sample)	Result (mg/m ³)	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 Lab ID: 1620245007	S	ampling Location: C	ARTRIDGE EVALU/	Collected: 07/15/2016 ATION Received: 07/20/2016
Method: Amines-VOA Aliphat		50	KC 226-96, XAD-7 Tub)/100mg [(NBD) Chlori Ir Volume Not Provid	de]
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

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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 EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliphatic			SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlor Air Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ³) Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	A NA	0.10
Ethylamine	<0.10	NA	a NA	0.10
Methylamine	<0.10	NA	NA NA	0.10

Sample ID: S16T021181				Collected: 07/15/2016
Lab ID: 1620245009		Sampling Location: C	CARTRIDGE EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliphat			SKC 226-96, XAD-7 Tu i0/100mg [(NBD) Chlor Nr Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ³)	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 Lab ID: 1620245010	c.	ampling Location:	CARTRIDGE EVALU	Collected: 07/15/2016 JATION Received: 07/20/2016
Method: Amines-VOA Aliphatic			SKC 226-96, XAD-7 Tu	
50/100mg [(NBD) Chloride] Sampling Parameter: Air Volume Not Provided				ride]
Analyte	Result (ug/sample)	Result (mg/m ³) Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	N	A NA	0.10
Ethylamine	<0.10	N	A NA	0.10
Methylamine	<0.10	N	a na	0.10

Sample ID: S16T021183 Lab ID: 1620245011	S	ampling Location:	CARTRIDGE	EVALUA	Collected: 07/15/2016 ATION Received: 07/20/2016
Method: Amines-VOA Aliphatic			SKC 226-96, X/ 50/100mg [(NBI Air Volume Not) Chlori	de]
Analyte	Result (ug/sample)	Result (mg/m) Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	N	A	NA	0.10
Ethylamine	0.20	N.	Ą	NA	0.10
Methylamine	0.87	N	Ą	NA	0.10

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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: 0	CARTRIDGE EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliphatic		Ę	SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlor Air Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ³)		RL (ug/sample)
Dimethylamine	<0.10	NA	NA NA	0.10
Ethylamine	<0.10	NA	NA NA	0.10
Methylamine	<0.10	NA	NA	0.10

Sample ID: S16T021185				Collected: 07/15/2016
Lab ID: 1620245013		Sampling Location:	CARTRIDGE EVALU	JATION Received: 07/20/2016
Method: Amines-VOA Alipha			SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlo Air Volume Not Provio	ride]
Analyte	Result (ug/sample)	Result (mg/m ³) Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	a na	0.10
Ethylamine	<0.10	NA	a na	0.10
Methylamine	<0.10	NA	A NA	0.10

Sample ID: S16T021186 Lab ID: 1620245014	s	ampling Location:	CARTRIDGE EVALU	Collected: 07/16/2016 JATION Received: 07/20/2016
Method: Amines-VOA Aliphatic			SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlo Air Volume Not Provid	ride]
Analyte	Result (ug/sample)	Result (mg/m ³) Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	N	A NA	0.10
Ethylamine	0.19	N	a na	0.10
Methylamine	0.48	N	A NA	0.10

Sample ID: S16T021187 Lab ID: 1620245015	S	ampling Location: C	ARTRIDGE EVALU	Collected: 07/16/2016 ATION Received: 07/20/2016
Method: Amines-VOA Aliphatic \		5	SKC 226-96, XAD-7 Tub 0/100mg [(NBD) Chlori Nor Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ³)	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

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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 EVALU	IATION Received: 07/20/2016
Method: Amines-VOA Aliphatic			SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlo Air Volume Not Provid	ride]
Analyte	Result (ug/sample)	Result (mg/m ³) Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	N	a na	0.10
Ethylamine	<0.10	N	A NA	0.10
Methylamine	<0.10	N	A NA	0.10

Sample ID: S16T021189				Collected: 07/16/2016
Lab ID: 1620245017		Sampling Location:	CARTRIDGE EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Alipha			SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlo Air Volume Not Provid	ride]
Analyte	Result (ug/sample)	Result (mg/m ³	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA NA	0.10
Methylamine	<0.10	NA	NA NA	0.10

Sample ID: S16T021190 Lab ID: 1620245018	S	ampling Location:	CARTRIDGE EVALU	Collected: 07/16/2016 ATION Received: 07/20/2016
Method: Amines-VOA Aliphatic VAA-1		Media:	be Analyzed: 07/25/2016 ide]	
Analyte	Result (ug/sample)	Result (mg/m ^a)		RL (ug/sample)
Dimethylamine	<0.10	NA	NA NA	0.10
Ethylamine	<0.10	NA	NA NA	0.10
Methylamine	<0.10	NA	NA NA	0.10

Sample ID: S16T021191 Lab ID: 1620245019	S	ampling Location: C	ARTRIDGE EVALU/	Collected: 07/16/2016 ATION Received: 07/20/2016
Method: Amines-VOA Aliphati			KC 226-96, XAD-7 Tub)/100mg [(NBD) Chlori Ir Volume Not Provid	ide]
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

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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 EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliphatic			SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlo Air Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ³) Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	N	a na	0.10
Ethylamine	<0.10	N	A NA	0.10
Methylamine	<0.10	N	A NA	0.10

Sample ID: S16T021193				Collected: 07/16/2016
Lab ID: 1620245021		Sampling Location: CA	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliphat			C 226-96, XAD-7 Tul 100mg [(NBD) Chlor Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ³)	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 Lab ID: 1620245022	S	ampling Location: (CARTRIDGE EVALU	Collected: 07/16/2016 ATION Received: 07/20/2016
Method: Amines-VOA Aliphati		ŧ	SKC 226-96, XAD-7 Tul 50/100mg [(NBD) Chlor Air Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ²)	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 Lab ID: 1620245023	S	ampling Location: C	ARTRIDGE EVALU	Collected: 07/16/2016 ATION Received: 07/20/2016
Method: Amines-VOA Aliphati		50	KC 226-96, XAD-7 Tub 0/100mg [(NBD) Chlori ir Volume Not Provid	de]
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	NA	0.10
Ethylamine	<0.10	NA	NA	0.10
Methylamine	<0.10	NA	NA	0.10

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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 EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Aliphatic			SKC 226-96, XAD-7 Tu 50/100mg [(NBD) Chlor Air Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ³) Result (ppm)	RL (ug/sample)
Dimethylamine	<0.10	NA	a na	0.10
Ethylamine	0.20	NA	a na	0.10
Methylamine	0.30	NA	A NA	0.10

Sample ID: S16T021197				Collected: 07/16/2016
Lab ID: 1620245025		Sampling Location: CA	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: Amines-VOA Alipha			C 226-96, XAD-7 Tu 100mg [(NBD) Chlor Volume Not Provid	ide]
Analyte	Result (ug/sample)	Result (mg/m ³)	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 Lab ID: 1620245026	Si	ampling Location: C	ARTRIDGE EVALU/	Collected: 07/16/2016 ATION Received: 07/20/2016
Method: Amines-VOA Aliphati		50	KC 226-96, XAD-7 Tub D/100mg [(NBD) Chlori ir Volume Not Provid	de]
Analyte	Result (ug/sample)	Result (mg/m ³)	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	
	/S/ David Teynor	/S/ Thomas Bosch	
Amines-VOA Aliphatic VAA-1	07/26/2016 12:27	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

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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.deg.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

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Quality Control Sample Batch Report

Analysis Information

Workorder: 1620245

Limits: Historical/Performance Basis: ALS Laboratory Group

Prepared By: NA

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

Blank

LMB: 509691 Analyzed: 07/25/2016 00:00 Units: uo/sample	0		
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			
	Result	MDL	RL
Units: ug/sample		MDL NA	RL 0.100
Units: ug/sample Analyte	Result	1000000	

Preparation: NA

Batch: NA

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509692 Analyzed: 07/25/2016 00:00 Dilution: 1 Units: ug/sample						LCSD: 50 Analyzed: 07 Dilution: 1 Units: ug	7/25/2016 0	0:00		
Analyte	Result	Target	%Rec	QC LI	imits	Result	% Rec	RPD	QCL	mits
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: 50 Analyzed: 07 Dilution: 1 Units: ug	//25/2016 0	0:00		
Analyte	Result	Target	%Rec	QC LI	imits	Result	% Rec	RPD	QCL	mits
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)

Peer Review	
/S/ Thomas Bosch	
07/26/2016 13:37	
	/S/ Thomas Bosch

Symbols and Definitions

- * Analyte above reporting limit or outside of control limits
- 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

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QCS V4.1

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N/A			ž		CHA	VIN OF C	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	LYSIS REQUEST	C.O.C. No. 20162094	
Collector JONES, PARKER L	1				Contact/Requestor	lor		Telephone No	MSIN FAG	of 3
SAF No.		1			Sample Origin	1000		373-6861	T6-02 TAX 372-1878	-1878
Project Title					CARTRIDGE EVAL	UATION		202003/CB20		
Shipped To (Lab)	ab)				N/A Method of Chinact	'on afevos		NOTS-0.21	Temp.	out
Protocol					Induce to boundary	nertt		Bill of Lading/Air Bill No.		20-
A Samula No	-	F			Data Turnaround 10 DAYS			Parts and Return No. 410 3.	94	519
completion.		+		Time	No./Type Container		Sample	Sample Analysis		Preservative
	S16T021173	¥.	_		XAD-7-NBD	AMINES	16-05982~4-A1.1		2	N/B
	S16T021174	VA	7/15/16		XAD-7-NBD	AMINES	16-05982-4-82 - 1	•		1.
	S16T021175	VA	7/15/16		XAD-7-NBD	AMINES	16-05982-4-B1.1		ž	A/N
	S16T021176	VA	7/15/16		XAD-7-WBD	AMINES	16-05982-4-BLANK *1		N	N/A
	S16T021177	VA	7/15/16		XAD-7-NBD	AMINES	16-05982-4-C1* ·		N ¹	N/N
	S16T021178	VA	7/15/16		XAD-7-NBD	AMINES	16-05982-4-01 ''		12	N/A
	S16T021179	VA	7/15/16		XAD-7-NBD	AMINES	16-05982-4-814	>	18	N/A
	S16T021180	VA	7/15/16		XAD-7-NBD	AMINES	16-05982-4-255-25.0 - L	•	81	N/A
	S167021181	VA	7/15/16		XAD-7-NBD	AMTNES	14-05002-4-11		N/N	N/A
	\$16T021182	VA	2/15/16				· · · · · · · · · · · · · · · · · · ·		/N/	N/A
SSIBLE SAI	POSSIBLE SAMPLE HAZARDS/REMARKS // ist all known water	SEMAF	IKS (1 iet all bo	a province and a	098-1-0	AMINES	16-05982-4-61.	•	N/N	(A
Relinquished Bv	Print			OWII WASIC	Msps O	2 •	SPECIAL INSTRUCTIONS Send Results to Carl Bowald IV & Greg Moore Carl W Howalder.gov and Gregory_S.Moore@rl gov See Sow for email and Gregory_S.Moore@rl CONTRACT 55502 RELEASE 9	ld IV & Greg Moore Gregory_S_Moore&rl.	Hold Time	
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Relinquished By	ten Qui	i Gu	ી ગ	olla	Date/Time Reco	Received By	FEDEX	7 1/9/16 0838 s Date/Time SE SO	= Soil DL = Sediment T = Solid WI	= Drum Liquids = Tissue = Wipe
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FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure,	e.g., R	eturn to custon	ner, per la	o procedure, beed in p	(Issaod)		S	= Drum Solids	

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	KSR L EVALUATION		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	IALYSIS REQUEST	C.O.C. No. 20162094	P94
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Matrix of Signation o	e Evaluation	CONTROUMALD IV	lor	Telephone No 373-6861	MSIN FAX 372-1878	-1878
Mathematical Lab (Lab (Lam) (Lam	e Evaluation	Sample Origin CARTRIDGE EVALI	DATION	Purchase Order/Charge Cod		
Ball Marka <		Logbook/ Work P	Package No.	zuzuus/CBZU Ire Cheet No		
Alter Tume Number of the stand Return No. Alto an and set of the and Return No. Alto and set of the stand Return No. Alto and set of the st	o (Lab)	N/A Method of Shinm	ent.	WTS-0-21	NO.	Jec
Libalio Faits and Refum No. Faits and Refum No. FIG 1.0 1 - Date Time No.Type Container Sample Arrabysis 3167031183 Via 7/15/16 Xx0-7-980 Ax1785 16-05982-4-x1 - - 3167031183 Via 7/15/16 Xx0-7-980 Ax1785 16-05982-4-x1 -			control of the second se	Bill of Lading/Air Bill No.	9004	11/19
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Instructing Instructions Instructions MPLE HAZAROSIREMARKS (List all known wastes) MSDS O Yes NSDS O		100 - 1 - ACC		•	N	N/A
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	Disposal Method	5	Disposed By		= Drum Solids	
121/1/14CULD IN	taining hazardoue	2	LIM	6	91KT/10	00%21

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					CH	AIN OF CI	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	ALYSIS REQUEST	20162094	
Collector JONES, PARKER L	L				Contact/Requestor CARL HOWALD IV	stor		Telephone No.373-6861	AX	277-1070
SAF NO.					Sample Origin	TIBUTON		ode		0101-2
Project Title CARTRIDGE EVALUATION	MURTION	1			Logbook/ Work Package No.	Package No.		zozoo3/cBzo Ice Chest No.	Temp.	
Shipped To (Lab)	ab)				Method of Shipment	nent		Bill of Ladino/Air Bill No.	NO	TCE
Protocol N/A					Data Turnaround 10 Dats	p	6	Parts and Return No. Parts	07 90041619	619
Sample No.	Lab ID	•	Date	Time	No/Type Container		Sam	Sample Analysis		Dresenrative
	S16T021193	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-EFF-BASE -1	,		N/P
	S16T021194	AN	1/16/16		XAD-7-NBD	AMINES	16-05983-4-F1 (*	X		N/A
	S16T021195	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-611.			N/A
	S16T021196	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-H1:.			N/N
	S16T021197	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-H24 ·			N/A
	S16T021198	VA	7/16/16		XAD-7-NBD	AMINES	16-05983-4-IN-BASE 3,			N/A .
		-								
								3		
OSCIDI E CA	POSSIBI E SAMELE UATABOSIDELAADISO 4111 411		1 1 1 1 1 0 0 0				-			
		(EMMP	KKS (LIST all K	nown was	tes) MSDS 🔿 Yes	2 •	SPECIAL INSTRUCTIONS Send Results to Carl Howald IV & Greg Moore Carl M Howalder.gov and Gregory_S_Mooreerl GONTRACT 55502 email RELEASE 9		Hold Time	i en s
Relinquished By Sharon L U Sl den	Print	17	~ Than 7	7-19-16	Date/Time	Repeived By	Print Sign R		Matrix	
Relinquished By	an Out	S.	i Clarkan -	7.13.10	Date/Time	Received By	FEDEX	Time SE SO	로 노 동	 Drum Liquids Tissue Wipe
Relinquished By Relinquished By	0	P	aller.		OD.	Received By Received By Received By	Jugge Tavi Ventor		Sludge L Water V Oil VA Air X Drum Solids	 Liquid Vegetation Vapor Other
FINAL SAMPLE DISPOSITION	Disposal Method	e.g., R	teturn to cust	omer, per l	(e.g., Return to customer, per lab procedure, used in	in process)	CON SUMEN		Date/Time	

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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			131 107-1		
Sample ID: S16T021258				Colle	cted: 07/15/2016
Lab ID: 1620244001	Sa	mpling Location: CAI	RTRIDGE EVALU	ATION Rece	eived: 07/20/2016
Method: NIOSH 1606	San		226-09, Charcoal /200mg Volume Not Provid		yzed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)	
Acetonitrile	<0.010	NA	NA	0.010	

Sample ID: S16T021259 Lab ID: 1620244002	Sa	mpling Location:	CARTRIDGE EVALU		cted: 07/15/2016 ived: 07/20/2016
Method: NIOSH 1606	San		SKC 226-09, Charcoal 400/200mg Air Volume Not Provid	n an an an an an an an an an an an an an	/zed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³) Result (ppm)	RL (mg/sample)	
Acetonitrile	<0.010	NA	A NA	0.010	

Sample ID: S16T021260 Lab ID: 1620244003	Sa	moling Location:	CARTRIDGE EVAL		Collected: 07/15/2016 Received: 07/20/2016
Method: NIOSH 1606		Media:	SKC 226-09, Charcoal 400/200mg Air Volume Not Provi	Tube	Analyzed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m) Result (ppm)	RL (mg/s	ample)
Acetonitrile	<0.010	N	A NA		0.010

ADDRESS 960 West	LeVoy Drive, Salt Lake City, Ltah, 84123 USA PHONE +1 801 266 7700 ALS GROUP USA, CORP. An ALS Limited Company	FAX +1 801 268 9992
Environmental 🎝	www.alsglobal.com	
	RIGHT SOLUTIONS HIGHT PARTNER	
Page 1 of 7	1620244 - Page 1 of 12 Mon, 07/25/16 4:12 PM	IHREP-V12.3



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

Analytical Results

Sample ID: S16T021261 Lab ID: 1620244004	Sa	mpling Location: CAI	RTRIDGE EVALU		ected: 07/15/2016 eived: 07/20/2016
Method: NIOSH 1606	San		C 226-09, Charcoal /200mg Volume Not Provid		lyzed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010	D

Acetonitrile	< 0.010	NA	NA	0.	010
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sam	ple)
Method: NIOSH 1606	San		C 226-09, Charcoal /200mg Volume Not Provid		nalyzed: 07/21/2016
Sample ID: S16T021262 Lab ID: 1620244005	Sa	mpling Location: CA	RTRIDGE EVALU		ollected: 07/15/2016 eceived: 07/20/2016

Acetonitrile	<0.010	NA	NA	0.010)
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)
Method: NIOSH 1606	San		C 226-09, Charcoal /200mg Volume Not Provid		lyzed: 07/21/2016
Sample ID: S16T021263 Lab ID: 1620244006	Sa	mpling Location: CAI	RTRIDGE EVALU		ected: 07/15/2016 eived: 07/20/2016

Sample ID: S16T021264 Lab ID: 1620244007	Sa	mpling Location: CA	RTRIDGE EVALU	and the second second second second second second second second second second second second second second second	ted: 07/15/2016 /ed: 07/20/2016
Method: NIOSH 1606	San		C 226-09, Charcoal D/200mg Volume Not Provid		zed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)	
Acetonitrile	<0.010	NA	NA	0.010	

Sample ID: S16T021265 Lab ID: 1620244008	Sa	mpling Location: CA	RTRIDGE EVALU		ected: 07/15/2016 eived: 07/20/2016
Method: NIOSH 1606		Media: SK	C 226-09, Charcoal)/200mg	Tube Ana	lyzed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Acetonitrile	<0.010	NA	NA	0.010	0

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

Analytical Results

Sample ID: S16T021266 Lab ID: 1620244009	Sa	mpling Location: CA			ected: 07/15/2016 eived: 07/20/2016
Method: NIOSH 1606		Media: SKC	226-09, Charcoal 200mg	Tube Ana	alyzed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample	e)
Acetonitrile	<0.010	NA	NA	0.01	0

Acetonitrile	<0.010	NA	NA	0.01)
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Method: NIOSH 1606	San		(C 226-09, Charcoal 0/200mg r Volume Not Provid		lyzed: 07/21/2016
Sample ID: S16T021267 Lab ID: 1620244010	Sa	mpling Location: CA	ARTRIDGE EVALU		ected: 07/15/2010 eived: 07/20/2010

Acetonitrile	<0.010	NA	NA	0.010	
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1606	San		226-09, Charcoal (200mg Volume Not Provid		yzed: 07/21/2016
Sample ID: S16T021268 Lab ID: 1620244011	Sa	mpling Location: CAI	RTRIDGE EVALU		cted: 07/15/2016 ived: 07/20/2016

Sample ID: S16T021269 Lab ID: 1620244012	Sa	mpling Location: CA	RTRIDGE EVALU	Charles and the second s	ted: 07/15/2016 /ed: 07/20/2016
Method: NIOSH 1606	San		C 226-09, Charcoal //200mg Volume Not Provid		zed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)	
Acetonitrile	<0.010	NA	NA	0.010	

Acetonitrile	<0.010	NA	NA	0.010	
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1606	San	40	KC 226-09, Charcoal 00/200mg ir Volume Not Provid	nunces source const	/zed: 07/21/2016
Sample ID: S16T021270 Lab ID: 1620244013	Sa	mpling Location: C	ARTRIDGE EVALU		cted: 07/15/2016 ived: 07/20/2016

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

Analytical Results

Sample ID: S16T021271				Col	lected: 07/16/2016
Lab ID: 1620244014	Sa	mpling Location: CA	RTRIDGE EVALU	ATION Red	ceived: 07/20/2016
Method: NIOSH 1606	San		C 226-09, Charcoal /200mg Volume Not Provid		alyzed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sampl	e)
Acetonitrile	<0.010	NA	NA	0.01	0

Acetonitrile	<0.010	NA	NA	0.01	0
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Method: NIOSH 1606	San		C 226-09, Charcoal 0/200mg Volume Not Provid		lyzed: 07/21/2016
Sample ID: S16T021272 Lab ID: 1620244015	Sa	mpling Location: CA	ARTRIDGE EVALU		ected: 07/16/2010 eived: 07/20/2010

Acetonitrile	<0.010	NA	NA	0.01	0
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample	e)
Method: NIOSH 1606	San		C 226-09, Charcoal /200mg Volume Not Provid		alyzed: 07/21/2016
Sample ID: S16T021273 Lab ID: 1620244016	Sa	mpling Location: CA	RTRIDGE EVALU		ected: 07/16/2016 eived: 07/20/2016

Sample ID: S16T021274 Lab ID: 1620244017	Sa	mpling Location: CA	RTRIDGE EVALU	description and the second	ted: 07/16/2016 /ed: 07/20/2016
Method: NIOSH 1606	San		C 226-09, Charcoal /200mg Volume Not Provid		zed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)	
Acetonitrile	<0.010	NA	NA	0.010	

Acetonitrile	<0.010	NA	NA	0.010	
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1606	San		C 226-09, Charcoal)/200mg Volume Not Provid	renam an read	/zed: 07/21/2016
Sample ID: S16T021275 Lab ID: 1620244018	Sa	mpling Location: CA	RTRIDGE EVALU		cted: 07/16/2016 ived: 07/20/2016

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

Analytical Results

Sample ID: S16T021276				Colle	ected: 07/16/2016
Lab ID: 1620244019	Sa	mpling Location: CA	RTRIDGE EVALU	ATION Rec	eived: 07/20/2016
Method: NIOSH 1606	San		C 226-09, Charcoal /200mg Volume Not Provid		lyzed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample	:)
Acetonitrile	<0.010	NA	NA	0.01	0

Acetonitrile	< 0.010	NA	NA	(0.010	
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/san	nple)	
Method: NIOSH 1606	San		C 226-09, Charcoal /200mg Volume Not Provid		Analyzed: 0	7/21/2016
Sample ID: S16T021277 Lab ID: 1620244020	Sa	mpling Location: CAI	RTRIDGE EVALU		Collected: 0 Received: 0	

Acetonitrile	<0.010	NA	NA	0.010	n.
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)	Ľ.
Method: NIOSH 1606	San		C 226-09, Charcoal /200mg Volume Not Provid		yzed: 07/21/2016
Sample ID: S16T021278 Lab ID: 1620244021	Sa	mpling Location: CAI	RTRIDGE EVALU		cted: 07/16/2016 ived: 07/20/2016

Sample ID: S16T021279 Lab ID: 1620244022	Sa	mpling Location: CA	RTRIDGE EVALU	descention. Distance	cted: 07/16/2016 ived: 07/20/2016
Method: NIOSH 1606	San		C 226-09, Charcoal //200mg Volume Not Provid		/zed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)	
Acetonitrile	<0.010	NA	NA	0.010	ł.

Sample ID: S16T021280						07/16/2016
Lab ID: 1620244023	Sa	mpling Location:	CARTRIDGE EV	ALUAT	ION Received:	07/20/2016
Method: NIOSH 1606	San		SKC 226-09, Char 400/200mg Air Volume Not P			07/21/2016
Analyte	Result (mg/sample)	Result (mg/m) Result (pp	m) R	L (mg/sample)	
Acetonitrile	<0.010	N	A	NA	0.010	

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

Analytical Results

Sample ID: S16T021281				Coll	ected: 07/16/2016
Lab ID: 1620244024	Sa	mpling Location: C	ARTRIDGE EVALU	ATION Rec	eived: 07/20/2016
Method: NIOSH 1606	San	44	KC 226-09, Charcoal 00/200mg ir Volume Not Provid		lyzed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample	2)
Acetonitrile	<0.010	NA	NA	0.01	0

Sample ID: S16T021282 Lab ID: 1620244025	Sa	mpling Location:	CARTRIDG	E EVALU	ATION		1: 07/16/2016 1: 07/20/2016
Method: NIOSH 1606	San		SKC 226-09, 400/200mg Air Volume I			Analyzed	1: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m ³		ılt (ppm)	RL (mg/s	ample)	
Acetonitrile	<0.010	N	4	NA		0.010	

Sample ID: S16T021283 Lab ID: 1620244026	Sa	mpling Location: CA	RTRIDGE EVALU		ted: 07/16/2016 ved: 07/20/2016
Method: NIOSH 1606	San		226-09, Charcoal (200mg Volume Not Provid		zed: 07/21/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)	
Acetonitrile	<0.010	NA	NA	0.010	

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

Method	Analyst	Peer Review	
NIOSH 1606	/S/ Young Hee Yoon	/S/ Lyle Edwards	
NIOSH 1006	07/25/2016 13:37	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

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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.deg.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

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Quality Control Sample Batch Report

Analysis Information

Workorder: 1620244

Limits: Historical/Performance Preparation: NA Basis: ALS Laboratory Group

Batch: NA Prepared By: NA

Analysis: IH GC-FID QC Batch: IFID/7608 (HBN: 173232) Analyzed By: Young Hee Yoon

Blank

MB: 509146 Analyzed: 07/21/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100
MB: 509149 Analyzed: 07/21/2016 00:00 Units: mg/sample			
Analyte	Result	MDL	RL
Acetonitrile	ND	NA	0.0100

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509147 Analyzed: 07/21/2016 00:00 Dilution: 1 Units: mg/sample						LCSD: 50 Analyzed: 07 Dilution: 1 Units: m	/21/2016 0	0:00		
Analyte	Result	Target	%Rec	QC LI	mits	Result	% Rec	RPD	QCLi	mits
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: 50 Analyzed: 07 Dilution: 1 Units: m	//21/2016 0	0:00		
Analyte	Result	Target	%Rec	QC Li	mits	Result	% Rec	RPD	QC Li	mits
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	/S/ Lyle Edwards	
07/25/2016 13:37	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

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QCS V4.1

ASSEMDIEL N/A									leas ony	
						CHA	CHAIN OF CUSTODY/SAMPLE ANÀLYSIS REQUEST	YSIS REQUEST	C.O.C. No. 20162096 Page 1 of	e
Collector JONES .					Sg	Contact/Requestor CARL HOWALD IV		Telephone No373-6861	MSIN T6-02 FAX 372-1878	18
SAF No.					Sa	Sample Orgin CARTRIDGE EVALUATION		Purchase Order/Charge Code 202003/CB20		
Project Title CARTRIDGE EVALUATION	LUATION				Lo N/R	Logbook/ Work Package No.		Ice Chest No.	Temp. ON The	0
Shipped To (Lab) ALS	(qe				Me	Method of Shipment		Bill of Lading/Air Bill No.	1	11019
Protocol N/A					102	Data Turnaround 10 DAYS		Parts and Return No. 4103	4	-
Sample No.	LabID	•	Date	Time	(TLON	No./Type Container	Sample	Sample Analysis		Preservative
	S16T021258	VA	7/15/16		CHARCI	CHARCOAL TUBE	Acetonitrile 16-05982-5-Al >		N/A	
	S16T021259	VA	7/15/16		CHARC	CHARCOAL TUBE	Acetonitrile 16-05982-5-A2 V		. N/A	
	S16T021260	VA	VA 7/15/16		CHARCI	CHARCOAL TUBE	Acetonitrile 16-05982-5-B1 ;		8/8	
	S16T021261	VA	VA 7/15/16		CHARCI	CHARCOAL TUBE	Acetonitrile 16-05982-5-BLANK .		N/A	
	S16T021262	VA	VA 7/15/16		CRARC	CHARCOAL TUBE	Acetonitrile 16-05982-5-C1 (.		N/A	
	S16T021263	VA	VA 7/15/16		CHARCH	CHARCOAL TUBE	Acetonitrile 16-05982-5-D1 y		N/A	
	S16T021264	VA	VA 7/15/16		CHARCI	CHARCOAL TUBE	Acetonitrile 16-05982-5-E1 \		N/A	
	S16T021265	VA	7/15/16	1	CHARC	CHARCOAL TUBE	Acetonitrile 16-05582-5-EFF-BASE		N/A	
	S16T021266	VA	VA 7/15/16		CHARC	CHARCOAL TUBE	Acetonitrile 16-05982-5-F1 N	÷	N/A	
	S16T021267	AN	7/15/16		CHARC	CHARCOAL TUBE	Acetonitrile 16-05982-5-G1 ,		N/A	
OSSIBLE S.	POSSIBLE SAMPLE HAZARDSREMARKS (List all known wastes) MSDS 🔾 Yes 💿 No	REMA	RKS (List a	known wa	stes) M	ISDS O Yee	S (O) No SPECIAL INSTRUCTIONS Send Results to Carl Rowald IV & Greg Moore Carl W HowaldErl.gov and Gregory_S_MooreBrl Gov ToT email RELEASE 9 Reference Contract # 55502	ld IV & Greg Moore Gregory_S_Moore@rl. 2	Hold Time	
Relinquished By	Relinquished By Print Shaven LUS Nan NC	M	Sign	91.91.C	- 1 I	Date/Time Rec	Genter Autic Techar	2	= Soil DL	= Drum Liquids
Relinquished By	Hadisher	0	Sout letre	and lallie	Dat	00	Acceled by FEDEX	Date/Time SE So Date/Time V	= Sediment T = Solid Wi = Siudge L = Water V = Oil VA	 Tissue Wipe Liquid Vegetation Vapor
Relinquished By .	· ^6				Date	Date/Time	Received By	Date/Time/ 0.008	X Im Solids	ler
FINAL SAMPLE DISPOSITION	Disposal Method (e.g.		Return to c	ustomer, per	r lab proc	Return to customer, per lab procedure used in process)	Houge Level By Jon	July 22, 2016	1 0 2 co And	

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Assembler				я	CHA	CHAIN OF CLISTODY/SAMPLE ANALYSIS REGULEST	VSIS REQUEST	20162096	9
					5			Page 2 of	f 3
Collector					Contact/Requestor CARL HOWALD IV	or	Telephone No.373-6861	MSIN FAX 372-1878	1878
SAF No.					Sample Orgin CARTRIDGE EVALUATION	ATION	Purchase Order/Charge Code 202003/ca20		
Project Title CARTRIDGE EVALUATION	UATION				Logbook/ Work Package No. N/A	ackage No.	Los Chest No. 2-1	Lemp. OC	Ice
Shipped To (Lab)	(0				Method of Shipment	ent	LONI	7107 900411019	010
Protocol N/A					Data Turnaround		Parts and Return No. 4103	14	-
Sample No.	LabID	ŀ-	Date	Time	No./Type Container	Sample	Sample Analysis		Preservative
	S16T021268	VA	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-H1 .	-	N/A	R
	S16T021269	KY.	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-H2 1		N/A	A
	S16T021270	A.	7/15/16		CHARCOAL TUBE	Acetonitrile 16-05982-5-IN-BASE 1		N/A	A.
	S16T021271	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-Al A.		N/A	A
	S16T021272	AN	7/16/16	-	CHARCOAL TUBE	Acetonitrile 16-05983-5-A2 -		N/A	r.
	S16T021273	AN	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-B1		N/N	N/A
	S16T021274	VA	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-BLANK (N/N	(A
	S16T021275	AN.	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-C1 /		N/N	N/A
	s16T021276	Š	7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-D1 i		N.	N/A
}	S16T021277	A.	7/16/16	•	CHARCOAL TUBE	Acetonitrile 15-05983-5-E1 /		N	N/A
SSIBLE S	POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes)	REMA	RKS (List al	I known wa	stes) MSDS 🔿 Yes	No SPECIAL INSTRUCTIONS Send Results to Carl Howald IV & Greg Moore Carl Results to Carl Howald IV & Greg Moore gov To'r email Relays 9 Reference Contract \$ 55502	ald IV & Greg Moore Gregory S.Moore&I.	Hold Time	
Relinquished By P	bint Print		Sign C	719-16	Date/Time Re	Received By Print Sign Sign	7/19/10 0520 S	Matrix* = Soil DI	= Drum Liouids
telinquished	10	inlin		Frid	1400	Eceived By Tearson Markey Com	an S S	= Sediment T = Solid WI = Studoe L	= Tissue = Wipe = Liouid
Relinquished	r)		alle	0	0	Received By And Town (In The Carl of The Carl of The Carl of the C		= Water V = Oil VA	= Vegetation
Refinquished By	<i>k</i>		b		Date/Time	Received By	Date/Time () (2)	= ∧ur > = f= Drum Solids	Culet
FINAL SAMPLE DISPOSITION	Disposal Method (e.g.		Return to cu	ustomer, pe	Return to customer, per lab procedure, used in	the in process of the property that	3105 (22	102 00 Mar	

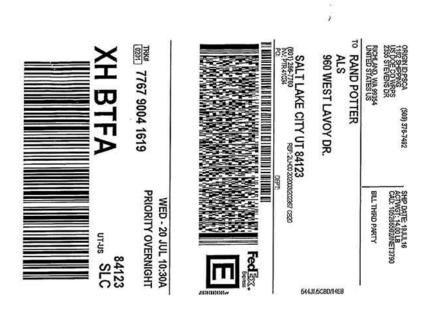
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					CHA	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	YSIS REQUEST	20162096 Page 3 of	2096 of 3
Collector	8				Contact/Requestor CARL KOWALD IV	tor	Telephone No 373-6861	MSIN FAX 37	FAX 372-1878
SAF No.		i i i			Sample Origin CARTRIDGE EVALUATION	UATION	ode		
Project Title CARTRIDGE EVALUATION	UATION				Logbook/ Work Package No.		Ice Chest No.	Temp. ON	100
Shipped To (Lab) ALS	(q				Method of Shipment		Bill of Lading/Air Bill No.	21109 9000	
Protocol N/A					Data Turnaround	U	Parts and Return No. 41()	34	1 1 614
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	VA 7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-F1 🖌			N/A
	S16T021280	VA	VA 7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-G1 *			N/A
	S16T021281	VA	VA 7/16/16		CHARCOAL TUBE	Acetonitrile 16-05983-5-H1 4			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 ,		- 12 -	N/A
		-							
		-							
OSSIBLE SA	POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes)	REMA	RKS (List all	known wa	sstes) MSDS O Yes	No SPECIAL INSTRUCTIONS send Results to Carl Howald IV & Greg Moore Carl # Howald@rl.gov and Gregory_S_Moore@rl gov ToV email RELEASE 9 Reference Contract # 55502	ald IV & Greg Moore I Gregory_S_Mooreëri. 02	Hold Time	
Relinquished By	F		AL ALLO		-	Received By Print Sign	7/19/10 Date/Time	Ma	1.00
Relinquished Bradisher	1 -	10/	1) Geoderu	F 3	TIGINA DATENTINE RE	Received By FEDEX	Date/Time SE		
Relinquished By Relinquished By	þ	R	educ		11)	Beceived By Clevel J. P. S. M. T. C. M. M. L. T. Received By	DateTime N. DateTime N. DateTime D. 03	= Sludge L = Water V = Oil VA = Air X	 Liquid Vegetation Vapor Other
FINAL SAMPLE DISPOSITION		1 (e.g.,	Return to cus	stomer, pe	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	19 possid By	July 22, 2016 10:	1 / Date/Time	-

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Aftor 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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20162086 Rev. 0

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

Document No.: 20162086 Rev. 0

Michael A. Purcell WAI Hanford Laboratory

Date Published August 2, 2016



Prepared for:

Prepared by:

LAB # 184777





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

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

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

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20162086 Rev. 0

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

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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 μ g/sample, except for samples 16-05982-6-A1, 16-05982-6-H1, 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

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	ug/sample	89.6	< 0.0500	< 0.0500	0.0500
16-05982-6-B1	Glass Wool	S16T021167	Mercury	ug/sample	89.6	< 0.0500	< 0.0500	0.0500
16-05982-6-BLANK	Total	S16T021168	Mercury	ug/sample	n/a	< 0.0500	< 0.0500	0.0500
16-05982-6-BLANK	Resin	S16T021169	Mercury	ug/sample	89.6	< 0.0500	< 0.0500	0.0500
16-05982-6-BLANK	Glass Wool	S16T021202	Mercury	ug/sample	89.6	< 0.0500	< 0.0500	0.0500
16-05982-6-C1	Total	S16T021204	Mercury	ug/sample	n/a	< 0.0500	< 0.0500	0.0500
16-05982-6-C1	Resin	S16T021206	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-C1	Glass Wool	S16T021207	Mercury	µg/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-D1	Total	S16T021229	Mercury	ug/sample	n/a	< 0.0500	< 0.0500	0.0500
16-05982-6-D1	Resin	S16T021234	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-D1	Glass Wool	S16T021235	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-E1	Total	S16T021237	Mercury	ug/sample	n/a	< 0.0500	< 0.0500	0.0500
16-05982-6-E1	Resin	S16T021238	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-E1	Glass Wool	S16T021239	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
the second second second second second second second second second second second second second second second s	Total	S16T021242	Mercury	ug/sample	n/a	< 0.0500	< 0.0500	0.0500
	Resin	S16T021243	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-EFF-BASE	Glass Wool	S16T021244	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-F1	Total	S16T021245	Mercury	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	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-G1	Total	S16T021248	Mercury	ug/sample	n/a	< 0.0500	< 0.0500	0.0500
16-05982-6-G1	Resin	S16T021249	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-G1	Glass Wool	S16T021250	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-H1	Total	S16T021251	Mercury	ug/sample	n/a	< 0.0500	0.302	0.0500
16-05982-6-H1	Resin	S16T021252	Mercury	ug/sample	91.8	< 0.0500	0.296	0.0500
16-05982-6-H1	Glass Wool	S16T021252	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05982-6-H2	Total	S16T021255	Mercury	ug/sample	n/a	< 0.0500	< 0.0500	0.0500
16-05982-6-H2	Resin	S16T021256	Mercury	ug/sample	91.8	<0.0500	< 0.0500	0.0500
16-05982-6-H2	Glass Wool	S16T021257	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05983-6-A1	Total	S16T021286	Mercury	ug/sample	n/a	<0.0500	0.360	0.0500
16-05983-6-A1	Resin	S16T021286	Mercury	ug/sample	91.8	<0.0500	0.355	0.0500
16-05983-6-A1	Glass Wool	S16T021287	Mercury	ug/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05983-6-A2	Total	S16T021288	Mercury	ug/sample	91.8 n/a	<0.0500	< 0.0500	0.0500
16-05983-6-A2	Resin	S16T021289	Mercury	ug/sample	91.8	<0.0500	< 0.0500	0.0500
16-05983-6-A2	Glass Wool	S16T021290	Mercury	µg/sample	91.8	< 0.0500	< 0.0500	0.0500
16-05983-6-B1	Total	S16T021291	Mercury	ug/sample	91.8 n/a	<0.0500	< 0.0500	0.0500
16-05983-6-B1	Resin	S16T021292 S16T021293	Mercury	ug/sample	n/a 88.2	<0.0500	<0.0500	0.0500
16-05983-6-B1	Glass Wool	S16T021293	Mercury	ug/sample	88.2	<0.0500	<0.0500	0.0500
	Total		18 CH B. C. M					
16-05983-6-BLANK 16-05983-6-BLANK	Total Resin	S16T021295 S16T021296	Mercury Mercury	µg/sample µg/sample	n/a 88.2	<0.0500	<0.0500 <0.0500	0.0500
Charles 1 1945 Juffaults LAINK	IN CS111	01010/////0	IN/IPTCUTTV	109/sample	100 /			117171717

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	ug/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	ug/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	ug/sample	88.2	< 0.0500	< 0.0500	0.0500
16-05983-6-F1	Total	S16T021313	Mercury	ug/sample	n/a	< 0.0500	< 0.0500	0.0500
16-05983-6-F1	Resin	S16T021314	Mercury	µg/sample	88.2	< 0.0500	< 0.0500	0.0500
16-05983-6-F1	Glass Wool	S16T021315	Mercury	ug/sample	88.2	< 0.0500	< 0.0500	0.0500
16-05983-6-G1	Total	S16T021317	Mercury	ug/sample	n/a	< 0.0500	< 0.0500	0.0500
16-05983-6-G1	Resin	S16T021319	Mercury	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	ug/sample	91.5	< 0.0500	< 0.0500	0.0500

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162086

Attachment 2

ANALYSIS DATE REPORT

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	07/21/201616:00	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	07/21/201616:00	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

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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

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162086

Attachment 3

RECEIPT PAPERWORK

				HECKLIST ATS-LO-090-101 Rev DG
Date Samples Received: 7-18-16		otal Nu	mbe	er of Samples: 260 Group #: 20162086 IH Technician: Brett Garner/But
Sample Custodian: <u>Sharo</u> .	-			IH Technician: Brett Garner/But
	Sa	mple C	uste	odian to Complete:
Action	Yes	No	N/A	Comments
RSR provided?			-	-
Verify GKI is complete			1	In Project File
Received from an alpha facility?	-		e the	
Check that outer custody seal is intact, if	-	~		Contact PC for approval to release
present			/	
Record cooler temperature in centigrade, as appropriate	10			Check if no cooler and/or no ice
Samples are intact and in good condition	V	-		If No, provide comments below
RSA/COC provided and complete containing the following information?	17.14 19.14 19.14	- 11 - X - 551		
Client name and client sample number	L		and the set of the	
Date and time of sampling	L			
Sampling location or origin	V		-	
Container type, size, and number	1		_	
Preservatives (if used) noted on the COC/RSA and sample bottles			U	
	-		-	
Analysis request is clear Signature of persons rollinguishing and	L	-	_	
 Signature of persons relinquishing and receiving samples 	V			
 Date and/or time of sample custody exchange 	L			
Verify that sample numbers on containers match the COO and/or RSA	V			
Samples stored properly (e.g., refrigeration)	U	-		
Notify the PC immediately if any problems	are no	ted. A	ny "N	No" checked boxes require PC resolution. For WRPS sample
the mitials block below is completed by the	respo	nsible	WRF	PS PC.
Samples acceptable for release? $\underline{\mathcal{Y}} \underline{\mathcal{C}}$			Initia	als <u>\$Ly</u> Date 7.18-16
f No. comment on communication and res. WRPS·Ship - 130 Ruc - 78 WHL - NH3 - 26 H2 - 26 Jumber of IH Samples Received:	olution		a.e.	als <u>SLU</u> Date <u>7.18.16</u> CeJZ <u>7(18/16</u> etron.t., le 26
Aldehyde Screen: 26 Amines: 2	1			7/
Beryllium: Be-Bulk:	No.	•	-Filte	a: 26 Aromatic HC: Asbestos.
Formaldehyde: Furans:	26	-	ercury	2/ 1,0-Duladiene.
Nitrous Oxide: Pyridines:	26	• • • • • •	SVO	

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

CACN: 2020	203	COA: CB20	÷	Survey	No.: 16-0598	2 - Resp	irator (Cartridge	Testin	g BY Farm
Contact Name:	Jones, Parker L		Phon	e: (509)373-4966		Turna	aroun	d: N/A		
Return Report To	: Caldwell, Joy	ce A			MSIN:	R1-06		Phone:	(509)376-0737
Laboratory Log No.	Sample ID/T	ype/Description					Req	uired Ar	alysi	s
	16-05982-3-	EFF-BASE / TDU	J (Tenax)				Fura	ins		1
			I ALL DALLARS	0000				5	/	
		F1/TDU (Tenax				_	Fura	ins		
						/				
	a service and the service serv	G1 / TDU (Tena)			/		Fura	ins		
		A AN ING A AN AN AN AN AN AN	in the second	71100114	,					
		H1 / TDU (Tenax		Qa III		-	Fura	ns		
			/	1999-201 7 .1						
		H2.1-TDU (Tenax					Fura	IRS.		
	mutani							/		
/	16-05982-3-1	N-BASE / TDU ((Tenax)				Fura	ns	/	<
	THE REPORT OF LEVEL OF LEVEL		I O NOM TO AND	11.1.11						
8167021154	4	A1 / Hydrar (SKC	SIL	A) TO 21157			Hg-E	Elementa	al	
5167621159	Ý	A2 / Hydrar (SKC	Slld	A) Tożilco			Hg-E	Elementa	al	
Special Instruction	IS:									
		Signature	147404	nted Name		ation		Dat	е	Time
Delivered to Stora	ge:	N/	Valeri	e Hendricks	2704HU	Rm HI	07	7/16/	16	1600
Retrieved from Sto	orage: Bu	Bun	BRET	T GARNER				7-18.	-16	0728
	O Sig	nature	0	Printed Nan	ne	T	Da	te	ŕ –	Time
Relinquished By:	But.	Sam	KREI	T GULNE	R	-	7-1	8-16		100
Received By:	Sh L	Udul	Sha	10y LUO	1.12	7	-18.	16		00
Relinquished By:										
Received By:										
Relinquished By:										
Received By:										
Additional Comme	nts.									

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

CACN: ZOZO		COA: CB20			o.: 16-05982			ung of Tann
Contact Name:			Phone: (5)	09)373-4966	ł	Turnaroun	Sector Market	
Return Report To	Caldwell, Joyc	e A			MSIN:	R1-06	Phone: (5	09)376-0737
Laboratory Log No.	Sample ID/Typ	e/Description				Re	quired Ana	lysis
5167021164		/ Hydrar (SKC :	SIGTO			Hg	-Elemental	
5167021168	16-05982-6-Bl	ANK / Hydrar (S	SKC 226-17-1A) 502116	9	Hg	-Elemental	
5167021204	r	I / Hydrar (SKC :	SULTO	21206	ì	Hg	-Elemental	
5167021229	r	I / Hydrar (SKC	SUTA	21234	ļ	Hg	-Elemental	
5167021237	16-05982-6-E	/ Hydrar (SKC :	226-17-1A) 516703			Hg	-Elemental	
3167021248	¥	FF-BASE / Hydra		SIGTO	1243	Hg	-Elemental	
516702124	Y .	/ Hydrar (SKC :	SULT	1244		Hg	-Elemental	
5167021241	3	1 / Hydrar (SKC	SULTA	21249		Hg	-Elemental	1
Special Instruction	IS:							
		Signature	Printed N	Name	Loca	tion	Date	Time
Delivered to Stora	ige: 11	X	Valerie He	endricks	2704HV K	M H107	2/16/16	1600
Retrieved from St	orage: But	San	BRETT G		などが強		7-18-16	6728
	Sion	ature	F	Printed Nam	e	Da	ate	Time
Relinguished By:	R.H.2	Perr	RRETT	GAR			8-16	1100
Received By:	Sh II	lall	Sharp	n/ 1/n	1 de	7.18	10 10 10 10 10 10 10 10 10 10 10 10 10 1	1100
Relinguished By:								
Received By:								
Relinquished By:								
Relinquished By: Received By:								

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Contractor: Was	NUMBER OF STREET, STREE	tection Solutions				Date Sa	mpled:	07/1	5/2016
cacn: 2020	23	COA: CB20)	Survey	No.: 16-05982	- Respirator	Cartridge 1	estin	g BY Farm
Contact Name:	Jones, Parker L	1001	Phone:	(509)373-4966		Turnarou	nd: N/A		
Return Report To	Caldwell, Joy	ce A			MSIN:	R1-06	Phone:	(509	376-0737
Laboratory Log No.	Sample 1D/Ty	pe/Description				Re	quired Ar	nalys	is
5167621251		11 / Hydrar (SK	516	125	3	Hg	Element	ai	
516762 25	16-05982-6-1	H2 / Hydrar (SK	C 226-17-1A) 5(67	621250		Hg	Element	al	
167021543-	1	N-BASE / Hydr		4-15	To2154	and the second	Element	aí	
1		A1 / CISA (SKC				NH	3	/	/
· · · · · · · · · · · · · · · · · · ·		ZTGISA (SKC			/	NH	3		
	Part of the second second	31 / CISA (SKC		Theme		. NH	3		
		BLANK / CISAT		a	:	NH	3		
/	Construction of a strength	C1 / CISA (SKC		•	é Thua	NH	3	/	/
Special Instruction	ns:								
		Signature	Printe	d Name	Loca	tion	Dat	e	. Time
Delivered to Stora	ige: 1	1260	Valerie	Hendricks	ZTOUHV K	2m H107	7/16/	16	1600
Retrieved from Ste	orage: BA	A Jam	BRETT	GARVER			748	16	0729
	,Sig	nature		Printed Nar	ne	D	ate	-	Time
Relinquished By:	Butte	Jan	KRET		VER		F-16	1	100
Received By:	ll 1	Hall	Shaw	Lind	Da	7:18			00
Relinquished By:	1 miles					1.0	40	-(1	~~
Received By:									
Manufacture and and an and an									
Relinquished By:	in the second seco					1	10.11		
Received By:			1						

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

CACN: 2020	2003	COA: CB	20		Survey N	lo.: 16-05983	Respirato	r Cartridge T	esting	BY Farm
Contact Name:	Iones, Parker L			Phone: (509)373-4966	1	Turnarou	ind: N/A		
Return Report To	: Caldwell, Joy	ce A				MSIN: R	1-06	Phone:	(509	376-0737
Laboratory Log No.	Sample ID/Ty	/pe/Descriptio	n				R	equired An	alys	is
516162 13 23	/	H1 / Hydrar (Si		516702	1324		H	g-Element	al	
5167021325	5	H2 / Hydrar (Si		SIGTOR	1329		H	g-Element	al	
S16702 13600	1	N-BASE / Hyd	68 B.C. 1994	SKC 226-17-14			Hg	g-Elementa	al	
ž.	4	A1 / CISA (SK		10.150			N	нз	/	
		42 / CISA (SK				110	AH	A3		
		31 / CISA (SK			da	7110/10	NI	H3		
•	Contraction action of	BLANK/CISA	/		•		N	H3		
	/	CITCISA (SK					N	H3		
Special Instruction	S:									
		Signature		Printed Na	ime	Locat	ion	Date	Э	Tim
Delivered to Stora	ge: H	1 Sun	2	Groches	aen E	2704HV	H107	07-16	-16	000
Retrieved from Sto	orage: Ba	# Darm		GRETT GA	RNER		- José	7-18-	16	082
	Sig	nature	T	Pri	nted Nan	ne	C	Date		Time
Relinquished By:	Bret	Jam	1	RRETT (5AdN.	ER	7-1	8-16	11	00
Received By:	Teres	Foresta		TERESA			1022 - 103	8-16	11	00
Relinquished By:										
Received By:										
Relinquished By:										
Received By:										
Additional Comme	Saller							1.1.1	-	

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

CACN: 202	003	COA: CB20		Survey No.	: 16-05983	- Respirator	Cartridge Tes	ting BY Farm
Contact Name:	Jones, Parker L		Phone: (5	09)373-4966		Turnarour	nd: N/A	
Return Report To	Caldwell, Jo	yce A			MSIN: F	1-06	Phone: (5	09)376-0737
Laboratory Log No.	Sample ID/T	pe/Description				Re	equired Ana	lysis
5111021292	16-05983-6-1	31 / Hydrar (SKC	226-17-1A) 5(675;	1293	121		g-Elemental	
516T021295	F	BLANK / Hydrar (S	.546-	670212	96	Hg	g-Elemental	
5167021294		C1 / Hydrar (SKC	S1670	1300		Hg	g-Elemental	
5167021301	16-05983-6-1	D1 / Hydrar (SKC	226-17-1A) 516707	1302		Hg	g-Elemental	
5167021304			SIGTO	1306		Hg	g-Elemental	
5167621307	F	EFF-BASE / Hydra	SIGTO	21311		Hg	g-Elemental	
5167621313	16-05983-6-1	-1 / Hydrar (SKC	51676	1314		Hg	g-Elemental	
5167621317	r	G1 / Hydrar (SKC	S16TO .	21319		Hg	g-Elemental	
Special Instruction	15:							
		Signature	Printed I	Name	Locat	tion	Date	Tim
Delivered to Stora	ige: the	1 Sung	Gerrados	Secn 2 0	2704111/	1+107	07-16-	16 000
Retrieved from St	orage: Du	Daim	BRETT G	ARNER			718-16	0824
	Sid	gnature	F	rinted Name		Di	ate	Time
Relinguished By:	But	Jan	RRET	- GARNE	R	7-18	3-16	1100
Received By:	Terro	Formente	TERESA	FORREST	e.a.	7-18		1100
Relinquished By:	and and a							
Received By:								
Relinquished By:								
Received By:								
and the second second second second								

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

CACN: 2020	203	COA: CB20		Survey N	lo.: 16-0598	3 - Respirat	or Cartridge Te	esting	BY Farm
Contact Name:	Jones, Parker L		Phone: (509)373-4966		Turnaro	und: N/A		
Return Report To	: Caldwell, Joyo	A ex			MSIN:	R1-06	Phone:	(509)	376-0737
_aboratory _og No.	Sample ID/Ty	ipe/Description				R	equired Ana	ilysis	5
**		FF-BASE / TD	U (Tenax)	m		F	urans	/	/
		1 / TDU (Tena:		a. a.		F	urans	4 A.S.	
	lossenes reverse	31 / TDU (Tena			9.	F	urans		
		11 / TDU (Tena		the Alive I		F	urans		
۹.	and the second s	12 / TDU (Tena	H	•1	-	F	urans		
	1.1	M-BASE / TOU	(Tenax)			F	urans		
167021286	Y	1 / Hydrar (SK	SILTO	1287		н	g-Elemental		
1676212999	16-05983-6-4	2 / Hydrar (SK	C 226-17-1A) 5 Corre			н	g-Elemental		
Special Instruction	IS:								
		Signature	Printed	Name	Loc	ation	Date		Time
Delivered to Stora Retrieved from Sto	den 1	Sung	Gercalo RETT G	Sacn 2 Aluer	2704HV	HIOT	07-16	16	0000
	Sigr	nature	1	Printed Nam	e	1	Date	-	Time
Relinquished By:	But 9	Jarm	BRETT	GARNI	ER	7-	18-16	11	00
Received By:	June 1	enet	TERESA				8-16		00
Relinquished By:	1								
Received By:									
Relinquished By:									
Received By:	10 A			10 10 10 20 C			e l		1.30
	ents:								

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

Document No.: 20162085 Rev. 0

Michael A. Purcell WAI Hanford Laboratory

Date Published August 10, 2016



Prepared for:





Prepared by:

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

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

August 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

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	ug/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	ug/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	ug/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	ug/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	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-BLANK	Back Resin	S16T021013	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
	Total	S16T021014	Ammonia	ug/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	ug/sample	99.6	<10.0	18.6	10.0
16-05982-7-D1	Total	S16T021017	Ammonia	ug/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	ug/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	S16T021020	Ammonia	µg/sample	99.6	<10.0	5.74E+03	1000
16-05982-7-E1	Back Resin	S16T021021	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
	Total	S16T021022	Ammonia	ug/sample	n/a	<10.0	<10.0	10.0
16-05982-7-EFF-BASE	Front Resin	S16T021025	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-EFF-BASE	Back Resin	S16T021024	Ammonia	µg/sample	99.6	<10.0	<10.0	10.0
16-05982-7-F1	Total	S16T021025	Ammonia	ug/sample	n/a	<10.0	2.14E+03	500
16-05982-7-F1	Front Resin	S16T021020	Ammonia	µg/sample	99.6	<10.0	2.14E+03	500
16-05982-7-F1	Back Resin	S16T021027	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-G1	Total	S16T021028	Ammonia	µg/sample	n/a	<10.0	5.94E+03	1000
16-05982-7-G1	Front Resin	S16T021029	Ammonia	ug/sample	99.6	<10.0	5.94E+03	1000
16-05982-7-G1	Back Resin	S16T021030	Ammonia	ug/sample	99.6	<10.0	<10.0	10.0
16-05982-7-H1	Total	S16T021054	Ammonia	ug/sample	n/a	<10.0	6.95E+03	1000
16-05982-7-H1	Front Resin	S16T021054	Ammonia	µg/sample	100	<10.0	6.92E+03	1000
16-05982-7-H1	Back Resin	S16T021060	Ammonia	ug/sample	100	<10.0	32.9	10.0
16-05982-7-H2	Total	S16T021068	Ammonia	ug/sample	n/a	<10.0	6.30E+03	1000
16-05982-7-H2	Front Resin	S16T021008	Ammonia	µg/sample	100	<10.0	6.28E+03	1000
16-05982-7-H2	Back Resin	S16T021074	Ammonia	ug/sample	100	<10.0	17.0	10.0
16-05982-7-IN-BASE	Total	S16T021075	Ammonia	µg/sample	n/a	<10.0	<10.0	10.0
16-05982-7-IN-BASE	Front Resin	S16T021089	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05982-7-IN-BASE	Back Resin	S16T021103	Ammonia	<u> </u>	100	<10.0	<10.0	10.0
16-05982-7-IN-BASE	Total	S16T021104	Ammonia	µg/sample	n/a	<10.0	<10.0 6.32E+03	1000
16-05983-7-A1	Front Resin	S16T021118	Ammonia	µg/sample µg/sample	n/a 100	<10.0	6.31E+03	1000
16-05983-7-A1	Back Resin	S16T021119	Ammonia	µg/sample	100	<10.0	<10.0	10.0
16-05983-7-A1	Total	S16T021120		ug/sample	n/a	<10.0	884	500
	Front Resin		Ammonia	1.5	n/a 100	<10.0	883	500
16-05983-7-A2	And the second se	S16T021148	Ammonia	µg/sample	100			10.0
16-05983-7-A2	Back Resin	S16T021149	Ammonia	µg/sample		<10.0	<10.0	1.07.0
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

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

DATA SUMMARY REPORT FOR SAMPLE GROUP 20162085

Attachment 2

ANALYSIS DATE REPORT

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

ANALYSIS DATE REPORT FOR SAMPLE GROUP 20162085

Attachment 3

RECEIPT PAPERWORK

222-S					AIN OF CUSTODY ECKLIST	ATS-LO-090-101 Rev DG -)
Date Samples Recei Sample Custodian:	ived: <u>7-18-16</u> Sharo-	т , Ц	otal N	Numbe	r of Samples: <u>260</u> Gr IH Technician: <u></u>	oup #: 20162085-NH Brett Garner/Butt Ac
		Sa	mple	Cust	odian to Complete:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Ac	tion	Yes	No	N/A		Comments
RSR provided?				-	-	
/erify GKI is complete				1	In Project File	
Received from an alpha	a facility?		~	1315	Contact PC for approval t	o release
Check that outer custor present	dy seal is intact, if	1		1	,	
Record cooler tempera	ture in centigrade, as	1°c			Check if no cooler and/or	no ice
Samples are intact and	in good condition	V	-		If No, provide comments below	v
RSA/COC provided and he following information	d complete containing n?			42		
Client name and	d client sample number	L				
Date and time o	f sampling	4			¥.	
 Sampling location 	on or origin	V				
Container type,	size, and number	L				
 Preservatives (if COC/RSA and s 	f used) noted on the sample bottles			U		
Analysis request	t is clear	V				
 Signature of per- receiving sample 	sons relinquishing and es	V			510 ° 1	
 Date and/or time exchange 	e of sample custody	L			. 20	
erify that sample numb atch the COO and/or I	pers on containers RSA	V				
amples stored properly	y (e.g., refrigeration)	U	-			
otify the PC immedia e initials block below	ately if any problems a w is completed by the	are no respo	ted. nsible	Any "I WRF	No" checked boxes require P 2S PC.	C resolution. For WRPS samples,
	- 26 - 26 es Received: 6 Amines: 2		Ar	ae	cutf etroniti, le 26 a: 26 Aromatic HC:	<u>2.18-16</u> 7(18/16
Formaldehyde:	Furans:			Mercur	y: 26 Methanol:	Nitrosamines: 26

A-6005-302 (REV 4)

1

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

	shington River Pr	otection Solutions	12			Date	Sampled:	07/1	5/2016
CACN: 2020	203	COA: CB20	3	Survey N	No.: 15-05982	2 - Respira	tor Cartridge 1	esting	9 8Y Farm
Contact Name:	Jones, Parker L	4	Phone: (50	9)373-4966		Turnaro	und: N/A	111100	CONCUMENTS OF
Return Report To	o: Caldwell, Jo	уса А			MSIN:	R1-05	Phone:	(509	376-0737
Laboratory Log No.	Sample ID/1	Type/Description				1	Required Ar	nalys	is
	16-05982-6-	-H1 / Hydrar (SK	C 226-17-1A)			1	Ig-Element	al	/
	MULTINA		881			1			
		-H2 / Hydrar (SK		_		-	Ig-Element	al	
	HAR ALL COLON	III IN AN AN IN AN AN AN AN AN AN AN AN AN AN AN AN AN	NND (ge th	elle	-			
	16-05982-6-	IN-BASE / Hydr	ar (SKC 226-17-1/	A)		1	Ig-Element	al	
	THE REAL PROPERTY OF		ALAN DIN MAN						~
516762 1002	16-05982-7-	A1 / CISA (SKC	226-29)		,	1	NH3		
and the set for the	in an an		51670	1004					
	16-05982-7-	-A2 / CISA (SKC	226-29)	In M		1	инз		240 CC
5167621005] IN ATO BRAN	H ON DE DE DE LE HERE	SIGTOR	1007	2. 	1			
	16-05982-7-	-B1 / CISA (SKC	226-29).		- diaman -	1	чН3 .		
5167621009	<u>]</u> immuni	III WARMANN AN I		1010					
5167621011	+	BLANK / CISA (516702	21012		1	NH3		
		-C1 / CISA (SKC	226-29) *				NH3		
5167021014			516702	1015					
and a second	the second second second second							in the second	
	1								
Special Instruction	1	Signature	Printed N		Loca	190.94.65	Date	е	Time
	ns:	Signature			Loca 2704 HV K	190.94.65	Date 7/16/10	-	Time 1600
Special Instruction	ns: age: 7	Signature		ndricks		190.94.65	1.1	6	
Special Instruction	age: orage: B	at Barn	- Valenie He BRETT GAN	ndricks RWER	2704 HV K	190.94.65	7/16/10 218-	6	1600 0801
Special Instruction Delivered to Stora Retrieved from St	age: orage: B	Signature	- Valenie He BRETT GAN	ndricks	2704 HV K	190.94.65	7/14/10 7-18-	6	1600 0801 Time
Special Instruction Delivered to Stora Retrieved from St Relinquished By:	age: orage: B	at Barn	- Valenie He BRETT GAN	ndricks RWER	2704 HV K	190.94.65	7/16/10 218-	6	1600 0801 Time 1:00
Special Instruction Delivered to Stora Retrieved from St Relinquished By: Received By:	age: orage: B	at Barn	- Valenie He BRETT GAN	ndricks RWER	2704 HV K	190.94.65	7/14/10 7-18-	6	1600 0801 Time
Special Instruction Delivered to Stora Retrieved from St Relinquished By: Received By: Relinquished By!	age: orage: B	at Barn	- Valenie He BRETT GAN	ndricks RWER	2704 HV K	190.94.65	7/14/10 7-18-	6	1600 0801 Time 1:00
Special Instruction Delivered to Stora Retrieved from St Relinquished By: Received By: Relinquished By: Received By:	age: orage: B	at Barn	- Valenie He BRETT GAN	ndricks RWER	2704 HV K	190.94.65	7/14/10 7-18-	6	1600 0801 Time 1:00
Special Instruction	age: orage: B	at Barn	- Valenie He BRETT GAN	ndricks RWER	2704 HV K	190.94.65	7/14/10 7-18-	6	1600 0801 Time 1:00

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

CACN: ZOZOC)3	COA: CB20		Survey No	.: 16-05982	- Respirato	r Cartridge	Testin	a BY Farm
Contact Name:		100111 0020	Phone: (509)373-4966		Turnarou		1000	3
Return Report To		e A	1.000000			R1-06	T	(509)376-0737
Laboratory Log No.	Sample ID/Ty	pe/Description				Re	equired Ar	alysi	s
5167021017		1 / CISA (SKC				N	13		
5167021620	16-05982-7-E	1 / CISA (SKC	226-29)' 31670;	21021		Nł	13		
5167021023	Y	FF-BASE / CIS	51670	1024		Nł	13		
516762622	1	1 / CISA (SKC :	SIGTO	1028		NF	13		
516621029	ľ	1 / CISA (SKC	226-29)° 5167p	21030		NF	13		
5167021054	The second second second second second second second second second second second second second second second s	1 / CISA (SKC	51470	1059	8	NF	13		
5167621068	16-05982-7-H	2 / CISA (SKC	226-29) 5(6,Tc	21074		NF	13		
5167021089	Y	I-BASE / CISA	(SKC 226-29)	102110		NF	13		
Special Instruction	S:								
	5	Signature	Printed	Name	Loca	tion	Dat	e	Time
Delivered to Storag	ge: 14	Sis	Valerie He	ndnicks z	704 HU RA	n H107	7/16/	16	1600
Retrieved from Sto	orage Bit	Ann	BREIT GA	KUER	推动的		7-18-	16	0801
	Cian	oturo		Drinted Name			lata	1	Time
Relinguished By:	RH	ature	BRUT	Printed Name	3	7	Date	-	1:00
Received By:	10 remain	am	Lord	A		1	18/16	1	in
Relinguished By:	Justup	5	RESUL	24142	-	-11	0110	11	100
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Received By:						-		1	
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SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

CACN: 2020	60	COA: CB20)	Survey N	lo.: 16-0598	3 - Respi	rator C	artridge Te	esting	BY Farm
Contact Name:	Jones, Parker L		Phone: (509)373-4966		Turna	round	: N/A		
Return Report To	Caldwell, Joyc	e A			MSIN:	R1-06	F	hone:	(509)	376-0737
Laboratory Log No.	Sample ID/Ty	pe/Description	6				Requ	ired Ana	lýsis	
516702 1170	16-05983-7-D	1 / CISA (SKC	226-29) 51675	21171	4		NH3			
5167621199	16-05983-7-E	1 / CISA (SKC	226-29) 5(676	1200			NH3			
5167021236	16-05983-7-E	FF-BASE / CIS	SA (SKC 226-29 5167) 2 124			NH3		6)	
516762 1259	16-05983-7-F	1 / CISA (SKC	226-29) 516To	21284			NH3			
5167021308	Y	1 / CIȘA (SKC	51670	1309			NH3		I	
5167621316	16-05983-7-F	11 / CISA (SKC	226-29) 516762	1318			NH3			8
516702132	16-05983-7-H	2 / CISA (SKC	516702	1326			NH3		-	
516762.133	16-05983-7-1	N-BASE / CISA	(SKC 226-29) 5167	135			NH3			
Special Instruction	s:						-			
		Signature	Printed	Name	Loc	ation		Date		Time
Delivered to Storag	ge: Au	Sun	Gerrock	Saienz	atound	140	7-1	07-16	-16	0000
Retrieved from Sto	rage: Dut	Jain		HENER		1.00		7-18-	10000	STATISTICS.
	Sigp	ature	La des	Printed Nam			Dat	e	-	Time
Relinquished By:	Bitto	tern	BRETT	GARN	ER	7-	- 18-	110	11	00
Received By:	1	Forme too	TERESA F	ORDELTO			- 18-			00
Relinquished By:	Jenes;	and and	TURESA P	C TENED / E						
Received By:		4								
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20162085 Rev

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

i.

CACN: 20200	03	COA: CB20)	Survey No	D.: 16-05983	- Respirator	Cartridge :	Testing	BY Farm
Contact Name:			Phone: (609)373-4966		Turnarou	nd: N/A		1997 T
Return Report To	: Caldwell, Jo	yce A			MSIN:	R1-06	Phone:	(509)	376-0737
Laboratory Log No.	Sample ID/T	ype/Description				Re	quired A	nalysi	s
3		H1 / Hydrar (SK)		· . ·	_	Hg	-Elemen	tal	-
·		H2 / Hydrar (SKi		OF 7/11	0/110	Hg	-Elemen	tal	
3 e - e		IN-BASE / Hydra		1A)		Hg	I-Element	tal	
5167621118	1	A1 / CISA (SKC	51670	2149		Nł	13		
516-05983-7-A2 / CISA (SKC 226-29) SIGTOR 1141							NH3		
5167621150		B1 / CISA (SKC	SIGTO	1152	A.	N	13		
5167021153	16-05983-7-	BLANK / CISA (SKC 226-29) 51670	1156		NH	13		
5167621162	16-05983-7-	C1 / CISA (SKC	226-29) 51676	21163		NH	13		
Special Instruction	S:			a se rescentos					
		Signature	Printed	Name	Loca	tion	Dat	e	Time
Delivered to Stora	ge: g	I Samp	Gerrado	Saenz.	RANDER	14107	07-16	5-16	0000
Retrieved from Sto	prage: Bu	Han	BRET	GARNER		and a second	7-18.	-16	0830
	A Sic	inature		Printed Name	2		ate	-	Time
Relinquished By:	But	Dam	BRETT	GAR	NER	7-18	-16	110	00
Received By: (Tues ?	Foreto	TERESA P	ORRESTE	n	7-18		110	
Relinquished By:		Sec. Sec. Sec.							
Received By:									
Relinquished By:									
Received By:									
								-	

C.3.8 Aldehydes

Analytical Results



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

Lab ID: 1620241001	Sa	mpling Location: CAI	TRIDGE EVALU	ATION Received: 07/20/2016
Method: EPA TO-11A		I (2,4- Analyzed: 07/21/2016		
Analyte	Result (ug/sample)	npling Parameter: Air 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 Lab ID: 1620241002	Sa	mpling Location: CAR	RTRIDGE EVALU	Collected: 07/15/2016 ATION Received: 07/20/2016
Method: EPA TO-11A	San		226-119, Silica Ge trophenylhydrazine) Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Formaldehyde	<0.050	NA	NA	0.050
Acetaldehyde	3.5	NA	NA	0.050

Results Continued on Next Page

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

Environmental J	www.alsglobal.com	J
	RIGHT SOLUTIONS RIGHT PARTNER	
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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	C-	ampling Location: CAR		ATION	Received: 07/20/2016
Lab 1D. 1020241002	00	ampling Location. CA	TRIDGE EVALU	ATION	Received. 0712012010
Method: EPA TO-11A	San	Analyzed: 07/21/2016			
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/	sample)
Acetone	<0.050	NA	NA	1000	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: \$16T021209				Collected: 07/15/2016
Lab ID: 1620241003	Sa	ampling Location: CAF	RTRIDGE EVALUA	TION Received: 07/20/2016
Method: EPA TO-11A	San	Media: SKC Dinit Npling Parameter: Air V	and a second a second second second	
Analyte	Result (ug/sample)	Result (mg/m ³)	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
lsovaleraldehyde	<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 Lab ID: 1620241004	Sa	mpling Location: CA	RTRIDGE EVALU	ATION	Collected: 07/15/2016 Received: 07/20/2016	
Method: EPA TO-11A	San		226-119, Silica Ge trophenylhydrazine) Volume Not Provid	and a second	Analyzed: 07/21/2016	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)		'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	
lsovaleraldehyde	<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				Co	lected: 07/15/2016
Lab ID: 1620241005	Sa	ampling Location: CAR	RTRIDGE EVALU	ATION Re	ceived: 07/20/2016
Method: EPA TO-11A	ethod: EPA TO-11A Media: SKC 226-119, Silica Gel (2,4- Dinitrophenylhydrazine) Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sampl	e)
Formaldehyde	<0.050	NA	NA	0.0	50
Acetaldehyde	6.3	NA	NA	0.0	50
Acetone	3.0	NA	NA	0.0	50
Acrolein	<0.050	NA	NA	0.0	50
Propionaldehyde	<0.050	NA	NA	0.0	50
Crotonaldehyde	<0.050	NA	NA	0.0	50
Butyraldehyde	<0.050	NA	NA	0.0	50
Benzaldehyde	<0.050	NA	NA	0.0	50
lsovaleraldehyde	<0.050	NA	NA	0.0	50
Valeraldehyde	<0.050	NA	NA	0.0	50
m-Tolualdehyde	<0.050	NA	NA	0.0	50
p-Tolualdehyde	<0.050	NA	NA	0.0	50
o-Tolualdehyde	<0.050	NA	NA	0.0	50
Hexanal	<0.050	NA	NA	0.0	50

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

Analytical Results

Sample ID: S16T021211						Collecte	d: 07/15/2016
Lab ID: 1620241005	Sa	mpling Location: C	ARTRIDGE	EVALU	ATION	Receive	d: 07/20/2016
Method: EPA TO-11A	San		SKC 226-119, S Dinitrophenylhy Air Volume No	drazine)		Analyze	d: 07/21/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result	(ppm)	RL (ug/s	sample)	
2,5-Dimethylbenzaldehyde	<0.050	NA		NA		0.050	

Sample ID: S16T021212					Collected: 07/15/2016	
Lab ID: 1620241006	Sa	Sampling Location: CARTRIDGE EVALUATION				
Method: EPA TO-11A	San		226-119, Silica Ge rophenylhydrazine) /olume Not Provid		Analyzed: 07/21/2016	
Analyte	Result (ug/sample)	Result (mg/m ³)	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	Sa	mpling Location: CA	RTRIDGE EVALU	ATION	Received: 07/20/2016	
Method: EPA TO-11A	Media: SKC 226-119, Silica Gel (2,4- Analyzed: 07/21/20 Dinitrophenylhydrazine) Sampling Parameter: Air Volume Not Provided					
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sa	imple)	
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

Analytical Results

Sample ID: S16T021213					Collected: 07/15/2016
Lab ID: 1620241007	Sa	mpling Location: CAR	RTRIDGE EVALU	ATION	Received: 07/20/2016
Method: EPA TO-11A	San	Media: SKC 226-119, Silica Gel (2,4- Dinitrophenylhydrazine) 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
lsovaleraldehyde	<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	Sa	ampling Location: CAF	RTRIDGE EVALU	ATION Received: 07/20/2016		
Method: EPA TO-11A	Sar	Media: SKC 226-119, Silica Gel (2,4-An: Dinitrophenylhydrazine) Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	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		
lsovaleraldehyde	<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: S16T021215					Collected: 07/15/2016
	92			00000000	
Lab ID: 1620241009	Sa	ampling Location: CAF	RTRIDGE EVALU	ATION	Received: 07/20/2016
Method: EPA TO-11A			226-119, Silica Ge trophenylhydrazine)		Analyzed: 07/21/2016
	San	npling Parameter: Air			
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ua/	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
lsovaleraldehyde	<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: 07/15/201	
Lab ID: 1620241010	Sa	ampling Location: CAP	RTRIDGE EVALU	ATION Received: 07/20/201	
Method: EPA TO-11A	Aethod: EPA TO-11A Media: SKC 226-119, Silica Gel (2,4- Dinitrophenylhydrazine) Sampling Parameter: Air Volume Not Provided				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)	
Formaldehyde	<0.050	NA	NA	0.050	
Acetaldehyde	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	
lsovaleraldehyde	<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 Client Project ID: CARTRIDGE EVALUATION Purchase Order: 55502 Rel9 Project Manager: Rand Potter

Analytical Results

2.5-Dimethylbenzaldehyde	<0.050	NA	NA	0.05	
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample	e)
Method: EPA TO-11A	Sam		C 226-119, Silica Ge itrophenylhydrazine) Volume Not Provid		alyzed: 07/21/2016
Sample ID: S16T021216 Lab ID: 1620241010	Sa	mpling Location: CA	RTRIDGE EVALU		lected: 07/15/2016 ceived: 07/20/2016

Sample ID: S16T021217					Collected:	07/15/2016	
Lab ID: 1620241011	Sa	ampling Location: CAP	RTRIDGE EVALU	ATION	Received:	07/20/2016	
Method: EPA TO-11A	San	Media: SKC 226-119, Silica Gel (2,4- Analyzed: 07/22/2016 Dinitrophenylhydrazine) Sampling Parameter: Air Volume Not Provided					
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/s	ample)		
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	Sa	mpling Location: CA	RTRIDGE EVALU	ATION	Received: 07/20/2016
Method: EPA TO-11A	San	Analyzed: 07/22/2016			
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sa	ample)
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

Analytical Results

Sample ID: S16T021218					Collected: 07/15/2016
Lab ID: 1620241012	Sa	mpling Location: CAR	RTRIDGE EVALU	ATION	Received: 07/20/2016
Method: EPA TO-11A	Media: SKC 226-119, Silica Gel (2,4 Analyzed: 07/22/201 Dinitrophenylhydrazine) 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
lsovaleraldehyde	<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					07/15/2016
Lab ID: 1620241013	Sa	ampling Location: CAF	RTRIDGE EVALU	ATION Received:	07/20/2016
Method: EPA TO-11A	San		226-119, Silica Ge trophenylhydrazine) /olume Not Provid		07/22/2016
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	
lsovaleraldehyde	<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	

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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	Sa	ampling Location: CAF	RTRIDGE EVALUA	ATION	Received: 07/20/2016
Method: EPA TO-11A	San		226-119, Silica Ge trophenylhydrazine) Volume Not Provid		Analyzed: 07/22/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	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
lsovaleraldehyde	<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	Sa	ampling Location: CAR	RTRIDGE EVALU	ATION	Received: 07/20/2016
Method: EPA TO-11A	San		226-119, Silica Ge rophenylhydrazine) /olume Not Provid		Analyzed: 07/22/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/s	ample)
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
lsovaleraldehyde	<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 Client Project ID: CARTRIDGE EVALUATION Purchase Order: 55502 Rel9 Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021221					Collected: 07/16	5/2016
Lab ID: 1620241015	Sa	mpling Location: C	ARTRIDGE EVALU	JATION	Received: 07/20	0/2016
Method: EPA TO-11A	San	Di	KC 226-119, Silica G initrophenylhydrazine ir Volume Not Provi)	Analyzed: 07/22	/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/s	ample)	
2,5-Dimethylbenzaldehyde	<0.050	NA	NA		0.050	

Sample ID: S16T021222					Collected: 07/16/2016
Lab ID: 1620241016	Sa	ampling Location: CAP	RTRIDGE EVALU	ATION	Received: 07/20/2016
Method: EPA TO-11A	San		226-119, Silica Ge rophenylhydrazine) /olume Not Provid		Analyzed: 07/22/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/s	ample)
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	Sa	mpling Location: CAR	RTRIDGE EVALU	ATION	Received: 07/20	/2016
Method: EPA TO-11A	San	Analyzed: 07/22/2016				
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/s	ample)	
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 Client Project ID: CARTRIDGE EVALUATION Purchase Order: 55502 Rel9 Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021223					Collected: 07/16/2016	
Lab ID: 1620241017	Sa	mpling Location: CAR	RTRIDGE EVALU	ATION	Received: 07/20/2016	
Method: EPA TO-11A	San	Media: SKC 226-119, Silica Gel (2,4- Dinitrophenylhydrazine) 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	
lsovaleraldehyde	<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: \$16T021224				Collected: 07/16/2016
Lab ID: 1620241018	Sa	ampling Location: CAP	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: EPA TO-11A	San		226-119, Silica Ge trophenylhydrazine) Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	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
lsovaleraldehyde	<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

Partalytroar reodated						
Sample ID: S16T021225					Collected: 07/16/2016	
Lab ID: 1620241019	Sa	ampling Location: CAR	RTRIDGE EVALU	ATION	Received: 07/20/2016	
Method: EPA TO-11A	San		226-119, Silica Ge trophenylhydrazine) Volume Not Provid		Analyzed: 07/22/2016	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)		sample)	
Formaldehyde	0.061	NA	NA	1000	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	
lsovaleraldehyde	<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	Sa	mpling Location: CAR	RTRIDGE EVALU	ATION F	Received: 07/20/2016
Method: EPA TO-11A	San		226-119, Silica Ge rophenylhydrazine) /olume Not Provid		Analyzed: 07/22/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/san	nple)
Formaldehyde	0.052	NA	NA	C	.050
Acetaldehyde	7.2	NA	NA	C	.050
Acetone	16	NA	NA	C	.050
Acrolein	<0.050	NA	NA	0	.050
Propionaldehyde	<0.050	NA	NA	C	.050
Crotonaldehyde	<0.050	NA	NA	C	.050
Butyraldehyde	<0.050	NA	NA	C	.050
Benzaldehyde	<0.050	NA	NA	C	.050
lsovaleraldehyde	<0.050	NA	NA	C	.050
Valeraldehyde	<0.050	NA	NA	C	.050
m-Tolualdehyde	<0.050	NA	NA	C	.050
p-Tolualdehyde	<0.050	NA	NA	0	.050
o-Tolualdehyde	<0.050	NA	NA	C	.050
Hexanal	<0.050	NA	NA	C	.050

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Analytical Results

Sample ID: S16T021226				Co	llected: 07/16/2016
Lab ID: 1620241020	Sa	mpling Location: C	ARTRIDGE EVALU	ATION Re	ceived: 07/20/2016
Method: EPA TO-11A	San	Di	KC 226-119, Silica Ge initrophenylhydrazine) ir Volume Not Provid		nalyzed: 07/22/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/samp	le)
2,5-Dimethylbenzaldehyde	<0.050	NA	NA	0.0	50

Sample ID: S16T021227					Collected: 07/16/2016
Lab ID: 1620241021	Sa	ampling Location: CAP	RTRIDGE EVALU	ATION	Received: 07/20/2016
Method: EPA TO-11A	San		226-119, Silica Ge rophenylhydrazine) /olume Not Provid		Analyzed: 07/22/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	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	Sa	ATION	Received: 07/20/2016				
Method: EPA TO-11A	Media: SKC 226-119, Silica Gel (2,4- Dinitrophenylhydrazine) Sampling Parameter: Air Volume Not Provided					Analyzed: 07/22/2016	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/s	ample)		
Formaldehyde	<0.050	NA	NA		0.050		
Acetaldehyde	7.8	NA	NA		0.050		
Acetone	25	NA	NA		0.50		
Acrolein	<0.050	NA	NA		0.050		
Propionaldehyde	0.095	NA	NA		0.050		

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Analytical Results

Sample ID: S16T021228					Collected: 07/16/2016
Lab ID: 1620241022	Sa	mpling Location: CAR	RTRIDGE EVALU	ATION	Received: 07/20/2016
Method: EPA TO-11A	San	Analyzed: 07/22/2016			
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
lsovaleraldehyde	<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 Lab ID: 1620241023	6	ampling Location: CAF		Collected: 07/16/201 ATION Received: 07/20/201
Lab 1D. 1020241023	50			
Method: EPA TO-11A	San		226-119, Silica Ge trophenylhydrazine) Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	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
lsovaleraldehyde	<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

Semple ID: 0467004004					Collected: 07/16/2016	
Sample ID: S16T021231					Collected: 07/16/2016	
Lab ID: 1620241024	Sa	ampling Location: CAF	RTRIDGE EVALU	ATION	Received: 07/20/2016	
Method: EPA TO-11A	San		226-119, Silica Ge rophenylhydrazine) /olume Not Provid		Analyzed: 07/22/2016	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)		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	
lsovaleraldehyde	<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: 07/16/20
Lab ID: 1620241025	Sa	ampling Location: CAP	RTRIDGE EVALU	ATION Received: 07/20/20
Method: EPA TO-11A	San		226-119, Silica Ge rophenylhydrazine) /olume Not Provid	· · · · · · · · · · · · · · · · · · ·
Analyte	Result (ug/sample)	Result (mg/m ³)	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
lsovaleraldehyde	<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 Client Project ID: CARTRIDGE EVALUATION Purchase Order: 55502 Rel9 Project Manager: Rand Potter

Analytical Results

Analyte	(ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sam	nple)
	San Result	pling Parameter: Air	trophenylhydrazine) Volume Not Provid		
Method: EPA TO-11A			226-119, Silica Ge		Analyzed: 07/22/2016
Sample ID: S16T021232 Lab ID: 1620241025	Sa	mpling Location: CA	RTRIDGE EVALU	and the second sec	Collected: 07/16/2016 Received: 07/20/2016

Sample ID: S16T021233				Collected	: 07/16/2016
Lab ID: 1620241026	Sa	ampling Location: CAP	RTRIDGE EVALU	ATION Received	: 07/20/2016
Method: EPA TO-11A	San		226-119, Silica Ge trophenylhydrazine) /olume Not Provid		1: 07/22/2016
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.

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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	/S/ Christopher Winter	
	07/26/2016 13:20	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.deg.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

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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.

ND = Not Detected, Testing result not detected above the LOD or LOD. 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

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Analysis Information

Workorder: 1620241

Limits: Historical/Performance Basis: ALS Laboratory Group

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

Blank

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

Preparation: NA Batch: NA Prepared By: NA

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509341 Analyzed: 07/21/2016 00:00 Dilution: 1 Units: ug/sample						LCSD: 50 Analyzed: 07 Dilution: 1 Units: ug	/21/2016 (0:00		
Analyte	Result	Target	%Rec	QCL	imits	Result	% Rec	RPD	QCL	mits
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

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Wednesday, July 27, 2016 1620241 - Page 19 of 25



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

Wednesday, July 27, 2016 1620241 - Page 20 of 25



Analysis Information

Workorder: 1620241

Limits: Historical/Performance Basis: ALS Laboratory Group

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

Blank

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

Preparation: NA Batch: NA Prepared By: NA

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509472 Analyzed: 07/22/2016 00:00 Dilution: 1 Units: ug/sample					_	LCSD: 50 Analyzed: 07 Dilution: 1 Units: ug	//22/2016 (00:00		
Analyte	Result	Target	%Rec	QC L	imits	Result	% Rec	RPD	QCL	mits
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

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Analysis Information

Workorder: 1620241

Limits: Historical/Performance Basis: ALS Laboratory Group

Analysis: EPA TO-11A Batch: ILC/12338 (HBN: 173364) 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.

Preparation: NA

Prepared By: NA

Batch: NA

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

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Addition Addition	PLE ANALYSIS REQUEST Telephone No ₃₇₃₋₆₈₁ Purchase Older/Charge Code Purchase Older/Charge Code Cod Chest No. De Chest No. Parts and Return No. Parts and Return No. Parts and Return No. Parts Analysis	C.O.C. No. 20162095 Page 1 of 3 MSIN ₇ 6-05 FX 372-1873 de TTUT QOAF [la[G] O3 4 Preservative 255 or 10w
Contact/Requestor Contact/Requestor Sample Ongin Sample Ongin Sample Ongin Logbook Work Package No. Logbook Work Package No. Jabl D • Date Jabl D • Date Tumaround Jabl D • Date Tumaround J21205 va 7/15/16 SILICA GEL Aldehyde 16- 221209 va 7/15/16 SILICA GEL Aldehyde 16- 221211 va 7/15/16 SILICA GEL Aldehyde 16- 221212 va 7/15/16 SILICA GEL Aldehyde 16- 221214 va 7/15/16 SILICA GEL Aldehyde 16- 221214 va 7/15/16 SILICA GEL Aldehyde 16- 221214 va 7/15/16 SILICA GEL Aldehyde 16- 221215 va 7/15/16 SILICA GEL Aldehyde 16- 221215 va 7/15/16 SILICA GEL Aldehyde 16- 221215 va 7/15/16 SILICA GEL Aldehyde 16-	Telephone No 373-6861 Purchase Order/Charge Code Purchase Order/Charge Code Dec Chegi No Use Chegi No Parts and Return No. 4-1(C Sample Analysis	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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FINAL SAMPLE Disposal Method (e.g., Return to customer, per tab procedure (used in process) Disposed B Disposed B	Disposed By CONSUM FTD	or 20116 16:00

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and the second se			1					Page 2 of	m
Collector				2	Contact/Requestor CARL HOWALD IV	cr.	Telephone No 373-6861	MSIN T6-05 FAX 372-1878	8
SAF No.			1		Sample Origin CARTRIDGE EVALUATION	ATION	Purchase Order/Charge Code 202003/CB20		
Project Title CARTRIDGE EVALUATION	ATION				Logbook/ Work Package No.	ackage No.	Ice Chest No.	Temp. Tre	
Shipped To (Lab)					Method of Shipment	ant a	5	01 1 4004 L. L	19
Protocol N/A					Data Turnaround		Parts and Return No. 41 03	34	-
Sample No.	Lab ID	•	Date	Time	No/Type Container	Sample	Sample Analysis		Preservative
	S16T021217	VA	7/15/16		SILICA GEL	* ', IH-8-2885-91 91 v		250	or low
	S16T021218	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-H2 、;		250	25C or low
	S16T021219	VA	7/15/16		SILICA GEL	Aldehyde 16-05982-8-IN-BASE' 1	~	250	25C or low
	S16T021220	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-Al		250	or low
	S16T021221	VA	2/16/16		SILICA GEL	Aldehyde 16-05983-8-A2).		250	or low
	S16T021222	VA	7/16/16		SILICA GEL	Aldehyde 16-05983-8-B1; '	-	250	or low
	S16T021223	A.	1/16/16		SILICA GEL	Aldehyde 16-05983-8-BLANK .		250	25C or low
	S16T021224	VA	VA 7/16/16		SILICA GEL	Aldehyde 16-05983-8-C1, ?		250	25C or low
	S16T021225	VA	VA 7/16/16		SILICA GEL	Aldehyde 16-05983-8-Dl,"		250	or low
	S16T021226	\$	VA 7/16/16		SILICA GEL	Aldehyde 16-05983-8-21,	7	. 250	or low
POSSIBLE SAM	POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) 2PA TO-11A	EMAR	KS (List all kno	New mas	tes) MSDS O Yes	NO SPECIAL INSTRUCTIONS Send Reutles to Carl Rowald IV @ Greg Moore Card Reutles to Carl Rowald IV @ Greg Moore Card Reutles for and Careford Second Second Second Second Release 9 Reference Contract # 55502 RicsH 2016 MOD	ald IV & Greg Moore ee SOW for email 02	Hold Time	90 *
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Contentingeneration Telephone No.373-6661 No.375-660 No.375-660 No.375-660 No.375-660 No.375-660 No.375-660 No.375-660 No.375-66						СНА	N OF CUSTODY/SAMPLE ANAL		20162095 Page 3 of	of 3
Sample Signification Substances Contrained Contrained Sector 222 Vin 7/16/16 SILICA GEL Alidehydre 16-05959-9-EPET-ALAR Sector 222 Va 7/16/16 SILICA GEL Alidehydre 16-05959-9-EPET-1 Sample Analysis Sector 222 Va 7/16/16 SILICA GEL Alidehydre 16-05959-9-EPET-1 Sample Analysis Sector 222 Va 7/16/16 SILICA GEL Alidehydre 16-05959-9-ET-1 Sample Analysis Sector 222 Va 7/16/16 SILICA GEL Alidehydre 16-05959-9-ET-1 Sample Analysis Sector 2222 Va 7/16/16 SILICA GEL Alidehydre 16-05959-9-ET-1 Sample Analysis Sector 2223 Va 7/16/16 SILICA GEL Alidehydre 16-05995-9-ET-1 Sample Analysis Sector 2223 Va 7/16/16 SILICA GEL Alidehydre 16-05995-9-ET-1	Collector					Contact/Requests CARL HOWALD IV			X	12-1878
The contraction Independent of Shipment In	SAF No.					Sample Origin CARTRIDGE EVALU		ode		
Io (Lab) Method of Shipment Method of Shipment Method of Shipment Method of Shipment BNG. Lab ID > Print Sing Franch Relum No. AT I GOOA I FNG. Lab ID * Date Time No.Type Container Sample Analysis 2 2 S167021227 Va 71/6/16 S111CA GEL Aldehyde 16-05989-8-ETF-2ASE - \ 2 2 S167021221 Va 7/16/16 S111CA GEL Aldehyde 16-05989-8-ETF-2ASE - \ 2 2 S167021221 Va 7/16/16 S111CA GEL Aldehyde 16-05989-8-ET - \ 2 2 S167021221 Va 7/16/16 S111CA GEL Aldehyde 16-05989-8-ET - \ 2 2 S167021221 Va 7/16/16 S111CA GEL Aldehyde 16-05989-8-ET - \ 2 2 S167021231 Va 7/16/16 S111CA GEL Aldehyde 16-05989-8-ET - \ 2 2 S166021231 Va 7/16/16 S111CA GEL Aldehyde 16-05993-9-EL - \ 2 2 S166021232 Va 7/16/16 S111CA GEL Aldehyde 16-05993-9-EL - \ 2 2 S166021233 Va 7/16	Project Title CARTRIDGE EVE	LURTION				Logbook/ Work P.		Ice Chest No.	Temp.	4
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LICA GEL Aldehyde 16-05983-8-EFF-BASE ~ 1 LICA GEL Aldehyde 16-05983-8-E1 - 1 LICA GEL Aldehyde 16-05983-8-C1 - 7 LICA GEL Aldehyde 16-05983-8-C1 - 7 LICA GEL Aldehyde 16-05983-8-H1 - 7 LICA GEL Aldehyde 16-05983-8-H2 - 7 LICA GEL Aldehyde 16-05983-8-H2 - 7 LICA GEL Aldehyde 16-05983-8-H2 - 7 LICA GEL Aldehyde 16-05983-8-H2 - 7 LICA GEL Aldehyde 16-05983-8-H2 - 7 LICA GEL Aldehyde 16-05983-8-H2 - 7 LICA GEL Aldehyde 16-05983-8-H2 - 7 LICA GEL Aldehyde 16-05983-8-H2 - 7 LICA GEL Aldehyde 16-05983-8-H2 - 7 LICA GEL Aldehyde 16-05983-8-H1 - 7 LICA	Sample No.			Date	Time	100				Preservative
LICA GEL Aldehyde 16-05983-8-71 . (LICA GEL Aldehyde 16-05983-8-01 . ' LICA GEL Aldehyde 16-05983-8-01 . ' LICA GEL Aldehyde 16-05983-8-11 . ' LICA GEL Aldehyde 16-05983-8-12 . ' LICA GEL Aldehyde 16-05983-8-12 . ' LICA GEL Aldehyde 16-05983-8-12 . ' HICA GEL Aldehyde 16-05983-8-1		S167021227	RN .			SILICA GEL				25C of low
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LICA GEL Aldehyde 16-05983-8-H1		S167021230	4N			SILICA GEL	Aldehyde 16-05983-8-G1 - *			25C or low
LICA GEL Aldehyde 16-05993-8-H2 , LICA GEL Aldehyde 16-05993-8-HX-BASE , MSDS O Yes O No SPECIALINSTRUCTIONS Houd I V @ Greg Koore Son For email Results to Carl Houald IV @ Greg Koore Contract # 55502 Release 9 Rel		S167021231	42			SILICA GEL	Aldehyde 16-05983-8-H1 - ,			
MSDS O Yes O No SPECIAL INSTRUCTIONS / 2502 MSDS O Yes O No SPECIAL INSTRUCTIONS Hod Time Point A for the Second Second Results of the Second		S16T021232	4N	7/16/16	_	SILICA GEL	Aldehyde 16-05983-8-H2 / ;			25C or low
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MSDS () Yes () No SPECIAL INSTRUCTIONS Send Results to carl Howald IV & Greg Moore Carl M Howalder, gov see SOW for email Scegöry_S_Moore@ri.gov see SOW for email Relarse Contract # 55502 NGOSH 2016 NOD			-							
	EPA TO-11A	WIPLE HAZARD	S/REM	ARKS (List all	known wa	SOSM	² ⊙	ld IV & Greg Moore e SOW for email 2	Hold Time	
	Relinquished			A	- A	Date/Time	in Jessie Tami	Date/Time	= Sludge L = Water V = Oil VA	= Liquid = Vegetation = Vapor = Other
Received BY Country Count westing BaterTime St. = Studge L = Noter V = V = V = V = V = V = V = V = V = V	FINAL SAMPLE DISPOSITION	Disposal Meth	od (e.g.	, Return to cu	stomer, pe	iod (e.g., Return to customer, per lab procedure, Used in p	Disposed By		Date/Time	

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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

1.3-Butadiene	0.050	NA	NA	0.010
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Method: NIOSH 1024	San	Media: SKC opling Parameter: Air N	226-37 Sorbent Tr Volume Not Provid	
Lab ID: 1620493001				Received: 07/22/2016
Sample ID: S16T021368				Collected: 07/15/2016

1.3-Butadiene	<0.0010	NA	NA	0.0010	
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air V	226-37 Sorbent Tu Volume Not Provid		yzed: 07/30/2016
Sample ID: S16T021369 Lab ID: 1620493002					cted: 07/15/2016 ived: 07/22/2016

Analyte	(mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)	
	San Result	pling Parameter: Air		AND A REAL PROPERTY AND A	
Method: NIOSH 1024		Media · SK(226-37 Sorbent T	48.5010.00	1: 07/30/2016
Sample ID: S16T021370 Lab ID: 1620493003					1: 07/15/2016 1: 07/22/2016

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Analytical Results					
Sample ID: \$16T021371					

Sample ID: S16T021371 Lab ID: 1620493004				Collected: 07/15/201 Received: 07/22/201
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	226-37 Sorbent Ti Volume Not Provid	
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

Lab ID: 1620493005				Rec	eived: 07/22/2016
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air	226-37 Sorbent Tr Volume Not Provid		lyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.018	NA	NA	0.01	0

1,3-Butadiene	0.042	NA	NA	0.0	010
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/sam	ole)
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air V	226-37 Sorbent Tr Volume Not Provid		nalyzed: 07/30/2016
Sample ID: S16T021373 Lab ID: 1620493006					ollected: 07/15/2016 eceived: 07/22/2016

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

1,3-Butadiene	0.050	NA	NA	0.010	
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air V	226-37 Sorbent Tr Volume Not Provid		/zed: 07/30/2016
Sample ID: S16T021375 Lab ID: 1620493008					cted: 07/15/2016 ived: 07/22/2016



Analytical Results	

1,3-Butadiene	0.13	NA	NA	0.010	
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC ppling Parameter: Air	226-37 Sorbent Tr Volume Not Provid		07/30/2016
Sample ID: S16T021376 Lab ID: 1620493009				Collected: (Received: (

Sample ID: S16T021377				17	ollected: 07/15/2016
Lab ID: 1620493010				R	eceived: 07/22/2016
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	226-37 Sorbent Ti Volume Not Provid	2012	Analyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sam	ple)
1,3-Butadiene	0.050	NA	NA	0	.010

1,3-Butadiene	0.066	NA	NA	0.0	010
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/samp	ole)
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air N	226-37 Sorbent Tr Volume Not Provid		nalyzed: 07/30/2016
Sample ID: S16T021378 Lab ID: 16204 93011					ollected: 07/15/2016 eceived: 07/22/2016

1.3-Butadiene	<0.0010	NA	NA	0.0010	
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided				/zed: 07/30/2016
Sample ID: S16T021379 Lab ID: 1620493012					cted: 07/15/2016 ved: 07/22/2016

1.3-Butadiene	<0.0010	NA	NA	0.0010	
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			zed: 07/30/2016
Sample ID: \$16T021380 Lab ID: 1620493013					ted: 07/15/2016 ved: 07/22/2016



Workorder: 34-1620493 Client Project ID: Washington River Protection So Purchase Order: 55502 Rel9 Project Manager: Rand Potter

> Collected: 07/15/2016 Received: 07/22/2016 Analyzed: 07/30/2016

Analytical Results				
Sample ID: \$16T021381				
Lab ID: 1620493014				
Method: NIOSH 1024	San	Media: SKC	226-37 Sorbent T Volume Not Provid	7.7.7
Analyto	Result	Desult (ma/m ²)	Posult (opm)	DI

Analyte	(mg/sample)	Result (mg/m²) Result (ppm) RL		RL (mg/sample)	
1,3-Butadiene	<0.0010	NA	NA	0.0010	

Sample ID: S16T021382 Lab ID: 1620493015					ted: 07/15/2016 ved: 07/22/2016
Method: NIOSH 1024	San	Media: SKC	226-37 Sorbent Tu Volume Not Provid	ube Analy	zed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)	
1,3-Butadiene	<0.0010	NA	NA	0.0010	

1,3-Butadiene	<0.0010	NA	NA	0.0010)
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/sample)
Method: NIOSH 1024	San	Media: SKC 226-37 Sorbent Tube ampling Parameter: Air Volume Not Provided			lyzed: 07/30/2016
Sample ID: S16T021383 Lab ID: 1620493016					ected: 07/15/2016 ei∨ed: 07/22/2016

Sample ID: S16T021384 Lab ID: 1620493017				1.107	ollected: 07/15/2016 eceived: 07/22/2016
Method: NIOSH 1024	San	Media: SKC	226-37 Sorbent T		nalyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sam	ole)
1,3-Butadiene	<0.0010	NA	NA	0.0	010

1.3-Butadiene	< 0.0010	NA	NA	0.0010	
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			zed: 07/30/2016
Sample ID: S16T021385 Lab ID: 1620493018					ved: 07/15/2016 ved: 07/22/2016



	Analytical Results
1	Sample ID: \$16T021386

Sample ID: S16T021386 Lab ID: 1620493019				Collected: 07/15/201 Received: 07/22/201
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	226-37 Sorbent T Volume Not Provid	
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	<0.0010	NA	NA	0.0010

1,3-Butadiene	0.0034	NA	NA	0.001	0
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample	e)
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	226-37 Sorbent Tu Volume Not Provid		alyzed: 07/30/2016
Sample ID: S16T021387 Lab ID: 1620493020				1.000	ected: 07/15/2016 eived: 07/22/2016

1,3-Butadiene	0.0064	NA	NA	0.0	010
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/sam	ole)
Method: NIOSH 1024	San	Media: SKC 226-37 Sorbent Tube ampling Parameter: Air Volume Not Provided			nalyzed: 07/30/2016
Sample ID: S16T021388 Lab ID: 1620493021					ollected: 07/15/2016 eceived: 07/22/2016

1,3-Butadiene	0.010	NA	NA	0.0010	
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC 226-37 Sorbent Tube Sampling Parameter: Air Volume Not Provided			yzed: 07/30/2016
Sample ID: S16T021389 Lab ID: 1620493022					cted: 07/15/2016 ived: 07/22/2016

1.3-Butadiene	< 0.0010	NA	NA	0.0010	
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air V	226-37 Sorbent Tr Volume Not Provid		zed: 07/30/2016
Sample ID: \$16T021390 Lab ID: 1620493023					ted: 07/15/2016 /ed: 07/22/2016



Ar	naly	tic	al F	les	ults	
1	1		100	-		12.2

Sample ID: \$16T021391				Colle	cted: 07/15/2016
Lab ID: 1620493024				Rece	eived: 07/22/2016
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	226-37 Sorbent T Volume Not Provid		yzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)	1
1,3-Butadiene	<0.0010	NA	NA	0.0010	1

Sample ID: \$16T021392					llected: 07/15/2016 ceived: 07/22/2016
Lab ID: 1620493025				Re	ceived: 0//22/2016
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	226-37 Sorbent Tr Volume Not Provid		alyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sampl	e)
1,3-Butadiene	<0.0010	NA	NA	0.00	10

1,3-Butadiene	< 0.0010	NA	NA	0.0	010
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/sam	ple)
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air V	226-37 Sorbent Tr Volume Not Provid		analyzed: 07/30/2016
Lab ID: 1620493026				R	eceived: 07/22/2016
Sample ID: S16T021393				C	ollected: 07/15/2016

1,3-Butadiene	0.071	NA	NA	0.0010	i i
Analyte	Result (mg/sample)	Result (mg/m ^a)	Result (ppm)	RL (mg/sample)	1
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air V	226-37 Sorbent Tr Volume Not Provid		yzed: 07/30/2016
Sample ID: S16T021394 Lab ID: 1620493027					ected: 07/16/2016 eived: 07/22/2016

1.3-Butadiene	< 0.0010	NA	NA	0.0010	
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air V	226-37 Sorbent Tu /olume Not Provid		zed: 07/30/2016
Sample ID: \$16T021395 Lab ID: 1620493028					ted: 07/16/2016 ved: 07/22/2016



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1,3-Butadiene	< 0.0010	NA	NA	0.0010	
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air V	226-37 Sorbent Tr Volume Not Provid	- C. C. C. C. C. C. C. C. C. C. C. C. C.	yzed: 07/30/2016
Sample ID: S16T021396 Lab ID: 1620493029					cted: 07/16/2016 ived: 07/22/2016

1.3-Butadiene	<0.0010	NA	NA	0.00	
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sampl	e)
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	226-37 Sorbent Tr Volume Not Provid		alyzed: 07/30/2016
Lab ID: 1620493030				Re	ceived: 07/22/2016
Sample ID: \$16T021397				Col	lected: 07/16/2016

1,3-Butadiene	0.017	NA	NA	0.0	010
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/sam	ple)
Method: NIOSH 1024	San	Media: SK0 pling Parameter: Air	226-37 Sorbent Tr Volume Not Provid		nalyzed: 07/30/2016
Sample ID: S16T021398 Lab ID: 1620493031					ollected: 07/16/2016 eceived: 07/22/2016

1,3-Butadiene	0.037	NA	NA	0.01	0
Analyte	Result (mg/sample)	Result (mg/m ^a)	Result (ppm)	RL (mg/sample)
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air V	226-37 Sorbent Tr Volume Not Provid		lyzed: 07/30/2016
Sample ID: S16T021399 Lab ID: 1620493032					ected: 07/16/2016 eived: 07/22/2016

1.3-Butadiene	< 0.0010	NA	NA	0.0010			
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)			
Method: NIOSH 1024	San	Media: SKC 226-37 Sorbent Tube Analyze Sampling Parameter: Air Volume Not Provided					
Sample ID: S16T021400 Lab ID: 1620493033				Collected: 0 Received: 0			



			Project Manager.	Rand Poller
Analytical Results				
Sample ID: \$16T021401				Collected: 07/16/20
Lab ID: 1620493034				Received: 07/22/20
Method: NIOSH 1024	Sar	Media: SKC npling Parameter: Air		
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.086	NA	NA	0.010
Sample ID: \$16T021402				Collected: 07/16/20
1 -h ID: 1000102025				Pencingt 07/22/20

Lab ID: 1620493035				Received: 07/22/2016
Method: NIOSH 1024			226-37 Sorbent T	
	Result	npling Parameter: Air	Volume Not Provid	led
Analyte	(mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.021	NA	NA	0.010

1,3-Butadiene	0.061	NA	NA	0.010			
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/sample)			
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air N	226-37 Sorbent Tr Volume Not Provid				
Sample ID: S16T021403 Lab ID: 1620493036					cted: 07/16/2016 ved: 07/22/2016		

1,3-Butadiene	0.032	NA	NA	0.010			
Analyte	Result (mg/sample)	Result (mg/m ^a)	Result (ppm)	RL (mg/sample)			
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air V	226-37 Sorbent Tr Iolume Not Provid				
Sample ID: S16T021404 Lab ID: 1620493037					ved: 07/16/2016 ved: 07/22/2016		

1.3-Butadiene	< 0.0010	NA	NA	0.0010		
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)		
Method: NIOSH 1024	Media: SKC 226-37 Sorbent Tube Analyzed Sampling Parameter: Air Volume Not Provided					
Sample ID: \$16T021405 Lab ID: 1620493038				Collected: (Received: (



Ana	lytic	al F	les	ults	
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Sample ID: S16T021406				Collecte	ed: 07/16/2016
Lab ID: 1620493039				Receive	ed: 07/22/2016
Method: NIOSH 1024	San	Media: SKC	226-37 Sorbent Ti Volume Not Provid	12 SA M	ed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)	
1,3-Butadiene	< 0.0010	NA	NA	0.0010	

Sample ID: S16T021407				Col	lected: 07/16/2016
Lab ID: 1620493040				Re	ceived: 07/22/2016
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air	226-37 Sorbent Ti Volume Not Provid	20. P	alyzed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sampl	e)
1,3-Butadiene	<0.0010	NA	NA	0.00	10

1.3-Butadiene	<0.0010	NA	NA	0.00	
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/samp	le)
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air	226-37 Sorbent Tr Volume Not Provid		nalyzed: 07/30/2016
Sample ID: S16T021408 Lab ID: 1620493041					ollected: 07/16/2016 eceived: 07/22/2016

1,3-Butadiene	<0.0010	NA	NA	0.001	0
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)
Method: NIOSH 1024	ube Ana led	lyzed: 07/30/2016			
Sample ID: S16T021409 Lab ID: 1620493042					ected: 07/16/2016 eived: 07/22/2016

Sample ID: S16T021410				Collected	: 07/16/2016
Lab ID: 1620493043				Received	: 07/22/2016
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	226-37 Sorbent Ti Volume Not Provid	and a second second second second second second second second second second second second second second second	: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)	
1,3-Butadiene	<0.0010	NA	NA	0.0010	



Workorder: 34-1620493 Client Project ID: Washington River Protection So Purchase Order: 55502 Rel9 Project Manager: Rand Potter

			Project Manager:	Rand Potter
Analytical Results				
Sample ID: \$16T021411				Collected: 07/16/2016
Lab ID: 1620493044				Received: 07/22/2016
Method: NIOSH 1024			C 226-37 Sorbent Ti	
	Sar	npling Parameter: Air	Volume Not Provid	led
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.059	NA	NA	0.010
Sample ID: \$16T021412				Collected: 07/16/2016
Lab ID: 1620493045				Received: 07/22/2016
Method: NIOSH 1024		Media: SKC	C 226-37 Sorbent Ti	ube Analyzed: 07/30/2016

Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	Volume Not Provid	
Analyte	Result (mg/sample)	Result (mg/m²)	Result (ppm)	RL (mg/sample)
1,3-Butadiene	0.0023	NA	NA	0.0010

1,3-Butadiene	0.097	NA	NA	0.010	
Analyte	Result (mg/sample)	Result (mg/m ²)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SK0 pling Parameter: Air	226-37 Sorbent Tr Volume Not Provid		zed: 07/30/2016
Sample ID: S16T021413 Lab ID: 1620493046					cted: 07/16/2016 ved: 07/22/2016

1,3-Butadiene	0.0016	NA	NA	0.0010	
Analyte	Result (mg/sample)	Result (mg/m ^a)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air V	226-37 Sorbent Tr Volume Not Provid		7/30/2016
Sample ID: S16T021414 Lab ID: 1620493047				Collected: 0 Received: 0	

1,3-Butadiene	0.072	NA	NA	0.010	
Analyte	Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)	
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air N	226-37 Sorbent Tr Volume Not Provid		yzed: 07/30/2016
Sample ID: \$16T021415 Lab ID: 1620493048					cted: 07/16/2016 ived: 07/22/2016



Workorder: 34-1620493 Client Project ID: Washington River Protection So Purchase Order: 55502 Rel9 Project Manager: Rand Potter

Analytical Results

Sample ID: \$16T021416				Collected	1: 07/16/2016
Lab ID: 1620493049				Received	1: 07/22/2016
Method: NIOSH 1024	San	Media: SKC	226-37 Sorbent To Volume Not Provid		1: 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: \$16T021417				Collec	cted: 07/16/2016
Lab ID: 1620493050				Recei	ved: 07/22/2016
Method: NIOSH 1024	San	Media: SKC npling Parameter: Air	226-37 Sorbent To Volume Not Provid	SUBSEE STREET	zed: 07/30/2016
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/sample)	
1,3-Butadiene	<0.0010	NA	NA	0.0010	

(ing/sample)	Result (mynn)	Result (ppin)	ite (ingestimpte)	
Result (mg/sample)	Result (mg/m ³)	Result (ppm)	RL (mg/sample)	
San				ed: 07/30/2016
				ed: 07/10/2016 ed: 07/22/2016
	Result	Sampling Parameter: Air Result	Sampling Parameter: Air Volume Not Provid Result	Media: SKC 226-37 Sorbent Tube Analyz Sampling Parameter: Air Volume Not Provided Result

1,3-Butadiene	<0.0010	NA	NA	0.00	10
Analyte	Result (mg/sample)	Result (mg/m³)	Result (ppm)	RL (mg/samp	le)
Method: NIOSH 1024	San	Media: SKC pling Parameter: Air	226-37 Sorbent T Volume Not Provid		alyzed: 07/30/2016
Lab ID: 1620493052					ceived: 07/22/2016
Sample ID: S16T021419				Co	llected: 07/16/2016

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

Method	Analyst	Peer Review	
NICOLI 4024	/S/ Fred Rejali	/S/ Thomas J. Masoian	
NIOSH 1024	08/01/2016 15:08	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

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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.

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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.deg.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/ga/
	Texas (TNI)	T 104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
Industrial Hygiene	AIHA-LAP, LLC (ISO 17025 and AIHA-LAP, LLC IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing:			
CPSC	ACLASS (ISO 17025, CPSC)	ADE-1420	http://www.aclasscorp.com
Soil, Dust, 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

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Diank

Quality Control Sample Batch Report

Workorder: 1620493

Limits: Historical/Performance Basis: ALS Laboratory Group

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

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

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 510263 Analyzed: 07/30/2016 00:00 Dilution: 1 Units: mg/sample						LCSD: 5 Analyzed: 0 Dilution: 1 Units: m	7/30/2016 0	00.00		
Analyte	Result	Target	% Rec	QCL	imits	Result	%Rec	RPD	QC LI	mits
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: 5 Analyzed: 0 Dilution: 1 Units: m	7/30/2016 0	00.00		
Analyte	Result	Target	% Rec	QCL	imits	Result	%Rec	RPD	QC LI	mits
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: 5 Analyzed: 0 Dilution: 1 Units: m	7/30/2016 0	00:00		
Analyte	Result	Target	% Rec	QCL	imits	Result	%Rec	RPD	QC LI	mits
1.3-Butadiene	0.0286	0.0274	105	78.0	117.6	0.0294	107	2.76	0.0	20.0

Page 1 of 2

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Workorder: 1620493

 MorKorder:
 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

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н.	1620493	33						Page 1 o	of 6
Collector					Contact/Requestor CARL HOWALD IV	or	Telephone No 373-6861	MSIN 76-05 FAX 372-	372-1878
SAF No.	+				Sample Origin CARTRIDGE EVALUATION	DATION	Purchase Order/Charge Code 202003/CB20	1.1.1	
Project Title CARTRIDGE EVALUATION	UATION			~	Logbook/ Work Package No.	ackage No.	Coltest No. O. S. S.	Temp.	212
Shipped To (Lab)	(9				Method of Shipment	lent	Bill of Lading/Air Bill No. Col	(15 83	X
Protocol N/A					Data Turmaround 10 Days		Parts and Return No.	1 0	
Sample No.	Lab ID	٠	Date	Time	No./Type Container	Sam	Sample Analysis		Preservative
	S16T021368	VA	1/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-A1 ' 🗸		5	CHILL -4C
	S16T021369	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-A2 &	~ /	5	CHILL -4C
	S16T021370	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-B1 ¹	- /		CHILL -4C
	S16T021371	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-BLANK ;	- 7	CH	CHILL -4C
	S16T021372	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-C1 /	- /	CH	CHILL -4C
	S16T021373	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-D1 1		CH	CHILL -4C
	S16T021374	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-E1 *	- 1	CH	CHILL -4C
	S16T021375	Ϋ́Α	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-F1		B	CHILL -4C
	S16T021376	AN N	VA 7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A+G1 1	. 7	B	CHILL -4C
	S167021377	\$	VA 7/15/16		CHARCOAL TUBE	1,3-Butadione 16-05982-9-A-H1	* >	CB	CHILL -4C
OSSIBLE SAI	POSSIBLE SAMPLE HAZARDSREMARKS (List all known wastes)	EMAF	tKS (List all kn	ovm wast	es) MSDS () Yes	Mo SPECIAL INSTRUCTIONS Send Require to Carl W Rowald IV, Carl W RevalderLoov, and Greg Mooro, Gregory_SMoorderLyov and Greg Mooro, Seference contract # 55502 REARENCE CONTRACT # 55502 RIDEN 1024 CHILL BELOW -4 C NIDEN 1024 RIDEN 1024 RIDEN 1024 RIDEN 1024 RIDEN 1024 RIDEN 04 RIDEN 1024 RIDEN 04 RIDE	Rewald IV. nd Greg Moore, see SOM for email 502	Hold Time	2
Relinquished By	LUDGE	2	Un LUch	50	7.2016 830	Print Sign	Gaidwhr 1 2016 230	Matrix* S = Soil Di = C	= Dam Liquide
Relinquished By	alch	1 In	i, Godioho	3	8		Date/Time	E = Sediment T D = Solid W	= Tissue = Wipe
Relinquished By Relinquished By	4	Educk	y			A Ulder Hill Allow Hill Manu HI	H 01/20 lue 9:30	= Water V = Oil VA = Air X	= Vegetation = Vapor = Other
FINAL SAMPLE DISPOSITION	Disposal Method (e	.g. R	ethod (e.g., Return to customer, per lab procedure	ner, per la	ab procedure used in process)	Disposed By	. 07/30/16	116 Date/Time	

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Collector.					Contact/Requestor	estor	Telephone No.	AX 372, 1070	
NES DE NA					CARL HOWALD IN	IA	Tooo_Crc	20-9L	
N/A				2	CARTRIDGE EVALUATION	MURTION	202003/CB20		
Project Title CARTRIDGE EVALUATION	UNTION				Logbook/ Work Package No.	k Package No.	Ice Chest No. 05.5	Temp. ON T.CC	
Shipped To (Lab)	(q)				Method of Shipment	pment	Bill of Lading/Air Bill No.	Bill of Ladingrafi Bill No.	
Protocol N/A					Data Turnaround	pur	Parts and Return No.	41035	
Sample No.	Lab ID	·	Date	Time	No./Type Container	er	Sample Analysis	Preservative	tive
	S16T021378	NA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-A-H2 1	~	CHILL -4C	U
	S16T021379	VA	7/15/16	+	CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-A1 ¹	>	CRILL -	140
	S16T021380	A.	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-A2 1	>	CHILL -	-40
	S16T021381	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-B1 1	11	CHILL -4C	U
	S167021382	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-BLANK . V	×.1	CHILL -4C	υ
	S167021383	AN	31/21/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-C1	/	CHILL -	-4C
	S16T021384	AN	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-D1 4	>	CHILL -	-4C
	S16T021385	AV	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	U
	S16T021387	VÀ	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-G11 V		CHILL -	-40
SSIBLE SA	POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes)	REMAR	KKS (List all k	novm wast	tes) MSDS O Yes	°² ⊙	SPECIAL INSTRUCTIONS Send Regults to Carl W Howald IV, Sand W Bewalderl gov, and Greg Moore, Gregory's Nooreefrigov ace SoW for email Reference Contract # 55502 NJOSH 1034 CHILL BELOW -4 C	Hold Time	: 8
Relinquished By Luce Luce Relinquished By	Lolder LL	2	Sign	91066	ate/Time 0830_ Date/Time	Received By Print Sign	Le Le 1/20/16 0830S	Matrix* S = Soil DL = Drum Liquids SE = Sediment T = Tissue	uids
Jului Ge	Qualer	14.	ului Gedich	1.80	_	FEDEX		= Solid WI = Sludge L	
Relinquishèd By Relinquished By	H	DOLON		*	Date/Time Re Date/Time Re	Received By Dringhill Deduce Hell Received By	UT Date Time UT Date Time Date Time	= Water V = Oil VA = Air X	5
FINAL SAMPLE DISPOSITION		e.g., F	leturn to custo	omer, per la	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	in process) Disposed By	2/26. 07130116		
samples con	taining hazardous	materi	als shall be pic	cked up by	requestor and return	All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.			1

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500					Ъ.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	(/SAMPLE ANALY	SIS REQUEST	20162100	2100
					_				Page 3	of 6
Collector JONES					Contact/Requestor CARL HOWALD IV	estor IV	Te	Telephone No 373-6861	MSIN FAX 37	372-1878
SAF No.					Sample Origin CARTRIDGE EVALUATION	NOLLON	Pt 20	Purchase Order/Charge Code 202003/CB20		
Project Title	UATION				Logbook/ Worl	Logbook/ Work Package No.	10	loe Chest No.	Temp.	1000
Shipped To (Lab)	(q				Method of Shipment	pment	18	Bill of Lading/Air Bill No.	קס פפריירר	
Protocol N/A					Data Turnaround 10 DAYS	nd	<u>ď</u>	Parts and Return No. 41		50 60
Sample No.	Lab ID		Date	Time	No./Type Container	ler	Sample Analysis			Preservative
	S16T021388	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-H1	5982-9-B-H1 : 🗸			CHILL -4C
	S16T021389	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-B-H2	5982-9-в-н2 і 🗸			CHILL -4C
	S167021390	A.V.	VA 7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-EFF-A-BASE4	5982-9-EFF-A-BASE4 V			CHILL -4C
	S16T021391	AN.	VA 7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-EFF-B-BASE;	5982-9-EFF-B-BASE			CRILL -4C
	S16T021392	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-IN-A-BASE	5982-9-IN-A-BASE ;			CHILL -4C
	S16T021393	VA	7/15/16		CHARCOAL TUBE	1,3-Butadiene 16-05982-9-IN-B-BASE	•			CHILL -4C
	S167021394	A.	VA 7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-A1	5983-9-A-AI # V		*	CHILL -4C
	\$16T021395	VA	VA 7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-A2 /	5983-9-A-A2 / 1			CRILL -4C
	S16T021396	AN	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-B1 /	5983-9-V-BI /			CRILL -4C
	S16T021397	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-BLANK ?-V	5983-9-A-BLANK 2-V			CRILL -4C
OSSIBLE SA	APLE HAZARDS/	REM	RKS (List all k	mown wast	POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS O Yes	°N (O	SPECIAL INSTRUCTIONS Sand Reutits to Carl W Howald TV, Carl W Hewalderl, gov, and Gree Moore, Gregory_S_Mooregri,gov see SOM for email Reference Contract # 55502 NUOSE 1024 CHILL BELOW -4 C	ld IV, reg Moore, SOM for email	Hold Time	
Relinquished By	Uolde L	1	ruchel	2.20/6	ate/Time A & Z_	Received By Print	Alor IL Jun Ols	Date/Time	= Soil DI	= Dorm Liquids
Relinquished By	a lich	1	W. Cual	15 mai	ie 1400		PEDEX	Date/Time SE SO	sediment T Solid W	= Tissue = Wipe = Liouid
Relinquished By Relinquished By		L\$	2		Date/Time F	HIII	Denthul	Date/Time W 51/21/10/24:360 Date/Time A	Mater V Oil VA Air X Drum Solids	 Exectation Vapor Other
FINAL SAMPLE	Disposal Method	(e.g.,	Return to cust	omer, per l	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	N.	Disposed By Celal.	01/30/16	Date/Time	

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							and the second se	Page 4	of 6
Collector					Contact/Requestor CARL HOWALD IV	stor	Telephone No.373-6861	MSIN T6-05 FAX 37	372-1878
SAF NO.					Sample Origin CARTRIDGE EVALUATION	ALUATION	Purchase Order/Charge Code 202003/CB20		
Project Title CARTRIDGE EVALUATION	LUATION				Logbook/ Work Package No. N/A	k Package No.	toe Chest No.	Temp.	Tre
Shipped To (Lab) ALS	ab)				Method of Shipment	oment	Bill of Lading/Air Bill No.	7.00	1
Protocol N/A					Data Tumaround	pu	Parts and Return No. 41.03	N N	cocal
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 i /			CHILL -4C
	\$16T021400	AV	VA 7/16/16	4	CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-E1 {			CHILL -4C
	S16T021401	AV	VA 7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-Fl /			CHILL -4C
а а	S16T021402	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-G1, V			CRILL -4C
	S167021403	VA	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-H1 7			CHILL -4C
	S16T021404	AN	VA 7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-A-H2 : /			CHILL -4C
	S167021405	VA	VA 7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-A1 N			CRILL -4C
	S16T021406	KN N	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-A2 V			CHILL -4C
	S16T021407	VA	7/16/16	1.9	CHARCOAL TUBE	1,3-Butadiene 16-05983-9-B-B1 /			CHILL -4C
ISSIBLE SA	APLE HA	EMA	KKS (List all k	nown waste	es) MSDS O Yes	<pre>es O No SPECIAL INSTRUCTIONS send Results to Carl W Howald IV, carl W HewaldBr1.gov wald Greg Morev, carl W HowaldBr1.gov see SOW for amail Reference Contract # 55502 RELAXE 9 NIOSH 1024 CHILL BELOW -4 C</pre>	owald IV, d Greg More, ee SOM for email 02 4 C	Hold Time	
Relinquished By Sharon LUA	Kalden Dhr		- Ullaly	1-20-16	e/Time	Received By Print Sign /	T/2d/to CR30 s	= Soil DL	= Drum Liquids
eclic C2	adam Ou	le.	adish	~7/20	effime (+tco	Received By FEDEX		= Sediment T = Solid W	= Tissue = Wipe
Relinquished By	At.	podley.				Received By Deburge Hull Philmeothill	2	= Water V = Oil VA	 Luquid Vegetation Vapor
Kelinquished By						teceived By	Date/Time DS	= Arr · · X = Drum Solids	= Other
FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedura	e.g., R	etum to custo	omer, per la	1	used in process) Disposed By	L. 07130/16	2300	

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Collector Jones SAF No.						CHAIN C	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	ALYSIS REQUEST	20162100 Page 5 of	2100 of 6.
SAT NO.					Contact/Requestor CARL HOWALD IV	Requestor		Telephone No373-6861	MSIN FAX 37	372-1878
N/A				•	Sample CARTRIDG	Sample Origin CARTRIDGE EVALUATION		ode		
Project Title CARTRIDGE EVALUATION	NOIL				Logbook/	Logbook/ Work Package No.	ge No.	Ice Chest No.	Temp	- Tro
Shipped To (Lab)				8	Method o	Method of Shipment		I No.		201
Protocol N/A					Data Tumaround	naround		Parts and Return No. 417	4172 5	5050
Sample No.	Lab ID	•	Date	Time	No /Type Container	ntainer	Sar	Sample Analysis	000	Preservative
-02	S16T021408	VA	7/16/16		CEARCOAL TUBE		1, 3-Butadiene 16-05983-9-B-BLANK . V	1		CHILL -4C
s	S16T021409	N.	7/16/16		CHARCOAL TUBE		1,3-Butadiene 16-05983-9-B-C1	/		CHILL -4C
S	S16T021410	VA	VA 7/16/16		CHARCOAL TUBE		1,3-Butadiene 16-05983-9-3-D1			CHILL -4C
S	S16T021411	VA	7/16/16		CHARCOAL TUBE		1,3-Butadiene 16-05983-9-B-El 1 🗸			CHILL -4C
S	S16T021412	×.	7/16/16		CHARCOAL TUBE		1,3-Butadiene 16-05983-9-B-F1, 🗸			CHILL -4C
ŝ	S16T021413	\$	VA 7/16/16		CHARCOAL TUBE		1,3-Butadiene 16-05983-9-B-G1/ 🗸			CHILL -4C
S	\$16T021414	AV	VA 7/16/16		CRARCOAL TUBE	internet.	1,3-Butadiene 16-05,983-9-B-H1 1 🗸			CHILL -4C
0	S16T021415	AN.	7/16/16		CHARCOAL TUBE		1,3-Butadiene 16-05983-9-B-H2 , V			CRILL -4C
8	S16T021416	AN.	VA 7/16/16		CHARCOAL TUBE		1,3-Butadiene 16-05983-9-EFF-A-BASE (1.2		CHILL -4C
S	S16T021417	VA	VA 7/16/16		CHARCOAL TUBE	UBE 1,3-	1, 3-Butadiene' 16-05983-9-EFF-B-BASE	1 2		CHILL -4C
POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS () Yes	E HAZARDS/R	EMAR	KS (List all kr	nown waste) SOSM (se	O Yes	No SPECIAL INSTRUCTIONS	•	Hold Time	
)))		Howald TV, and Greg Moore, see SOM For amail 5502 -4 C		ц
Kelinquished By	I 0 D		Sign N 0	r	Date/Time	Received By	Print	→/ / Date/Time	Matrix*	
Relinquished By	4 4	1	Dulli) (Tachich		71, 2016 0530	Deceived By	10 (1 ach () uh / redut	120//6 0830 S	= Soil DL = Sediment T = Solid VM	 Drum Liquids Tissue Wipe
Relinquished By Relinquished By	12	Allex			Date/Time Date/Time	Received By DCI/VOCHTI	E Dr	$dterTime St. Date/Time St. dt = \frac{1}{Date/Time}$	= Sludge L = = Water V = = Oil VA = = Air X = = Drum Solids	 Liquid Vegetation Vapor Other
FINAL SAMPLE Dist	Disposal Method (e.g., Return to customer, per lab procedure used in process)	.g., Re	turn to custo	mer, per la	b procedure u	sed in process	FINAL SAMPLE Disposal Method (e.g., Return to customer, per lab procedure/used in process) Disposed By	.L. 07130/16	Date/Time 2300	

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	1				H5	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	ALYSIS REQUEST	Page 6 of	6
Collector					Contact/Requestor CARL HOWALD IV	stor	Telephone No.373-6861	MSIN FAX 372-1878	78
SAF No.					Sample Origin CARTRIDGE EVALUATION	CURTION	Purchase Order/Charge Code 202003/CB20		
Project Title CARTRIDGE EVALUATION	ALUATION				Logbook/ Work Package No.	Package No.	Ice Chest No. KK	Temp. TAP.	1
Shipped To (Lab) ALS	Lab)				Method of Shipment	ment	Bill of Lading/Air Bill No.	17	0
Protocol N/A					Data Turnaround 10 DAYS	p	Parts and Return No. 4-1075	000000000000000000000000000000000000000	0
Sample No.	Lab ID	<u> </u>	Date.	Time	No./Type Container		Sample Analysis		Preservative
	S16T021418	AN	7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-IN-A-BASE «	1.	CHILL	T -4C
	S16T021419	VA	VA 7/16/16		CHARCOAL TUBE	1,3-Butadiene 16-05983-9-IN-B-BASE , V	. /	CHILL	L -4C
							0.1		
		$\left \right $							
× .					1	•			
OSSIBLE SA	POSSIBLE SAMPLE HAZARDS/REMARKS (1 ist all known worked)	ZEMA	RKS /I ist all	known waete	Hene				
					O source	ž D	Rowald IV, und Greg Noore, see Sof for email 502 -4 C	Hold Time	
Kelinquished By	I.A. Pri	1	Sign		Date/Time	Print Sign	The Date/Time	Matrix*	
Relinquished By	dister 1	Tell	Rally .	Dullificalish 2016	Date/Time	HULL Tadrah Chulic Dachah Receiverny FEDEX	100 million (1990)		e liqu
elinquished By	#	Forlev	>~		Date/Time	Received By Draw Hill II a Line	pate/Time W	= Sludge L = Lquid = Water V = Vegetation = Oil VA = Vapor	etation or
Relinquished By			4		Date/Time Rec		Date/Time A	X m Solids	5
NOLLISOdSIQ EINAL SAMPLE	Disposal	(e.g., ŀ	ketum to cus	stomer, per la	Method (e.g., Return to customer, per lab procedure) used in process)	process) Disposed By	(. 07/30/16	Date/Time 2300	±:

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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				Co	ollected: 07/15/2016
Lab ID: 1620246001	Sa	ampling Location: C	ARTRIDGE EVALU	ATION Re	eceived: 07/20/2016
Method: NIOSH 1613 Mod.	San	1(KC 226-01, Charcoal 00/50mg ir Volume Not Provid		nalyzed: 07/26/2016
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/samp	le)
Pyridine	0.91	NA	NA	0	.50
2,4-Dimethylpyridine	1.3	NA	NA	0	.50

Sample ID: S16T021122 Lab ID: 1620246002	Sa	mpling Location: CAP	RTRIDGE EVALU	Collected: 07/15/201 ATION Received: 07/20/201
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021123 Lab ID: 1620246003	5	mpling Location: CA		Collected: 07/15/2016 ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.		Media: SKC	226-01, Charcoal 50mg	Tube Analyzed: 07/26/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

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

Environmental 🏂	www.alsglobal.com	
	RIGHT SOLUTIONS RIGHT PARTNER	
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Workorder: 34-1620246 Client Project ID: CARTRIDGE EVALUATION Purchase Order: 55502 Rel9 Project Manager: Rand Potter

Analytical Results

Sample ID: S16T021124 Lab ID: 1620246004	Sa	mpling Location: CAI	RTRIDGE EVALU		lected: 07/15/2016 ceived: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid		alyzed: 07/26/2016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sampl	e)
Pyridine	<0.50	NA	NA	0.9	50
2,4-Dimethylpyridine	<0.50	NA	NA	0.9	50

2,4-Dimethylpyridine	<0.50	NA	NA	0.50
Pyridine	<0.50	NA	NA	0.50
Analyte	Result (ug/sample)	Result (mg/m³)	Result (ppm)	RL (ug/sample)
Method: NIOSH 1613 Mod.			C 226-01, Charcoal /50mg Volume Not Provid	
Sample ID: S16T021125 Lab ID: 1620246005	Sa	ampling Location: CA	RTRIDGE EVALU	ATION Received: 07/20/2010

Sample ID: S16T021126				Collected: 07/15/201 ATION Received: 07/20/201
Lab ID: 1620246006	58	mpling Location: CAF	RIRIDGE EVALU	ATION Received. 0/120/201
Method: NIOSH 1613 Mod.	San		226-01, Charcoal 50mg Volume Not Provid	
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	Sa	ampling Location: CAI	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

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

Analytical Results

Sample ID: \$16T021128 Lab ID: 1620246008	Sa	ampling Location: CAI	RTRIDGE EVALU	Collected: 07/15/20 ATION Received: 07/20/20
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021129 Lab ID: 1620246009	Sa	ampling Location: CA	RTRIDGE EVALU	Collected: 07/15/2016 ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		C 226-01, Charcoal /50mg Volume Not Provid	· · · · · · · · · · · · · · · · · · ·
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021130				Collected: 07/15/2016
Lab ID: 1620246010	Sa	mpling Location: CAI	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021131				Collected: 07/15/2016
Lab ID: 1620246011	Sa	mpling Location: CAR	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	1.0	NA	NA	0.50
2,4-Dimethylpyridine	1.3	NA	NA	0.50

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

Analytical Results

Sample ID: S16T021132 Lab ID: 1620246012	Sa	ampling Location: CAI	RTRIDGE EVALU	Collected: 07/15/201 ATION Received: 07/20/201
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021133 Lab ID: 1620246013	Sa	ampling Location: CA	RTRIDGE EVALU	Collected: 07/15/201 ATION Received: 07/20/201
Method: NIOSH 1613 Mod.	San		C 226-01, Charcoal D/50mg • Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021134				Collected: 07/16/2016
Lab ID: 1620246014	Sa	ampling Location: CAR	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	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	Sa	ampling Location: CAI	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

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

Analytical Results

Sample ID: S16T021136 Lab ID: 1620246016	Sa	ampling Location: CAI	RTRIDGE EVALU	Collected: 07/16/201 ATION Received: 07/20/201
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: \$16T021137				Collected: 07/16/2016
Lab ID: 1620246017	Sa	ampling Location: CAR	RIRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	-
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: 07/16/2	2016
Lab ID: 1620246018	Sa	mpling Location: CAF	RTRIDGE EVALU	ATION Received: 07/20/2	2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid		016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)	
Pyridine	<0.50	NA	NA	0.50	
2,4-Dimethylpyridine	<0.50	NA	NA	0.50	

Sample ID: S16T021139				Collected: 07/16/2016
Lab ID: 1620246019	Sa	ampling Location: CAR	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

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

Analytical Results

Sample ID: S16T021140 Lab ID: 1620246020	Sa	ampling Location: CAI	RTRIDGE EVALU	Collected: 07/16/2 ATION Received: 07/20/2	
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid		016
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)	
Pyridine	<0.50	NA	NA	0.50	
2,4-Dimethylpyridine	<0.50	NA	NA	0.50	

Sample ID: S16T021142 Lab ID: 1620246021	Sa	ampling Location: CA	RTRIDGE EVALU	Collected: 07/16/201 ATION Received: 07/20/201
Method: NIOSH 1613 Mod.	San		C 226-01, Charcoal D/50mg • Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021143				Collected: 07/16/2016
Lab ID: 1620246022	Sa	mpling Location: CAF	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal 50mg /olume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021144				Collected: 07/16/2016
Lab ID: 1620246023	Sa	ampling Location: CAR	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

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

Analytical Results

Sample ID: S16T021145 Lab ID: 1620246024	Sa	ampling Location: CAI	RTRIDGE EVALU	Collected: 07/16/2016 ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	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	Sa	ampling Location: CAR	RTRIDGE EVALU	ATION Received: 07/20/2016
Method: NIOSH 1613 Mod.	San		226-01, Charcoal /50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Sample ID: S16T021147 Lab ID: 1620246026	Sa	ampling Location: CAF	RTRIDGE EVALU	Collected: 07/16/201 ATION Received: 07/20/201
Method: NIOSH 1613 Mod.	San		226-01, Charcoal 50mg Volume Not Provid	
Analyte	Result (ug/sample)	Result (mg/m ³)	Result (ppm)	RL (ug/sample)
Pyridine	<0.50	NA	NA	0.50
2,4-Dimethylpyridine	<0.50	NA	NA	0.50

Comments

Quality Control: NIOSH 1613 Mod. - (HBN: 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	
NIOOU 1612 Mad	/S/ Emilie Pratt	/S/ Thomas J. Masoian	
NIOSH 1613 Mod.	07/27/2016 11:26	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

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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.deg.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

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Quality Control Sample Batch Report

Analysis Information

Workorder: 1620246

Limits: Historical/Performance Basis: ALS Laboratory Group

Analysis: NIOSH 1613 Mod. Batch: ISVO/3072 (HBN: 173466) 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
Analyte Pyridine	Result ND	MDL NA	RL 0.200

Preparation: NA

Prepared By: NA

Batch: NA

Laboratory Control Sample - Laboratory Control Sample Duplicate

LCS: 509730 Analyzed: 07/26/2016 19:56 Dilution: 1 Units: ug/sample						LCSD: 50 Analyzed: 07 Dilution: 1 Units: ug	7/26/2016 2	20:15		
Analyte	Result	Target	%Rec	QC LI	mits	Result	% Rec	RPD	QC Li	nits
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: 50 Analyzed: 07 Dilution: 1 Units: ug	7/27/2016 0)5:40		
Analyte	Result	Target	%Rec	QC LI	mits	Result	% Rec	RPD	QC Li	nits
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
- A 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

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QCS V4.1

Assembler N/A								1	
0.00.000					CHA	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	YSIS REQUEST	C.O.C. No. 20162093 Page 1 of	.62093 1 of 3
COLLECTOR					Contact/Requestor CARL HOWALD IV		Telephone No.373-6861	MSIN FAX	FAX, 372-1878
SAF No.					Sample Origin CARTRIDGE EVALUATION	ATION	Purchase Order/Charge Code 202003/CB20		
Project Title CARTRIDGE EVALUATION	UATION				Logbook/ Work Package No.	10	Ice Chest No.	Temp.	Toe
Shipped To (La	(9				Method of Shipment		Bill of Lading/Air Bill No.	06 LOILL	90641619
Protocol N/A					Data Tumaround 10-Days		Parts and Return No. 4	E	
Sample No.	Lab ID	ŀ	Date	Time	No./Type Container	Sampl	Sample Analysis		Preservative
	\$167021121	AN.	7/15/16		CHARCOAL TUBE	Pyridines 15-05982-10-A1 ;			N/A
	S16T021122	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-N2 1			N/A
	S16T021123	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-B1 2			N/A
	S167021124	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-BLANK			8/8
	S16T021125	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-C1		2	N/A -
	S167021126	VA	1/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-D1 /			N/N
	S16T021127	Va	1/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-E1 1			N/A
	S16T021128	A	1/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-EFF-BASE			3/A
	S167021129	VA	1/15/16		CRARCOAL TUBE	Pyridines 16-05982-10-F1 ;			N/K
	S16T021130	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-61 ¹			N/A
POSSIBLE SA	POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes)	REM	ARKS (List all)	known wast	es) MSDS O Yes	No SPECIAL INSTRUCTIONS See Results to Carl Bowald IV 8 Greg Moore Carl W Bowaldstrictor and GregGry_S.Moore@rl.gov see SOW for email	ald IV 8 Greg Moore tee SOW for email	Hold Time	
						RELEASE 9 Reference Contract # 55502		s .	
Relinquished By Shaven Lill Relinquished By Millin Gredla	Prin Prin	2m	Sign LLAN	1-2	DateTime DateTime DateTime	Received By Print Sign Hoceword By Techor Outlin Clad	Date/Time Sate/Time Sate/Sate/Sate/Sate/Sate/Sate/Sate/S	Matrix S = Soil DL SE = Sediment T SO = Soid W1 SI = Sludge L SI = Wator V	trik* DL = Drum Liquids T = Tissue M = Wipe L = Liquid L = Liquid
Relinquished By	2		bed	and	ep 1	Parry and a gall and a Sell	Date/Time	Solids	٩.,
FINAL SAMPLE DISPOSITION	Disposal Me	d (e.g.	Return to cus	tomer, per l	thod (e.g., Return to customer, per lab procedure, used in process)	/ Disposed By	Ar Enilia Pa	the patertime	Date/Time

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1 /10	ЭE) (СНА	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		20162093 Page 2 of	
Collector					Contact/Requestor	tor	Telephone No.373-6861	MSIN 76-05 FAX 372-1878	78
SAF No.		4			Sample Origin CARTRIDGE EVALUATION	UATION	Purchase Order/Charge Code 202003/CB20		
Project Title	TATION				Logbook/ Work Package No.	Package No.	loe Chest No.	T MO.	T CP.
Shipped To (Lab)	(q)				Method of Shipment	hent	1		0
Protocol					Data Tumaround		Parts and Return No. 4103	4	
Sample No.	LabID	•	Date Tir	Time	No./Type Container		Sample Analysis	Pre	Preservative
	S16T021131	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-H1 ¢		N/A	
	\$167021132	VA	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-H2 ;		N/A	
	S16T021133	A.	7/15/16		CHARCOAL TUBE	Pyridines 16-05982-10-IN-BASE		N/A	
	S16T021134	VA	1/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-A1 /		N/A	
	\$16T021135	AN	VA 7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-A2 1		N/A	
	S16T021136	V.A	- 91/91/2		CHARCOAL TUBE	Pyridines 16-05983-10-B1 1		N/A	
i.	S16T021137	VA	7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-BLANK }		N/A	
	S16T021138	VA	VA 7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-C1 /		N/A	
	\$16T021239	VA	VA 7/16/16	i	CHARCOAL TUBE	Pyridines 16-05983-10-D1 1		N/A	
	\$16T021240	AN	VA 7/16/16		CHARCOAL TUBE	Pyridines 16-05983-10-E1 /		N/A	
SSIBLE SA	POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS O	REMAN	KKS (List all known	1 waste	is) MSDS O Yes	No SPECIAL INSTRUCTIONS send Results to Carl Howald IV & Grey Mor Carl # Rowald&1.90v and Carl # Rowald&1.90v are Cregory_S.Morreërl.90v see SOW for email RELEAS Contract # 55502	ald IV & Grey Moore ee SOW for email 02	Hold Time	a.
Relinquished By	Sy Print	10	Sign A	13	eu	Repaived By Print Sign		Matrix*	the day
Sharen L.W. Relinquished By	Noller Mr.	1 64	119/1 119/10	110 10	Y	HILL Tack Low JULLE LOGIC	Lime COCC	= Soil UL = Sediment T = Solid VII = Sludge L	= Urum Liquids = Tissue = Vripe = Liquid
Relinquished By	N O		hedro		0	Herster Townhall	2	Mater V Oli VA	= Vegetation = Vapor
Relinquished By	A.		D		Date/Time	-	Date/Time	m Solids	
FINAL SAMPLE	Disposal Me	(e.g.,	Return to customer	r, per la	thod (e.g., Return to customer, per lab procedure, used in process)	T process) / Disposed By	grathe But	L DateTime	100

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N/A						CHAI	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		Page	20162093 Page 3 of 3
Collector					00	Contact/Requestor	-		MSIN T6-05 F	FAX 372-1878
SAF No.					0.0	Sample Origin	NOIL	Purchase Order/Charge Code 202003/CB20		
Project Title					122	Logbook/ Work Package No.		Ice Chest No. Temp. ON ICE	Temp.	Temp. ON ICE
CANTRIDUE EVALUA Shipped To (Lab)	ab)				-	Method of Shipment		ading/Air Bill No.	06 [0)0	041619
Protocol N/A						Data Tumaround		Parts and Return No. 41	41034	
Sample No.	LabID	•	Date	Time	No	No/Type Container	Sample Analysis	sis		Preservative
	S16T021142	VA	7/16/16		CHAF	CHARCOAL TUBE	Pyridines 16-05983-10-EFF-BASE			8/A
	S16T021143	VA	7/16/16		CHAF	CHARCOAL TUBE	Pyridines 16-05983-10-F1)			N/A
	S16T021144	VA	VA 7/16/16		CHAF	CHARCOAL TUBE	2yridines 16-05983-10-G1 *			N/A
	S16T021145	VA	VA 7/16/16		CHAF	CHARCOAL TUBE	Pyridines 16-05983-10-H1 4		-	N/N
	S16T021146	VA	7/16/16		CHAE	CHARCOAL TUBE	Pyridines 16-05983-10-H2 -/			N/N
	S16T021147	VA	7/16/16		CHAI	CHARCOAL TUBE	Fyridines 16-05983-10-IN-BASE			N/A
		-						14 <u>-</u>		
		-					P.			
		-								
OSSIBLE S	POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes)	REMA	KKS (List all	known was	tes)	MSDS O Yes	° ^y ⊙	f § Greg Moore f for email	Hold Time	
							RELEASE 9 Reference Contract \$ 55502			
Relinquished By Relinquished By Relinquished By Relinquished By Relinquished By	Reimquistred By Print Starre-Ulfol Gre- JU Reimquistred By Reimquistred By Reimquistred By	1202	Sign Sign	719.16 7-19.16		Date/Time Rec 0ate/Time Rec Date/Time Rec Date/Time Rec	Received By Print Sign Sign Julle Clacker & Dulle Badio in 7 Received By FEDEX Preserved By Jan Soll and Ward Drs. 2011 Received By Days 2010 and Ward Drs. 2011	Date/Time 1.9.16.087. Date/Time 0.1-9.16.	Image: Second	Matrix* DL = Drum Liquids T = Tissue M = Wige L = Liquid V = Vegetation X = Other X = Other
FINAL SAMPLE		(e.g.,	Return to cu	istomer, per	r lab pr	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	process) Laisposed By Hill A	V thille (lat a	Date/Time 21/27/10/17/0

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RJ LeeGroup, Inc. | Columbia Basin Analytical Laboratories 2710 North 20th Avenue, Pasco WA 99301 Tel: (509) 545-4989 | Fax: (509) 544-6010

Carl Howald IV

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

Project: Cartridge Evaluation

Contract No.:

08/18/16 55503 R5

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 concer	ntrations above the reporting limit in the san	nples.		
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	С
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	С
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 IG	CV, 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 incheiro

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.

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Carl Howald IV Washington River Protection Solutions, LLC P.O. Box 850 MSIN H6-16 Richland, WA 99352 Client Project: Cartridge Evaluation		Emissions of	OSH 2522	A Analyzer	RJ Lee Group No.: Samples Received: Report Date: COC No.: Extraction Date:	07/ 08/ 201	07059 /19/16 /18/16 62097 27/2016
Sample Identificatio Client Sample ID R	n ILG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifiers
16-05982-11-A1 S16T021332	W607059-01	07/15/16	07/27/16	N-Nitrosodimethylamine	0.264	0.023	
		07/15/16	07/29/16	N-Nitrosodimethylamine	<0.020	0.020	
		07/15/16	07/29/16	N-Nitrosomethylethylamine	<0.020	0.020	
		07/15/16	07/27/16	N-Nitrosomethylethylamine	0.309	0.023	
		07/15/16	07/27/16	N-Nitrosodiethylamine	0.024	0.022	
		07/15/16	07/29/16	N-Nitrosodiethylamine	<0.020	0.020	
		07/15/16	07/27/16	N-Nitrosodi-n-propylamine	0.155	0.021	
		07/15/16	07/29/16	N-Nitrosodi-n-propylamine	<0.019	0.019	
		07/15/16	07/27/16	N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16	07/29/16	N-Nitrosodi-n-butylamine	<0.020	0.020	
		07/15/16	07/29/16	N-Nitrosopiperidine	<0.019	0.019	
		07/15/16	07/27/16	N-Nitrosopiperidine	0.212	0.022	

		07/15/16	07/27/16	N-Nitrosopyrrolidine	0.179	0.022
		07/15/16	07/29/16	N-Nitrosopyrrolidine	<0.019	0.019
		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
leport Qualifiers:			B = Analyte	letected in the associated blank		
A = Target Analyte media breakthrough suspect, see analy	tical report		d = Data that	exceeds the RSD criteria set by the SOP		
9 = Analyte analyzed in a dilution			H = Holding	times for preparation or analysis exceeded		
E = Report concentration was above the instrument calibration			10 (1 (1 (1 (1 (1 (1 (1 (1 (1 (ondition at receipt out of compliance with me	thod defined conditions	01
 Analyte detected below quantitation limits, concentrat. 	ion is estimated		the second second	ut of method specific acceptance QC criteria		
P = Library spectrum match, rsd >90% to RT match	17 - 14 -			overy outside accepted recovery limits		
R = RPD (relative percent difference) outside accepted rec U = Analyte analyzed for but not detected	every timits			P accredited analyte		
아이들 것은 것은 것은 것은 것을 가지 않는 것을 하는 것을 가지 않는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 하는 것을 수가 있다. 것을 하는 것을 하는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있다. 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있다. 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있다. 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있다. 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있다. 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있다. 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있다. 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 있다. 것을 수가 있는 것을 수가 않았다. 것을 것을 수가 있는 것을 수가 않았다. 것을 것 같이 같이 하는 것을 수가 있는 것을 수가 있는 것을 수가 있는 것을 수가 않았다. 것 같이 같이 같이 같이 않았다. 것 것 같이 같이 같이 같이 같이 같이 않았다. 것 같이 같이 같이 같이 같이 같이 같이 않았다. 것 것 같이 같이 같이 않았다. 것 것 같이 같이 같이 같이 않았다. 것 같이 같이 같이 같이 같이 않았다. 것 같이 같이 같이 않았다. 것 것 같이 않았다. 것 것 같이 않 않 않 않 않았다. 것 같이 것 것 않았다			ND = Not D			
N/A = Not Applicable			C = Confirm	ntion analysis unavailable		

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Sample Identification Client Sample ID RJ	n LG ID	Sampling Date	Analysis Date	Analyte	Concentration ug/tube	RL	Qualifier
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	
eport Qualifiers: = Target Analyte media breakthrough suspect, see anai = Analyte analyzed in a dilution = Report concentration was above the instrument calib = Analyte detector bloca quantitation limits, concentra = Liburay spectrum match, rsd >90% ur RT match = RPD (relative prevent difference) outside accepted ro i= Analyte detector for but not detected (A = Net Applicable	ration range tion is estimated		d = Data tha $H = HoldingL = Sample + G Q = Result + GS = Spike Ret Z = Not ELND = Not E$	detected in the associated blank t exceeds the RSD criteria set by the SOP times for preparation or analysis exceeded condition at receipt out of compliance with u of method specific acceptance QC criteria vary autistic decepted recovery limits W accredited analyte Vetected ation analysis unavailable			

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Sample Identification Client Sample ID RJL0	S ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifier
16-05982-11-E1 \$16T021338	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 \$16T021339	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		N-Nitrosodiethylamine	<0.022	0.022	
		07/15/16		N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/15/16		N-Nitrosodi-n-butylamine	<0.022	0.022	
		07/15/16		N-Nitrosopiperidine	<0.022	0.022	
		07/15/16		N-Nitrosopyrrolidine	<0.022	0.022	
		07/15/16		N-Nitrosomorpholine	<0.022	0.022	
epert Qualifiers: = Target Analyte media breakthrough suspect, see analyti > Analyte analyzed in a dilitation = Report concentration usa above the instrument calibrati = Analyte devices device quantitation limits, concentration = Library spectrum match, rol >90% or RT match = RPD (relative percent difference) outside accepted record = Analyte devices for but not delected Is = Not Aprilicable	ion range t is estimated		d = Data that H = Holding L = Sample o Q = Result o S = Spike Res Z = Not ELA ND = Not D	letected in the associated blank exceeds the RSD criteria set by the SOP times for preparation or analysis exceeded multition at receipt out of compliance with n at oper unside acceptance QC: riteria of our outside acceptance QC: criteria or our outside acceptant recovery limits P acceeding analysis exceeding analysis unarcallable			

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◯ RJ LEE GROUP

Sample Identification Client Sample ID RJI	.G ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifier
16-05982-11-H1 \$16T021342	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	С
		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 516T021343	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 516T021344	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	1
		07/16/16		N-Nitrosodimethylamine	0.126	0.023	
		07/16/16		N-Nitrosomethylethylamine	<0.020	0.020	
		07/16/16		N-Nitrosomethylethylamine	0.249	0.023	
		07/16/16		N-Nitrosodiethylamine	<0.020	0.020	
		07/16/16		N-Nitrosodiethylamine	0.033	0.022	
		07/16/16		N-Nitrosodi-n-propylamine	<0.019	0.019	
		07/16/16		N-Nitrosodi-n-propylamine	0.115	0.021	
leport Qualifiers: = Target Analyte media breakthrough suspect, see analy = Analyte analyzed in a dilution = Report concentration was above the instrument califie = Analyte detected below quantitation limits, concentration = Library systems match, rsd >90% w KT maleh = Library systems match, rsd >90% w KT maleh = RPD (relative procent difference) outside accepted reo I = Analyte analyzed for but not detected VA = Not Applicable	ation range ion is estimated		d = Data tha H = Holding L = Sample o Q = Result o S = Spike Ro	detected in the associated blank et exceeds the RSD criteria set by the SOP (times for preparation or analysis exceeded out of method specific acceptance QC criteria vancer analysis exception ecceptance QC criteria vancer analysis exception tecorery limits AP accredited analyte vetexted			

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◯ RJ LEE GROUP

Sample Identification Client Sample ID RJLG I	D	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifier
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 \$16T021346	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-BI 516T021347	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		N-Nitrosodi-n-propylamine	<0.021	0.021	
		07/16/16		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		N-Nitrosomorpholine	<0.022	0.022	
eport Qualifiers: = Target Analyte media broakthrough suspect, see analytical = Analyte analyzed in a dilution = Report concentration was above the instrument calibration = Analyte detected below quantilation limits, concentration is = Library spectrum match, rsd >80% w RT match = RPD (relative percent difference) outside accepted recovery I = Analyte analyzed for but not detected (A = Not Applicable	range estimated		d = Data thi N = Holdiny L = Sample Q = Result o S = Spike Ra Z = Not EL ND = Not L	detected in the associated blank t exceeds the RSD criteria set by the SOP (times for preparation or analysis exceeded) condition at receipt out of compliance with us of method system (in exception CC) (criteria variant) and the state of the set of the set exceeds of the set	method defined conditions		

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Sample Identification Client Sample ID RJI	.G ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifier
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 516T021351	W607059-20	07/16/16	07/29/16	N-Nitrosodimethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosomethylethylamine	<0.023	0.023	
		07/16/16	07/29/16	N-Nitrosodiethylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-propylamine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	<0.021	0.021	
		07/16/16	07/29/16	N-Nitrosopiperidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
16-05983-11-EFF-BASE \$16T021352	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		N-Nitrosomorpholine	<0.022	0.022	
eport Qualifiers: = Target Analyte media breakthrough suspect, see analy = Analyte analyzed in a dibution = Report concentration was above the instrument calibu = Analyte detected below quantitation limits, concentrat = Library spectrum match, rsd >90% w RT match	ation range ion is estimated		d = Data theH = HoldingL = SampleQ = Result oS = Spike Re	detected in the associated blank it exceeds the RSD criteria set by the SOP times for preparation or analysis exceeded condition at receipt out of compliance with and of method specific acceptance QC criteria exceept outside accepted recovery limits	method defined conditions		
= RPD (relative percent difference) outside accepted rec = Analyte analyzed for but not detected	overy limits		ND = Not I				
l/A = Not Applicable			C = Confirm	ration analysės unavailable			

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◯ RJ LEE GROUP

Sample Identifie Client Sample ID	ration RJLG ID	Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifier
16-05983-11-F1 \$16T021353	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 516T021354	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		N-Nitrosodi-n-propylamine	0.038	0.022	
		07/16/16	07/29/16	N-Nitrosodi-n-butylamine	0.023	0.021	С
		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		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		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		N-Nitrosopiperidine	<0.022	0.022	
		07/16/16		N-Nitrosopyrrolidine	<0.022	0.022	
		07/16/16	07/29/16	N-Nitrosomorpholine	<0.022	0.022	
eport Qualifiers: = Target Analyte media brokthrough suspect, si = Analyte analyzed in a dilution = Roport concordation uses above the instrument = Analyte detected below quantitation limits, con = Liburys spectrum match, sid >00% we RT mat = RDT (relative general difference) makids weep = Analyte analyzed for but not detected	t calibration range centration is estimated th		d = Data theH = HoldingL = SampleQ = Result oS = Spike Re	detected in the associated blank at exceeds the RSD criteria set by the SOP (times for preparation or analysis's exceeded condition at receipt out of compliance with out of method specific acceptance QC criteri excorry outside accepted recovery limits AP accedited analyte betected	method defined conditions		
l/A = Not Applicable				nation analysis unavailable			

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Sample Identification Client Sample ID RJLG ID		Sampling Date	Analysis Date	Analyte	Concentration µg/tube	RL	Qualifier
16-05983-11-IN-BASE \$16T021357	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	
eport Qualifiers:			B = Analyte	detected in the associated Mank			
- Transf. Associate models be added as a provided on a such that are	in all		1. MA	a			

A = Target Analyte media breakthrough suspect, see analytical report D = Analyte analyzed in a dilutionE = Report concentration was above the instrument calibration range E = koport concentration was above in environment catarramon range<math display="inline">[] = Analyte detected bylcox quantifiation limits, concentration is estimated<math>P = thrang spectrum match, rod >90% w RT matchR = RPD (relative percent difference) ontside accepted recovery limitsU = Analyte analyzed for but not detected

N/A = Not Applicable

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 = Syike Recovery outside accepted recovery limits Z = Not ELAP accredited analyte

ND = Not Detected C = Confirmation analysis unavailable

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These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard usurranty and limitation of liability provisions. No responsibility or liability is assumed for the manuse in which the results are used or interpreted. Unless molified in writing to return the samples covered by this report. RJ Lee Group will store the samples for a period q hinty (90) days before discarding. A shipping and handling for will be assessed for the return of any samples. Unless otherwise noted, samples were received in an acceptable condition. This laboratory operates in accordance with ISO 17025 guidelines, and holds limited scopes of accreditation under ORELAP Lab Code 4061 AltHA-LAP, LL to LD 172655 PAPA ID WAODIS's and WA DOE Lab DE COSP. The period may not be used to claim product endosement by any laboratory according gency. The results contained in this report relate only to the items tested or to the samples's as received by the laboratory. Any reproduction of this document must be in full for the report to be collid. Quality control data is available upon request.

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ORJ 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		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		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		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		07/27/16	0.200	0.179	0.91	0.196	98.1	2.35	
N-Nitrosopyrrolidine	930-55-2	a series and the first sector of	07/28/16	0.200	0.181	0.90	0.200	99.9	1.19	
N-Nitrosopyrrolidine	930-55-2		07/28/16	0.200	0.209	1.04	0.201	100	0.357	
N-Nitrosodiethylamine	55-18-5		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	a data da	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		07/28/16	0.200	0.197	1.00	0.197	98.7	1.16	
N-Nitrosodi-n-butylamine	924-16-3		07/27/16	0.200	0.184	0.91	0.202	101	1.20	
N-Nitrosodi-n-butylamine	924-16-3		07/28/16	0.200	0.193	0.93	0.206	103	2.82	
N-Nitrosodi-n-butylamine	924-16-3	Contraction of the second	07/28/16	0.200	0.203	1.01	0.202	101	1.55	
N-Nitrosodi-n-propylamine	621-64-7	and the second second second second second second second second second second second second second second second	07/27/16	0.200	0.190	0.93	0.204	102	2.32	
N-Nitrosodi-n-propylamine	621-64-7		07/28/16	0.200	0.191	0.93	0.206	103	3.20	
N-Nitrosodi-n-propylamine	621-64-7		07/28/16	0.200	0.203	1.04	0.194	97.3	2.94	
N-Nitrosomethylethylamine	10595-95-6	e a compañía de terter	07/27/16	0.200	0.178	0.89	0.200	100	1.13	
N-Nitrosomethylethylamine	10595-95-6		07/28/16	0.200	0.181	0.87	0.208	104	4.17	
N-Nitrosomethylethylamine	10595-95-6	00(4)2)04	07/28/16	0.200	0.199	1.01	0.196	98.0	2.26	
N-Nitrosomorpholine	59-89-2		07/27/16	0.200	0.187	0.92	0.202	101	1.32	
N-Nitrosomorpholine	59-89-2		07/28/16	0.200	0.190	0.93	0.205	102	2.87	
N-Nitrosomorpholine	59-89-2		07/28/16	0.200	0.209	1.06	0.196	98.3	1.48	
N-Nitrosopiperidine	100-75-4		07/27/16	0.200	0.185	0.92	0.201	100	0.906	
N-Nitrosopiperidine	100-75-4	and the second second	07/28/16	0.200	0.187	0.92	0.203	102	2.46	
N-Nitrosopiperidine	100-75-4		07/28/16	0.200	0.206	1.03	0.200	99.7	0.774	
N-Nitrosopyrrolidine	930-55-2		07/27/16	0.200	0.188	0.91	0.206	103	2.35	
N-Nitrosopyrrolidine	930-55-2		07/28/16	0.200	0.183	0.90	0.203	101	1.19	
N-Nitrosopyrrolidine	930-55-2		07/28/16	0.200	0.208	1.04	0.200	99.6	0.357	
N-Nitrosodiethylamine	55-18-5		07/27/16		0.00	0.91	0.00	0.22		
N-Nitrosodiethylamine	55-18-5	A STOCKED	07/28/16		0.00	0.90	0.00			
N-Nitrosodiethylamine	55-18-5		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	0.020	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	9/9/22/01	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		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	МВ	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		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		07/27/16	0.020	0.023	0.88	0.026	128		
N-Nitrosodimethylamine	62-75-9		07/28/16	0.020	0.021	0.85	0.025	123		
N-Nitrosodimethylamine	62-75-9		07/28/16	0.020	0.028	1.00	0.028	139		
N-Nitrosodi-n-butylamine	924-16-3		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	CONTROL #	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		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		07/28/16	0.020	0.024	0.87	0.027	136		
N-Nitrosomethylethylamine	10595-95-6		07/28/16	0.020	0.024	1.01	0.024	119		
N-Nitrosomorpholine	59-89-2		07/27/16	0.020	0.022	0.92	0.024	122		
N-Nitrosomorpholine	59-89-2		07/28/16	0.020	0.021	0.93	0.023	115		
N-Nitrosomorpholine	59-89-2		07/28/16	0.020	0.026	1.06	0.024	118		
N-Nitrosopiperidine	100-75-4		07/27/16	0.020	0.023	0.92	0.025	127		
N-Nitrosopiperidine	100-75-4		07/28/16	0.020	0.022	0.92	0.024	118		
N-Nitrosopiperidine	100-75-4	· · · · · · · · ·	07/28/16	0.020	0.026	1.03	0.025	125		
N-Nitrosopyrrolidine	930-55-2	255 A.C. 9. 275.4	07/27/16	0.020	0.023	0.91	0.025	127		
N-Nitrosopyrrolidine	930-55-2		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, s D = Analyte analyzed in a dilution E = Report concentration uses above the instrumer = Analyte detected below quantitation limits, so P = Library spectrum match, rod 500% w RT mat R = RPD (relative percent difference) outside accel t = Analyte analyzed for but not detected N/A = Not Applicable Scientist II DeNomy Dage	it catibration range icentration is estimated ich)&	d = H = I. = Q = S = Z =	Analyte detected i Data that exceeds Holding times for Sample condition, Result out of meti Spike Revery on Not ELAP accred = Not Detected	the RSD criteria preparation or a at receipt out of c tod specific accep tside accepted rec	set by the nalysis exi ompliance tance QC	verded with method defines criteria	l conditions		

These results are submitted pursuant to RL Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability procisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples covered by this report, RL Lee Group will store the samples for a period of ninety (90) days before disarding. A shipping and handling the will be assessed for the return of any samples. Unless otherwise noted, samples were received in an acceptable condition. This laboratory operates in accodance with ISO 17025 guidelines, and holds limited scopes of acceptiation under ORELAP Lab Code 4061 AHALAP, Led IaD 172656 EPA ID WA01195 and WA DOL Lab ID CS99. This report may not be used to claim product endoscement by any laboratory acceptible ogency. The results contained in this report relate only to the items tested or to the sample's) as received by the laboratory. Any reproduction of this document must be in full for the report to be

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FINAL SAMPLE DISPOSITION	Relinquished By	Relinquished By Relinquished By Relinquished By Relinquished By	POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes)											Sample No.	Protocol N/A	Shipped To (Lab)	Project Title CARTRIDGE EVALUATION	SAF No.	Collector	ASSEMDIER N/A	Annahlas
Disposal Method		kolden k	PLE HAZARDS/	S16T021341	S16T021340	S16T021339	S16T021338	S16T021337	S16T021336	S16T021335	S16T021334	S16T021333	S16T021332	Lab ID			ATION				
(e.g., R		SAKE	REMAR	VA	VA	VA	VA	Vλ	VA	VA	VA	VA	VA	•							
ONSOMED		A LAND	KS (List all k	7/15/16	7/15/16	7/15/16	7/15/16	7/15/16	7/15/16	7/15/16	7/15/16	7/15/16	7/15/16	Date							
omer, per la		71-67-6	nown wast											Time							
Disposal Method (e.g., Return to customer, per lab procedure, used in process) CONSDMED	Date/Time R	ate/Time <u> </u>	MSDS O	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	No./Type Container	Data Tumaround	Method of Shipment	Logbook/ Work Package No.	CARTRIDGE EVALUATION	Contact/Requestor	CH	
n process)	Received By	Received By Received By LUCe Received By	Yes 🕥 No	Nitrosamines	Nitrosamines	Nitrosamines	Nitrosamines	Nitrosamines	Nitrosamines	Nitrosamines	Nitrosamines	Nitrosamines	Nitrosamines		D	ment	Package No.	LUATION	stor	AIN OF CUS	
Disposed By		T. RICE RILEE SROUP	SPECIAL INSTRUCTIONS Send Results to Carl Howald IV @ Greg Mo Carl W Howald@rl.qov and GregGry_S_Moore@rl.gov see SOW for email CONTRACT 55503 RELEASE 5	16-05982-11-G1 - ~ .	Nitrosamines 16-05982-11-F1 r 🔹 V	Nitrosamines 16-05982-11-EFF-BASE	16-05982-11-E1 · · V	Witrosamines 16-05982-11-D1 /	Nitrosamines 16-05982-11-Cl · : 🗸	16-05982-11-BLANK • .	16-05982-11-81	Nitrosamines 16-05982-11-A2. • V	16-05982-11-A1 · V	S						TODY/SAMPLE AN	
	Date/Time	DateTime 7-/9-16 0230 DateTime ROUP 7/19/10 11: 15 DateTime DateTime	Howald IV @ Greg Moore and v see SOW for email	<	<	. ~				2				Sample Analysis	Parts and Return No.	Bill of Lading/Air Bill No.	Ice Chest No.	Purchase Order/Charge Code 202003/CB20	Telephone No 373-6861	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	
Date/Time	A = Air DS = Drum Solids	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil	Hold Time														Temp.	ode	MSIN T6-05 FAX	Page 1 of	In non N
Date/Time	×	Aatrix*																		20162	>
14:45	= Other	= Drum Liquids = Tissue = Wipe = Liquid = Liquid = Vegetation = Vapor		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Preservative					372-1878	097 of 3	

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FINAL SAMPLE DISPOSITION	Relinquished By	RE Kocces	Relinquished By Print		POSSIBLE SAMPLE HAZARDS/REMARKS (I ist all known wastes)	\$167021350	\$167021349	S16T021348	S16T021347	S16T021346	\$16T021345	\$167021344	S16T021343	S16T021342	Sample No. Lab ID	Protocol N/A	Shipped To (Lab)	CARTRIDGE EVALUATION	SAF No.	JONES	8/74	Assembler
CON		X	Sign		VA 7/	VA 7/	VA 7/	VA 7/	VA 7/	VA 7/	VA 7/	VA 7/	VA 7/	VA 7/	•							
D N S UME D		ויך פ	Sign		7/16/16 KS (List all kr	7/16/16	7/16/16	7/16/16	7/16/16	7/16/16	7/16/16	7/15/16	7/15/16	7/15/16	Date							
omer, per la		7-19-16	2.7.1		nown waste										Time							
Disposal Method (e.g., Return to customer, per lab procedure, used in process) CONSUMED	Date/Time R	Date/Time R	0°	(Thermosorb-N MSDS O Yes	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	Thermosorb-N	No./Type Container	Data Turnaround	Method of Shipment	Logbook/ Work Package No.	CARTRIDGE EVALUATION	CARL HOWALD IV	СН	-
JP Disposed By	Received By	2 RIL Opper 7-	Received By Print Sign	(Nitrosamines 16-05983-11-E1 , ~	Nitrosamines 16-05983-11-01. 🕈	Nitrosamines 16-05983-11-C1 🛪	Nitrosamines 16-05983-11-BLANK	Nitrosamines 16-05983-11-81	Nitrosamines 16-05983-11-A2	Nitrosamines 16-05983-11-A1 🔨	Nitrosamines 16-05982-11-IN-BASE 7	Nitrosamines 16-05982-11-H2	Nitrosamines 16-05982-11-H1		٩	nent	Package No.	JUATION	tor	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	
	Date/Time		Date/Time	wald IV @ Greg Moore d see SOW for email											Sample Analysis	Parts and Return No.	Bill of Lading/Air Bill No.	Ice Chest No.	Purchase Order/Charge Code 202003/CB20	Telephone No373-6861	LYSIS REQUEST	
Date/Time	A = Air X DS = Drum Solids	= Solid WI = Sludge L = Water V = Oli VA	S = Soil DL SE = Sediment T		Hold Time													Temp.	de	MSIN FAX	20162097 Page 2 of	C.O.C. No.
54:41	= Other	= Wipe = Liquid = Vegetation = Vapor	= Drum Liquids = Tissue		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Preservative					372-1878	2097 of 3	

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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 correction¹ as shown in the following equation:

$$C = 24.45 \frac{r}{MV}$$

where *C* is the concentration of COPC in ppmv; *r* is the analytical result with units of μ g/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	<u>8.7</u>
B	6.9	7.2	7.1
С	2.3	2.5	2.4
D	0.8	0.8	0.8
Е	1.9	2.1	2.0
F	3.8	6.8	5.3
G	1.6	1.7	1.7
Н	7.7	6.5	7.1
Ι	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 85.9°F (or 302.9 K). Here, for tube location 'A' and upstream of the respirator cartridge, the corresponding temperature correction factor would be 0.984, and the pressure correction factor for the respirator cartridge outlet would be 0.944. When multiplied, these two factors equal 0.929, which would be the overall correction to the reported volume measurement.

- 5. The analytical detection limit—or reporting limit in some cases—for every COPC was obtained from the raw analytical data. Here, the average flow rate was used to calculate the approximate analytical detection limit as the percentage of 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%
-	Ammonia	10	5565-112	405	25	2000/10		2.33%
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%	125	7.43%
5	Weredry	10	5565-112	0.00041	0.005	13.376		1.4370
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%
	and burneric							
4	1,3-Butadiene	14	5983-G1	2.4	1.0	241%		2.02%

COPC #		Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL
5	Benzene		2	5982-A1	0.00276	0.50	0.551%	N DLr	(%OEL) 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%	125	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		10	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	5983-01 5983-H2	0.00012	0.50	0.024%	YES	0.024%
5	benzene		10	3363-H2	0.00012	0.50	0.02476	165	0.02476
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%
-									0.0050/
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%	1150	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	4.0		8	5983-D1	0.00088	20	0.004%	YES	0.005%
	1-Butanol					20	0.0049/	VEC	0.005%
7	1-Butanol 1-Butanol		10	5983-E1	0.00083	20	0.004%	YES	0.00370
7			12	5983-E1 5983-F1	0.00083	20	0.004%	YES	0.005%
	1-Butanol								

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-H1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	4	5982-A2	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	6	5982-61 5982-C1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	8	5982-C1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	10	5982-D1	0.00008	0.50	0.016%	YES	0.030%
11	4-Methyl-2-hexanone	10	5982-E1 5982-G1	0.00015	0.50	0.010%	YES	0.030%
				0.00015				
11	4-Methyl-2-hexanone	16	5982-H2		0.50	0.030%	YES	0.030%
11	4-Methyl-2-hexanone	2 16	5983-A1	0.00111 0.00101	0.50	0.223%		0.030%
11	4-Methyl-2-hexanone		5983-H1				VEC	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%
			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%	5.041	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	Acetaldehvde	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	10	5983-E1	0.20	25	0.783%		0.005%
15	Acetaldehyde	14	5983-G1	0.18	25	0.724%		0.005%
15	Acetaldehyde	14	5983-H2	0.19	25	0.749%		0.005%
15	Acetaldeliyde	10	5565-ff2	0.15	25	0.74376		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	5982-01	0.00020	25	0.001%	YES	0.001%
16	Butanal	8	5982-D1	0.00020	25	0.001%	YES	0.001%
16	Butanal	10	5982-E1	0.00020	25	0.001%	YES	0.001%
16	Butanal	10	5982-G1	0.00027	25	0.001%	YES	0.001%
16	Butanal	14	5982-01 5982-H2	0.00027	25	0.001%	YES	0.001%
16	Butanal	2	5983-A1	0.001	25	0.085%	TES	
				0.019				0.001%
16 16	Butanal	16	5983-H1		25	0.075%	VEC	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%	VEC	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%	125	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%
20	2,5 Dinyaroraran	10	5505 112	0.00002	0.001	1.00%	125	1.01/0
21	2,5-Dihydrofuran	2	5982-A1	0.00021	0.001	20.7%	1000	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%
	2,5-Dihydrofuran	16	5983-H2	0.00002	0.001			

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	10	5983-E1	0.00002	0.001	1.90%	YES	1.98%
22		12	5983-G1	0.00002	0.001	1.87%	YES	1.98%
22	2-Methylfuran							
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%
25	2,5-bimetryndran	10	5565-112	0.00005	0.001	5.64%	125	5.10%
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%
	2-Pentylfuran	10	5983-E1	0.00002	0.001	1.67%	YES	1.74%
77		12	2202-11	0.00002	0.001	1.07%	TES	1./4%
27 27	2-Pentylfuran	14	5983-G1	0.00002	0.001	1.69%		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%
	Black Island Island	12	5983-F1	0.00022	0.55	0.040%	YES	0.041%
33	Diethylphthalate					0.04076	165	0.041/0
33 33 33	Diethylphthalate Diethylphthalate Diethylphthalate	14	5983-G1 5983-H2	0.00022 0.00021	0.55	0.040%	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 10	5983-D1	0.00080	6.0	0.013%		0.003%
35 35	Propanenitrile	10	5983-E1 5983-F1	0.00264 0.00628	6.0 6.0	0.044% 0.105%		0.003%
35	Propanenitrile Propanenitrile	12	5983-F1 5983-G1	0.00028	6.0	0.223%		0.003%
35	Propanenitrile	14	5983-G1 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%	WEG	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 36	Butanenitrile Butanenitrile	6 8	5982-C1 5982-D1	0.00012 0.00012	8.0 8.0	0.002%	YES	0.003%
36		10	5982-D1 5982-E1	0.00012	8.0	0.001%		0.003%
36	Butanenitrile Butanenitrile	10	5982-E1	0.00012	8.0	0.003%	YES	0.003%
36	Butanenitrile	14	5982-01 5982-H2	0.00032	8.0	0.004%	165	0.003%
36	Butanenitrile	2	5982-H2	0.014	8.0	0.172%		0.003%
36	Butanenitrile	16	5983-H1	0.014	8.0	0.135%		0.003%
36	Butanenitrile	2	5983-A2	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	4	5983-R2	0.00012	8.0	0.002%	YES	0.003%
36	Butanenitrile	6	5983-01 5983-C1	0.00012	8.0	0.001%	YES	0.003%
36	Butanenitrile	8	5983-D1	0.00012	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%
	Butanenitrile	14	5983-G1	0.00012	8.0	0.001%	YES	0.003%
36								

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	10	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%	TES	0.003%
38	Hexanenitrile	16	5983-H1	0.00188	6.0	0.031%		
38	Hexanenitrile	2	5983-A2	0.00011	6.0		VEC	0.003%
38	Hexanenitrile	4				0.002%	YES	0.003%
			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	10	5983-E1	0.00488	5.0	0.097%	YES	0.103%
42	Ethylamine	12	5983-G1	0.00480	5.0	0.096%	YES	0.103%
42	Ethylamine	14		0.00487	5.0			
42	curylamine	10	5983-H2	0.00487	5.0	0.097%	YES	0.103%

4 N.Nirosodimetrylamine 2 982-41 0.00009 0.0003 1384 4 N.Nirosodimetrylamine 2 982-42 0.00009 0.0003 11.75; YES 4 N.Nirosodimetrylamine 6 5982-41 0.00004 0.0003 11.75; YES 4 N.Nirosodimetrylamine 6 5982-61 0.0003 0.0003 11.75; YES 4 N.Nirosodimetrylamine 10 5982-61 0.0003 0.0003 11.25; YES 4 N.Nirosodimetrylamine 14 5982-61 0.0003 0.0003 11.25; YES 4 N.Nirosodimetrylamine 12 5983-41 0.00028 0.0003 11.25; YES 4 N.Nirosodimetrylamine 2 5983-42 0.00038 11.75; YES 4 N.Nirosodimetrylamine 2 5983-41 0.00038 10.0003 11.75; YES 4 N.Nirosodimetrylamine 4 5988-41 0.00003 11.35; <th>COPC #</th> <th>Analyte</th> <th>End Time (h)</th> <th>Position</th> <th>Conc. (ppm)</th> <th>OEL (ppm)</th> <th>Fraction of OEL</th> <th>Measurement < DL?</th> <th>Approx. DL (%OEL)</th>	COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL?	Approx. DL (%OEL)
43 NNitrosodimethylamine 2 5982-A2 0.0003 11.2% YES 43 NNitrosodimethylamine 6 5982-C1 0.0003 11.2% YES 43 NNitrosodimethylamine 10 5982-C1 0.0003 10.003 11.2% YES 43 NNitrosodimethylamine 10 5982-C1 0.0003 10.003 11.2% YES 43 NNitrosodimethylamine 14 5982-C1 0.0003 10.003 11.2% YES 43 NNitrosodimethylamine 12 5983-A1 0.0003 10.003 12.4% YES 43 NNitrosodimethylamine 2 5983-A1 0.0003 11.2% YES 43 NNitrosodimethylamine 6 5983-11 0.0003 11.2% YES 43 NNitrosodimethylamine 6 5983-12 0.0003 11.2% YES 44 NNitrosodimethylamine 10 5983-12 0.0003 11.2% YES 45 NN							134%		11.7%
43 N-Nitrosodimetylamine 4 5982-61 0.00004 0.0003 11.6% YES 43 N-Nitrosodimetylamine 6 5982-61 0.00003 0.0003 11.7% YES 43 N-Nitrosodimetylamine 10 5982-61 0.00003 0.0003 10.2% YES 43 N-Nitrosodimetylamine 14 5982-61 0.00003 0.0003 11.2% YES 43 N-Nitrosodimetylamine 16 5982-14 0.00003 0.0003 10.2% YES 43 N-Nitrosodimetylamine 2 5983-81 0.00003 0.0003 11.7% YES 43 N-Nitrosodimetylamine 6 5983-51 0.00003 0.0003 11.3% YES 43 N-Nitrosodimetylamine 10 5983-51 0.00003 0.0003 11.3% YES 44 N-Nitrosodimetylamine 10 5983-51 0.00003 0.0003 11.3% YES 44 N-Nitrosodimetylamine 10 5983									11.7%
43 N.Nircodimetylamine 6 5982-01 0.00003 0.0003 11.7% YES 43 N.Nircodimetylamine 10 5982-01 0.00003 0.0003 11.2% YES 43 N.Nircodimetylamine 14 5982-11 0.00003 0.0003 11.2% YES 43 N.Nircodimetylamine 14 5982-12 0.00003 0.0003 11.2% YES 43 N.Nircodimetylamine 15 5983-11 0.00018 0.0003 94.0% 43 N.Nircodimetylamine 2 5983-14 0.00003 0.0003 11.7% YES 43 N.Nircodimetylamine 4 5983-11 0.00003 0.0003 11.3% YES 43 N.Nircodimetylamine 10 5983-11 0.00003 0.0003 11.3% YES 43 N.Nircodimetylamine 16 5983-11 0.00003 0.0003 11.3% YES 44 N.Nircodimetylamine 16 5982-14 0.00002									11.7%
43 N-Nitrosodimetylamine 8 5982-E1 0.00004 0.0003 11.3% YES 43 N-Nitrosodimetylamine 12 5982-E1 0.00003 0.0003 11.3% YES 43 N-Nitrosodimetylamine 16 5982-61 0.00003 0.0003 11.2% YES 43 N-Nitrosodimetylamine 16 5982-61 0.00003 0.0003 96.0% 43 N-Nitrosodimetylamine 16 5983-A1 0.00003 0.0003 91.0% 44 N-Nitrosodimetylamine 6 5983-61 0.00003 0.0003 11.3% YES 45 N-Nitrosodimetylamine 6 5983-61 0.00003 0.0003 11.3% YES 45 N-Nitrosodimetylamine 10 5983-61 0.00003 0.0003 11.3% YES 44 N-Nitrosodimetylamine 10 5983-71 0.00003 0.0001 25.5% 44 N-Nitrosodiethylamine 10 5983-71 0.000003 0.0001									11.7%
43 N-Nirosodimetylamine 10 5982-E1 0.0003 0.003 10.9% YES 43 N-Nirosodimetylamine 14 5982-F1 0.0003 0.0003 11.2% YES 43 N-Nirosodimetylamine 16 5982-H2 0.0003 0.0003 60.6% YES 43 N-Nirosodimetylamine 16 5983-A1 0.0003 60.003 94.0% 43 N-Nirosodimetylamine 16 5983-A1 0.0003 0.0003 11.7% YES 43 N-Nirosodimetylamine 2 5983-A1 0.00003 0.0003 11.7% YES 43 N-Nirosodimetylamine 8 5983-D1 0.00003 0.0003 11.3% YES 43 N-Nirosodimetylamine 10 5983-F1 0.00003 0.0003 11.3% YES 43 N-Nirosodimetylamine 16 5983-F1 0.00002 0.0001 2.5% 44 N-Nirosodiethylamine 16 5982-F1 0.00002 0.0001		-							11.7%
43 N-Nitrosodimetylamine 12 5982-51 0.0003 0.003 12.2% YES 43 N-Nitrosodimetylamine 16 5982-14 0.0003 0.0003 11.2% YES 43 N-Nitrosodimetylamine 16 5983-14 0.00018 0.0003 96.0% 43 N-Nitrosodimetylamine 16 5983-14 0.0003 0.0003 11.4% YES 43 N-Nitrosodimetylamine 2 5983-21 0.0003 0.0003 11.2% YES 43 N-Nitrosodimetylamine 8 5983-51 0.00003 0.0003 11.2% YES 43 N-Nitrosodimetylamine 10 5983-71 0.00003 0.0003 11.3% YES 44 N-Nitrosodiethylamine 10 5983-71 0.00003 0.0003 11.3% YES 44 N-Nitrosodiethylamine 10 5983-71 0.00002 0.0001 24.5% YES 44 N-Nitrosodiethylamine 10 5982-72 0.0									11.7%
43 N-Nitrosodimethylamine 14 592-62 0.0003 0.0003 11.2% YES 43 N-Nitrosodimethylamine 15 5933-41 0.00018 0.0003 60.6% 43 N-Nitrosodimethylamine 15 5933-41 0.0003 0.0003 11.4% YES 43 N-Nitrosodimethylamine 2 5933-61 0.0003 0.0003 11.7% YES 43 N-Nitrosodimethylamine 6 5933-61 0.0003 0.0003 11.7% YES 43 N-Nitrosodimethylamine 12 5933-61 0.0003 0.0003 11.4% YES 44 N-Nitrosodimethylamine 12 5933-61 0.00003 0.0003 11.3% YES 44 N-Nitrosodiethylamine 16 5932-41 0.00003 0.0001 25.5% 44 N-Nitrosodiethylamine 2 5952-61 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 6 5952-10 0.00002									11.7%
43 N-Nitrosodimethylamine 16 5982-41 0.0003 0.0003 94.0% 43 N-Nitrosodimethylamine 16 5983-41 0.00013 0.0003 94.0% 43 N-Nitrosodimethylamine 16 5983-41 0.0003 0.0003 11.7% YES 43 N-Nitrosodimethylamine 6 5983-51 0.00004 0.0003 11.7% YES 43 N-Nitrosodimethylamine 6 5983-51 0.00003 0.0003 11.3% YES 43 N-Nitrosodimethylamine 10 5983-51 0.00003 0.0003 11.3% YES 44 N-Nitrosodimethylamine 14 5983-61 0.00003 0.0001 26.5% 44 N-Nitrosodiethylamine 16 5982-41 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 6 5982-61 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5982-61 0.00002 0.0001									11.7%
43 N-Nitrosodimethylamine 2 593.41 0.00018 0.0003 94.0% 43 N-Nitrosodimethylamine 2 5983.42 0.00003 0.0003 11.4% YES 43 N-Nitrosodimethylamine 4 5983.51 0.00003 0.0003 11.7% YES 43 N-Nitrosodimethylamine 6 5983.51 0.00003 0.0003 11.3% YES 43 N-Nitrosodimethylamine 10 5983.41 0.00003 0.0003 11.3% YES 44 N-Nitrosodimethylamine 16 5983.412 0.00003 0.0003 11.3% YES 44 N-Nitrosodiethylamine 16 5983.42 0.00003 0.0001 23.5% YES 44 N-Nitrosodiethylamine 2 5982.42 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 6 5982.01 0.00002 0.0001 24.2% YES 44 N-Nitrosodiethylamine 16 5982.41		-							11.7%
43 N-Nitrosodimethylamine 16 \$983-41 0.00028 0.0003 \$11.4% YES 43 N-Nitrosodimethylamine 4 \$983-51 0.0003 \$11.7% YES 43 N-Nitrosodimethylamine 6 \$983-51 0.0003 \$11.7% YES 43 N-Nitrosodimethylamine 8 \$983-51 0.0003 \$11.3% YES 44 N-Nitrosodimethylamine 10 \$983-51 0.0003 \$0.0003 \$11.3% YES 43 N-Nitrosodimethylamine 14 \$983-61 0.00003 \$0.0003 \$11.3% YES 44 N-Nitrosodiethylamine 16 \$982-41 0.00002 0.0001 \$23.5% YES 44 N-Nitrosodiethylamine 2 \$982-61 0.00002 0.0001 \$24.4% YES 44 N-Nitrosodiethylamine 6 \$982-01 0.00002 0.0001 \$24.5% YES 44 N-Nitrosodiethylamine 16 \$982-61 0.00002 0.0001								YES	11.7%
43 N-Nitrosodimethylamine 2 593.42 0.0003 11.4% YES 43 N-Nitrosodimethylamine 4 593.41 0.0003 11.7% YES 43 N-Nitrosodimethylamine 6 593.51 0.0003 11.3% YES 43 N-Nitrosodimethylamine 10 593.41 0.0003 0.0003 11.4% YES 44 N-Nitrosodimethylamine 12 593.41 0.0003 0.0003 11.3% YES 45 N-Nitrosodimethylamine 16 593.42 0.00003 0.0003 11.3% YES 44 N-Nitrosodiethylamine 16 593.42 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 2 593.242 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 6 593.241 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 593.421 0.00002 0.0001 23.5% <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>11.7%</td>									11.7%
43 N-Nitrosodimethylamine 4 593-81 0.0004 0.0003 11.7% YES 43 N-Nitrosodimethylamine 6 593-01 0.0003 0.0003 11.3% YES 43 N-Nitrosodimethylamine 10 593-81 0.0003 0.0003 11.3% YES 43 N-Nitrosodimethylamine 12 593-81 0.0003 0.0003 11.3% YES 44 N-Nitrosodimethylamine 14 593-61 0.00003 0.0003 11.3% YES 44 N-Nitrosodiethylamine 16 5982-41 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 16 5982-41 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5982-41 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5982-41 0.00002 0.0001 24.3% YES 44 N-Nitrosodiethylamine 10 5982-41								VEC	11.7%
43 N-Nitrosodimethylamine 6 \$933.41 0.0003 11.7% YES 43 N-Nitrosodimethylamine 10 \$933.81 0.0003 0.0003 11.4% YES 43 N-Nitrosodimethylamine 12 \$933.81 0.0003 0.0003 11.2% YES 43 N-Nitrosodimethylamine 12 \$933.81 0.0003 0.0003 11.2% YES 44 N-Nitrosodiethylamine 16 \$932.41 0.00003 0.0001 23.3% YES 44 N-Nitrosodiethylamine 16 \$932.41 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 16 \$932.41 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 \$932.41 0.00002 0.0001 24.3% YES 44 N-Nitrosodiethylamine 10 \$932.41 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 12 \$932.41 0									11.7%
43 N-Nitrosodimethylamine 8 593-01 0.0003 0.0003 11.3% YES 43 N-Nitrosodimethylamine 10 593-51 0.0003 0.0003 11.3% YES 44 N-Nitrosodimethylamine 12 593-51 0.0003 0.0003 11.3% YES 44 N-Nitrosodimethylamine 14 593-61 0.00003 0.0003 11.3% YES 44 N-Nitrosodiethylamine 16 5982-11 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 2 5982-01 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 4 5982-01 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5982-11 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 12 5982-11 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 12 5982-1									11.7%
43 N-Nitrosodimethylamine 10 5983-F1 0.00003 0.0003 11.4% YES 43 N-Nitrosodimethylamine 12 5983-F1 0.00003 0.0003 11.3% YES 44 N-Nitrosodimethylamine 16 5983-F1 0.00003 0.0003 11.3% YES 44 N-Nitrosodiethylamine 16 5982-A1 0.00003 0.0001 23.3% YES 44 N-Nitrosodiethylamine 2 5982-A1 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 6 5982-A1 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 6 5982-A1 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5982-A1 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 12 5982-A1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16									11.7%
43 N-Nitrosodimethylamine 12 \$983-61 0.0003 0.0003 11.3% YES 43 N-Nitrosodimethylamine 16 \$983-61 0.0003 0.0003 11.3% YES 44 N-Nitrosodimethylamine 16 \$982-41 0.00003 0.0001 25.5% 44 N-Nitrosodiethylamine 2 \$982-41 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 2 \$982-61 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 \$982-61 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 \$982-61 0.00002 0.0001 22.5% YES 44 N-Nitrosodiethylamine 16 \$982-61 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 16 \$982-12 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 \$983-11 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>11.7%</td></t<>									11.7%
43 N-Nitrosodimethylamine 14 5983-61 0.0003 0.0003 11.2% YES 43 N-Nitrosodiethylamine 16 5983-41 0.00003 0.0001 23.5% YES 44 N-Nitrosodiethylamine 16 5982-A1 0.00001 23.3% YES 44 N-Nitrosodiethylamine 2 5982-A2 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 6 5982-11 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5982-11 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 10 5982-11 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 12 5982-11 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5982-142 0.00001 23.4% YES 44 N-Nitrosodiethylamine 16 5983-11 0.00002 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>11.7% 11.7%</td></td<>									11.7% 11.7%
43 N-Nitrosodiethylamine 16 5983-H2 0.0003 0.0001 26.5% 44 N-Nitrosodiethylamine 2 5982-H1 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 2 5982-A2 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 4 5982-A2 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5982-D1 0.00002 0.0001 24.3% YES 44 N-Nitrosodiethylamine 10 5982-F1 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 14 5982-F1 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 16 5982-A1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5983-A1 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 16 5983-B1 0									11.7%
44 N-Nitrosodiethylamine 2 5982-A1 0.00003 0.0001 23.3% YES 44 N-Nitrosodiethylamine 2 5982-A2 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 4 5982-A2 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5982-C1 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5982-E1 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 12 5982-F1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5983-A1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 2 5983-A2 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 4 5983-B1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 10 5983-C		-							
44 N-Nitrosodiethylamine 16 5982-H1 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 2 5982-A2 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5982-C1 0.00002 0.0001 24.2% YES 44 N-Nitrosodiethylamine 8 5982-D1 0.00002 0.0001 24.3% YES 44 N-Nitrosodiethylamine 10 5982-E1 0.00002 0.0001 22.3% YES 44 N-Nitrosodiethylamine 14 5982-E1 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 16 5982-E1 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 16 5983-E1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 6 5983-E1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 5983	43	N-Nitrosodimetnylamine	16	5983-HZ	0.00003	0.0003	11.3%	TES	11.7%
44 N.Nitrosodiethylamine 2 5982-A2 0.00002 0.0001 23.7% YES 44 N.Nitrosodiethylamine 4 5982-B1 0.00002 0.0001 24.4% YES 44 N.Nitrosodiethylamine 8 5982-D1 0.00002 0.0001 23.5% YES 44 N.Nitrosodiethylamine 10 5982-F1 0.00002 0.0001 23.5% YES 44 N.Nitrosodiethylamine 14 5982-F1 0.00002 0.0001 23.4% YES 44 N.Nitrosodiethylamine 16 5982-H2 0.00002 0.0001 23.4% YES 44 N.Nitrosodiethylamine 2 5983-A1 0.00002 0.0001 23.4% YES 44 N.Nitrosodiethylamine 2 5983-A1 0.00002 0.0001 23.4% YES 44 N.Nitrosodiethylamine 8 5983-D1 0.00002 0.0001 23.4% YES 44 N.Nitrosodiethylamine 12 5983-F									24.4%
44 N-Nitrosodiethylamine 4 5982-81 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5982-01 0.00002 0.0001 24.3% YES 44 N-Nitrosodiethylamine 10 5982-61 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 12 5982-61 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 16 5982-61 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 16 5983-81 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 2 5983-81 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 4 5983-81 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5983-61 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 10 5983									24.4%
44 N-Nitrosodiethylamine 6 5982-C1 0.00002 0.0001 24.2% YES 44 N-Nitrosodiethylamine 10 5982-F1 0.00002 0.0001 24.3% YES 44 N-Nitrosodiethylamine 12 5982-F1 0.00002 0.0001 22.7% YES 44 N-Nitrosodiethylamine 14 5982-F1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5982-H2 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5983-H1 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 6 5983-F1 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5983-F1 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5983-F1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 598									24.4%
44 N-Nitrosodiethylamine 8 5982-01 0.00002 0.0001 24.3% YES 44 N-Nitrosodiethylamine 10 5982-61 0.00002 0.0001 22.7% YES 44 N-Nitrosodiethylamine 14 5982-61 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5982-12 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5983-11 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 2 5983-81 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 6 5983-10 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5983-61 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 12 5983-61 0.00002 0.0001 23.7% YES 44 N-Nitrosomethylethylamine 12 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>24.4%</td></td<>									24.4%
44 N-Nitrosodiethylamine 10 \$982-£1 0.00002 0.0001 22.7% YES 44 N-Nitrosodiethylamine 12 \$982-£1 0.00002 0.0001 22.7% YES 44 N-Nitrosodiethylamine 16 \$982-£1 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 16 \$983-A1 0.00003 0.0001 23.4% YES 44 N-Nitrosodiethylamine 2 \$983-A1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 2 \$983-A1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 6 \$983-D1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 \$983-E1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 14 \$983-61 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 16 \$98									24.4%
44 N-Nitrosodiethylamine 12 5982-F1 0.00002 0.0001 22.7% YES 44 N-Nitrosodiethylamine 14 5982-62 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5983-A1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 2 5983-A1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5983-A2 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 6 5983-A2 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5983-E1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 12 5983-F1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 16 5983-H2 0.00003 9.6% YES 45 N-Nitrosomethylethylamine 2 5982-A1 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>24.4%</td></td<>									24.4%
44 N-Nitrosodiethylamine 14 5982.41 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5983.41 0.00003 0.0001 34.5% 44 N-Nitrosodiethylamine 16 5983.41 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5983.42 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 4 5983.42 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5983.61 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 5983.61 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 14 5983.61 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 16 5982.41 0.00003 9.56% YES 44 N-Nitrosomethylethylamine 2 5982.42 0.00003									24.4%
44 N-Nitrosodiethylamine 16 5982-H2 0.00002 0.0001 23.3% YES 44 N-Nitrosodiethylamine 16 5983-A1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 16 5983-A2 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 4 5983-A2 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5983-C1 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 10 5983-E1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 12 5983-F1 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 16 5983-F1 0.00002 0.0001 23.5% YES 44 N-Nitrosomethylethylamine 16 5982-A1 0.00003 10.2% 45 N-Nitrosomethylethylamine 2 5982-A1 0.00003									24.4%
44 N-Nitrosodiethylamine 2 5983-A1 0.0003 0.0001 34.5% 44 N-Nitrosodiethylamine 16 5983-H1 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 2 5983-B1 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 4 5983-B1 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5983-C1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 5983-E1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 12 5983-F1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 14 5983-F1 0.00002 0.0001 23.5% YES 44 N-Nitrosomethylethylamine 16 5982-A1 0.00003 0.0003 10.2% 45 N-Nitrosomethylethylamine 2 5982-A2 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine									24.4%
44 N-Nitrosodiethylamine 16 5983-H1 0.00002 0.0001 23.4% YES 44 N-Nitrosodiethylamine 2 5983-A2 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 4 5983-B1 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5983-C1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 5983-F1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 12 5983-F1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 16 5983-F1 0.00002 0.0001 23.5% YES 44 N-Nitrosomethylethylamine 16 5982-F1 0.00003 10.2% YES 45 N-Nitrosomethylethylamine 2 5982-F1 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 5982-F1 0.00003 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>YES</td> <td>24.4%</td>								YES	24.4%
44 N-Nitrosodiethylamine 2 5983-A2 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 4 5983-61 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5983-61 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 5983-61 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 12 5983-61 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 16 5983-61 0.00002 0.0001 23.5% YES 44 N-Nitrosomethylethylamine 16 5982-61 0.00003 0.0003 10.2% 45 N-Nitrosomethylethylamine 2 5982-61 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 2 5982-61 0.00003 0.0003 9.82% YES 45 N-Nitrosomethylethylamine 5982-61 0.000									24.4%
44 N-Nitrosodiethylamine 4 5983-81 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 6 5983-C1 0.00002 0.0001 24.4% YES 44 N-Nitrosodiethylamine 8 5983-D1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 5983-E1 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 12 5983-F1 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 16 5983-H2 0.00002 0.0001 23.5% YES 44 N-Nitrosomethylethylamine 2 5982-A1 0.00003 0.0003 10.2% 45 N-Nitrosomethylethylamine 2 5982-A2 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 2 5982-A1 0.0003 0.0003 9.65% YES 45 N-Nitrosomethylethylamine 2 5982-E1									24.4%
44 N-Nitrosodiethylamine 6 5983-C1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 5983-E1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 5983-E1 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 12 5983-F1 0.00002 0.0001 23.2% YES 44 N-Nitrosodiethylamine 14 5983-61 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 16 5982-A1 0.00002 0.0001 23.5% YES 45 N-Nitrosomethylethylamine 16 5982-A1 0.00003 0.0003 9.5% YES 45 N-Nitrosomethylethylamine 2 5982-A2 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5982-D1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 10 5982-D1 0.00003 0.0003 9.47% YES 45<									24.4%
44 N-Nitrosodiethylamine 8 5983-D1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 10 5983-E1 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 12 5983-F1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 14 5983-G1 0.00002 0.0001 23.2% YES 44 N-Nitrosodiethylamine 16 5983-H2 0.00002 0.0001 23.2% YES 45 N-Nitrosomethylethylamine 2 5982-A1 0.00003 0.0003 10.2% 45 N-Nitrosomethylethylamine 2 5982-A2 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 4 5982-D1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 8 5982-D1 0.00003 0.0003 9.82% YES 45 N-Nitrosomethylethylamine 12 5982-F									24.4%
44 N-Nitrosodiethylamine 10 5983-E1 0.00002 0.0001 23.7% YES 44 N-Nitrosodiethylamine 12 5983-F1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 14 5983-G1 0.00002 0.0001 23.2% YES 44 N-Nitrosodiethylamine 16 5983-H2 0.00002 0.0001 23.5% YES 45 N-Nitrosomethylethylamine 16 5982-H1 0.00003 0.0003 10.2% 45 N-Nitrosomethylethylamine 16 5982-H1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 2 5982-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5982-C1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 10 5982-E1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 12 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>24.4%</td></td<>									24.4%
44 N-Nitrosodiethylamine 12 5983-F1 0.00002 0.0001 23.6% YES 44 N-Nitrosodiethylamine 14 5983-G1 0.00002 0.0001 23.5% YES 44 N-Nitrosodiethylamine 16 5983-H2 0.00002 0.0001 23.5% YES 45 N-Nitrosomethylethylamine 16 5982-A1 0.0003 0.0003 10.2% 45 N-Nitrosomethylethylamine 2 5982-A2 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 4 5982-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5982-C1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 10 5982-E1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 10 5982-F1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 12 5983-H1 0.00003 0.0003 9.45% YES 45									24.4%
44 N-Nitrosodiethylamine 14 5983-G1 0.00002 0.0001 23.2% YES 44 N-Nitrosodiethylamine 16 5983-H2 0.00002 0.0001 23.5% YES 45 N-Nitrosomethylethylamine 16 5982-A1 0.00003 10.2% 45 N-Nitrosomethylethylamine 16 5982-A2 0.00003 0.0003 19.2% 45 N-Nitrosomethylethylamine 2 5982-A2 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 4 5982-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5982-C1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 10 5982-F1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 14 5982-G1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>24.4%</td>									24.4%
44 N-Nitrosodiethylamine 16 5983-H2 0.00002 0.0001 23.5% YES 45 N-Nitrosomethylethylamine 16 5982-A1 0.0003 0.0003 10.2% 45 N-Nitrosomethylethylamine 16 5982-A1 0.00003 0.0003 10.2% 45 N-Nitrosomethylethylamine 2 5982-A2 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 4 5982-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5982-C1 0.00003 0.0003 9.82% YES 45 N-Nitrosomethylethylamine 10 5982-E1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 12 5982-F1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5983-A1 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>24.4%</td>									24.4%
45 N-Nitrosomethylethylamine 2 5982-A1 0.00040 0.0003 132% 45 N-Nitrosomethylethylamine 16 5982-A2 0.0003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 2 5982-A2 0.0003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 4 5982-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5982-C1 0.00003 0.0003 9.77% YES 45 N-Nitrosomethylethylamine 8 5982-D1 0.00003 0.0003 9.82% YES 45 N-Nitrosomethylethylamine 10 5982-F1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 12 5982-F1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 14 5982-B1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16									24.4%
45 N-Nitrosomethylethylamine 16 5982-H1 0.0003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 2 5982-A2 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 4 5982-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5982-C1 0.00003 0.0003 9.77% YES 45 N-Nitrosomethylethylamine 8 5982-D1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 10 5982-E1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 12 5982-E1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 14 5982-G1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H1 0.00003 0.0003 101% 45 N-Nitrosomethylethylamine 2 5983-A1 0.00003 0.0003 101% 45 N-N	44	N-Nitrosodiethylamine	16	5983-HZ	0.00002	0.0001	23.5%	YES	24.4%
45 N-Nitrosomethylethylamine 2 5982-A2 0.0003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 4 5982-B1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5982-C1 0.00003 0.0003 9.77% YES 45 N-Nitrosomethylethylamine 8 5982-D1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 10 5982-E1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 12 5982-F1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 14 5982-G1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.00003 0.0003 101% 45 N-Nitrosomethylethylamine 2 5983-A1 0.00003 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-H1 0.00003 0.0003 9.59% YES 45 N-Ni	45	N-Nitrosomethylethylamine	2	5982-A1	0.00040	0.0003	132%		9.85%
45 N-Nitrosomethylethylamine 4 5982-B1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5982-C1 0.0003 0.0003 9.77% YES 45 N-Nitrosomethylethylamine 8 5982-D1 0.0003 0.0003 9.82% YES 45 N-Nitrosomethylethylamine 10 5982-E1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 12 5982-E1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 14 5982-G1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.00003 0.0003 9.42% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.00003 0.0003 101% 45 N-Nitrosomethylethylamine 2 5983-A1 0.00033 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-H1 0.00003 0.0003 9.55% YES 45 N-Ni	45	N-Nitrosomethylethylamine	16	5982-H1	0.00003	0.0003	10.2%		9.85%
45 N-Nitrosomethylethylamine 6 5982-C1 0.0003 0.0003 9.77% YES 45 N-Nitrosomethylethylamine 8 5982-D1 0.00003 0.0003 9.82% YES 45 N-Nitrosomethylethylamine 10 5982-E1 0.00003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 12 5982-F1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 14 5982-F1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.00003 0.0003 9.42% YES 45 N-Nitrosomethylethylamine 16 5983-A1 0.00030 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-A2 0.00003 0.0003 9.55% YES 45 N-Nitrosomethylethylamine 2 5983-A2 0.00003 0.0003 9.85% YES <td< td=""><td>45</td><td>N-Nitrosomethylethylamine</td><td>2</td><td>5982-A2</td><td>0.00003</td><td>0.0003</td><td>9.56%</td><td>YES</td><td>9.85%</td></td<>	45	N-Nitrosomethylethylamine	2	5982-A2	0.00003	0.0003	9.56%	YES	9.85%
45 N-Nitrosomethylethylamine 8 5982-D1 0.0003 0.0003 9.82% YES 45 N-Nitrosomethylethylamine 10 5982-E1 0.0003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 12 5982-F1 0.0003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 14 5982-F1 0.00003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.00003 0.0003 9.42% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.00030 0.0003 101% 45 N-Nitrosomethylethylamine 2 5983-A1 0.00030 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-H1 0.00003 0.0003 9.5% YES 45 N-Nitrosomethylethylamine 2 5983-A2 0.00003 0.0003 9.5% YES 45 N-Nitrosomethylethylamine 4 5983-B1 0.00003 0.0003 9.5% YES 45 N-Nitro	45	N-Nitrosomethylethylamine	4	5982-B1	0.00003	0.0003	9.85%	YES	9.85%
45 N-Nitrosomethylethylamine 10 5982-E1 0.0003 0.0003 9.47% YES 45 N-Nitrosomethylethylamine 12 5982-F1 0.0003 0.0003 9.15% YES 45 N-Nitrosomethylethylamine 14 5982-G1 0.0003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.0003 0.0003 9.42% YES 45 N-Nitrosomethylethylamine 2 5983-A1 0.0003 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-H1 0.00030 0.0003 101% 45 N-Nitrosomethylethylamine 2 5983-A2 0.00033 0.0003 9.5% YES 45 N-Nitrosomethylethylamine 2 5983-B1 0.00033 0.0003 9.5% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.00033 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-D1 0.00033 0.0003 9.52% YES 45 N-Nitroso	45	N-Nitrosomethylethylamine			0.00003	0.0003	9.77%		9.85%
45 N-Nitrosomethylethylamine 12 5982-F1 0.0003 0.0003 9.15% YES 45 N-Nitrosomethylethylamine 14 5982-G1 0.0003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.0003 0.0003 9.42% YES 45 N-Nitrosomethylethylamine 16 5983-A1 0.00030 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-H1 0.00005 0.0003 107% 45 N-Nitrosomethylethylamine 2 5983-A2 0.00003 0.0003 9.59% YES 45 N-Nitrosomethylethylamine 2 5983-A2 0.00003 0.0003 9.59% YES 45 N-Nitrosomethylethylamine 4 5983-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.00003 0.0003 9.55% YES 45 N-Nitrosomethylethylamine 8 5983-D1 0.00003 0.0003 9.52% YES 45 N-Nit	45	N-Nitrosomethylethylamine	8	5982-D1	0.00003	0.0003	9.82%	YES	9.85%
45 N-Nitrosomethylethylamine 14 5982-G1 0.0003 0.0003 9.45% YES 45 N-Nitrosomethylethylamine 16 5982-H2 0.0003 0.0003 9.42% YES 45 N-Nitrosomethylethylamine 2 5983-A1 0.00030 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-H1 0.00005 0.0003 17.7% 45 N-Nitrosomethylethylamine 2 5983-A2 0.00003 0.0003 9.59% YES 45 N-Nitrosomethylethylamine 4 5983-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 8 5983-C1 0.00003 0.0003 9.52% YES 45 N-Nitrosomethylethylamine 8 5983-C1 0.00003 0.0003 9.52% YES 45 N-Nitrosomethylethylamine 10 5983-E1 0.00003 0.0003 9.56% YES 45 N-Ni	45	N-Nitrosomethylethylamine	10	5982-E1	0.00003				9.85%
45 N-Nitrosomethylethylamine 16 5982-H2 0.0003 0.0003 9.42% YES 45 N-Nitrosomethylethylamine 2 5983-A1 0.0003 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-A1 0.0003 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-H1 0.00003 0.0003 9.59% YES 45 N-Nitrosomethylethylamine 2 5983-A2 0.00003 0.0003 9.59% YES 45 N-Nitrosomethylethylamine 4 5983-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 8 5983-D1 0.00003 0.0003 9.52% YES 45 N-Nitrosomethylethylamine 10 5983-E1 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 12 5983-F1	45	N-Nitrosomethylethylamine	12	5982-F1	0.00003	0.0003	9.15%	YES	9.85%
45 N-Nitrosomethylethylamine 2 5983-A1 0.00030 0.0003 101% 45 N-Nitrosomethylethylamine 16 5983-H1 0.00005 0.0003 17.7% 45 N-Nitrosomethylethylamine 2 5983-A2 0.0003 0.0003 9.59% YES 45 N-Nitrosomethylethylamine 2 5983-A2 0.0003 0.0003 9.59% YES 45 N-Nitrosomethylethylamine 4 5983-B1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.00003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 8 5983-D1 0.00003 0.0003 9.52% YES 45 N-Nitrosomethylethylamine 10 5983-E1 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 12 5983-G1 0.00003 0.0003 9.38% YES 45 N-Ni									9.85%
45 N-Nitrosomethylethylamine 16 5983-H1 0.00005 0.0003 17.7% 45 N-Nitrosomethylethylamine 2 5983-A2 0.0003 0.0003 9.59% YES 45 N-Nitrosomethylethylamine 4 5983-B1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.00033 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 8 5983-D1 0.00003 0.0003 9.52% YES 45 N-Nitrosomethylethylamine 10 5983-E1 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 12 5983-G1 0.00003 0.0003 9.38% YES								YES	9.85%
45 N-Nitrosomethylethylamine 2 5983-A2 0.0003 0.0003 9.59% YES 45 N-Nitrosomethylethylamine 4 5983-B1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 8 5983-D1 0.00003 0.0003 9.52% YES 45 N-Nitrosomethylethylamine 10 5983-E1 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 12 5983-G1 0.00003 0.0003 9.38% YES									9.85%
45 N-Nitrosomethylethylamine 4 5983-B1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 6 5983-C1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 8 5983-D1 0.0003 0.0003 9.52% YES 45 N-Nitrosomethylethylamine 10 5983-E1 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 14 5983-G1 0.00003 0.0003 9.38% YES									9.85%
45 N-Nitrosomethylethylamine 6 5983-C1 0.0003 0.0003 9.85% YES 45 N-Nitrosomethylethylamine 8 5983-D1 0.0003 0.0003 9.52% YES 45 N-Nitrosomethylethylamine 10 5983-E1 0.0003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 14 5983-G1 0.00003 0.0003 9.38% YES									9.85%
45 N-Nitrosomethylethylamine 8 5983-D1 0.00003 0.0003 9.52% YES 45 N-Nitrosomethylethylamine 10 5983-E1 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 14 5983-G1 0.00003 0.0003 9.38% YES									9.85%
45 N-Nitrosomethylethylamine 10 5983-E1 0.00003 0.0003 9.56% YES 45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 14 5983-G1 0.00003 0.0003 9.38% YES									9.85%
45 N-Nitrosomethylethylamine 12 5983-F1 0.00003 0.0003 9.54% YES 45 N-Nitrosomethylethylamine 14 5983-G1 0.00003 0.0003 9.38% YES									9.85%
45 N-Nitrosomethylethylamine 14 5983-G1 0.00003 0.0003 9.38% YES									9.85%
									9.85%
45 N-Nitrosomethylethylamine 16 5983-H2 0.00003 0.0003 9.50% 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 5983-H2	0.00002	0.0006	3.41%	YES	3.58%
46	N-Nitrosomorpholine	16	5983-HZ	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 47	Tributyl phosphate	12 14	5983-F1 5983-G1	0.00015	0.20	0.073%	YES	0.084%
47	Tributyl phosphate Tributyl phosphate	14	5983-01 5983-H2	0.00013	0.20	0.071%	YES	0.084%
	ributyi phospilate	10	3363-HZ	0.00014	0.20	0.071%	125	0.00470
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 48	Dibutyl butylphosphonate Dibutyl butylphosphonate	6 8	5983-C1	0.00010 0.00010	0.007	1.36% 1.45%	YES	1.46%
48 48	Dibutyl butylphosphonate	10	5983-D1 5983-E1	0.00010	0.007	1.45%	YES	1.46% 1.46%
48 48	Dibutyl butylphosphonate	10	5983-E1 5983-F1	0.00010	0.007	1.46%	YES	1.46%
	bioacyr bucyphosphonate	12						1.4070
48	Dibutyl butylphosphonate	14	5983-G1	0.00010	0.007	1.43%	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.

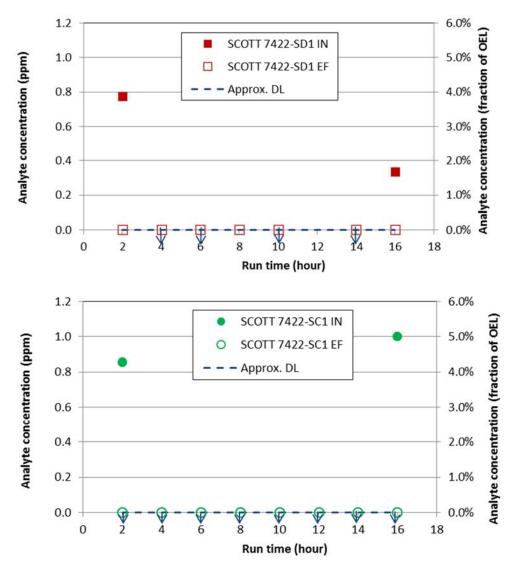


Figure E.1. Plot of Measured 1-Butanol Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

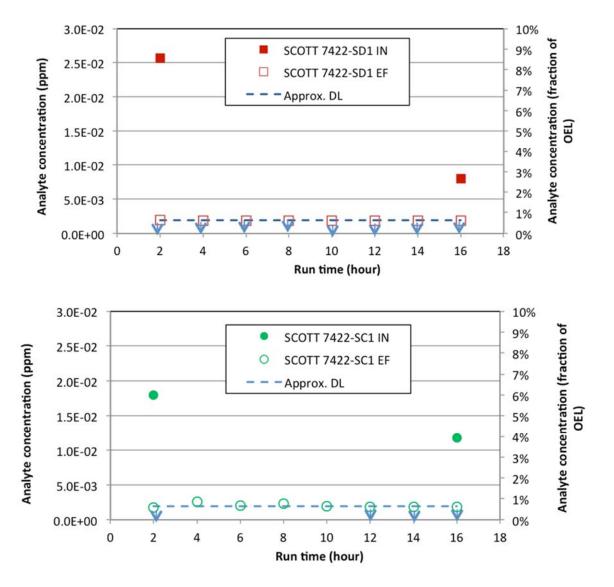


Figure E.2. Plot of Measured Formaldehyde Concentrations before the Inlets and after the Outlets of the two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

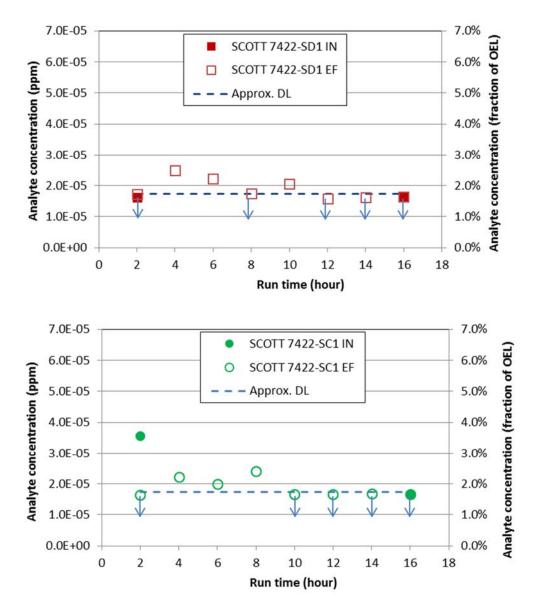


Figure E.3. Plot of Measured 2-Pentylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

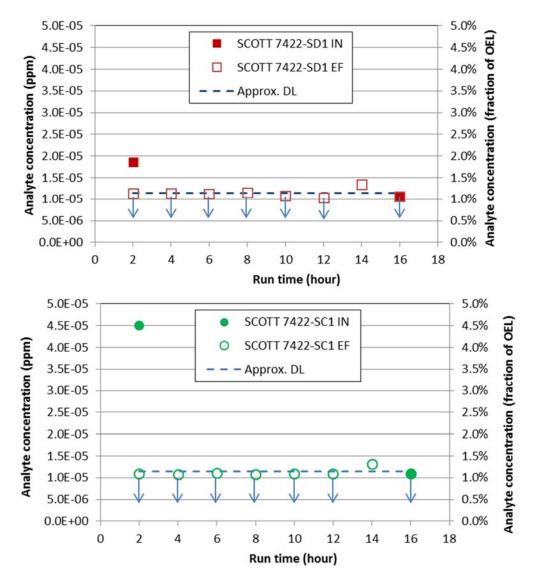


Figure E.4. Plot of Measured 2-Heptylfuran Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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.

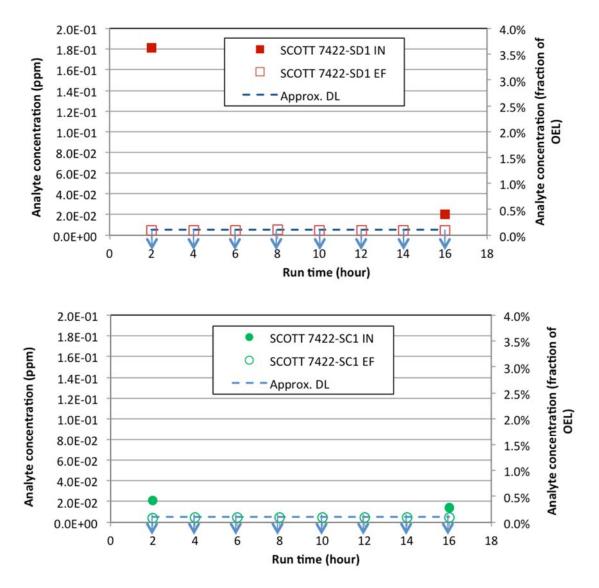


Figure E.5. Plot of Measured Ethylamine Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested (SCOTT 7422-SD1 and SCOTT 7422-SC1). Data points noted with ↓ indicates measurements less than the DL or RL.

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/m³ and ppm) columns, rather than numbers, and required calculations to supply these concentrations. The calculations made use of values already in the database: the molecular weight, the Reported Value and its units, and the Sample Volume and its units. A temperature of 25°C and a pressure of 1 atm were assumed.

The method described above was consistent with that used in PNNL-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 average² 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 ("*").

							Histor	Historical Measurements ¹	ments ¹		2	Measurements in this study	in this stud	
	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Number of Values	Maximum Value	Average Value	Maxímum Value (%0EL)	Average Value (%0EL)	Max inlet (%OEL)	Avg. Inlet (%0EL)	Max outlet (%OEL)	Approx. DL ¹³ (%OEL)
Inorganic	anic							1						
~	Ammonia	7664-41-7	-28	Poling et al., 2007 ²	25 ppm	-	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	asured	
a	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)
Hydro	Hydrocorbons													
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%	138%	119%	268%	2.02% (RL)
an -	Benzene	71-43-2	176	Poling et al., 2007	0.5 ppm	4	≺RL	<rl< td=""><td>٩R</td><td>٨L</td><td>0.86%</td><td>0.72%</td><td>0.049%</td><td>0.024%</td></rl<>	٩R	٨L	0.86%	0.72%	0.049%	0.024%
0	Biphenyl	92-52-4	491	Poling et al., 2007	0.2 ppm	4	٩	٩	٩R	٨L	SDL	SDL	٩DL	0.048- 0.092%
Alcohols	slot													
5	1-Butanol	71-36-3	243	HSOIN	20 ppm	4 78	4.32 63.5	3.81 14.6	22% 318%	19% 73%	5.02%	3.72%	0.008%	0.005%
-	Methanol	67-56-1	148	Poling et al., 2007	200 ppm	1	٩	٩	ਝ	ß		Not Measured	asured	
Ketones	1es													
0 1	2-Hexanone	591-78-6	262	NIOSH	5 ppm	4	<rl< td=""><td>0.0281</td><td><rl< td=""><td>0.56%</td><td>0.37%</td><td>0.34%</td><td><dl< td=""><td>0.003%</td></dl<></td></rl<></td></rl<>	0.0281	<rl< td=""><td>0.56%</td><td>0.37%</td><td>0.34%</td><td><dl< td=""><td>0.003%</td></dl<></td></rl<>	0.56%	0.37%	0.34%	<dl< td=""><td>0.003%</td></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 Detec	Not Detected - TIC ¹²	
11	4-Methyl-2-hexanone	105-42-0	282	Predicted ACD/Labs ⁵	0.5 ppm	0	n/ā	n/a	n/a	n/a	0.27%	0.24%	۲OL	0.030%
11	6-Methyl-2-heptanone	928-68-7	333	Predicted ACD/Labs	8 ppm	0	n/a	n/a	n/a	n/a		Not Dete	Not Detected - TIC	
13	3-Buten-2-one	78-94-4	179	CRC Handbook 1989	0.2 ppm	4	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>23.5%</td><td>11.0%</td><td>1.86%</td><td>%060.0</td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>23.5%</td><td>11.0%</td><td>1.86%</td><td>%060.0</td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>23.5%</td><td>11.0%</td><td>1.86%</td><td>%060.0</td></rl<></td></rl<>	<rl< td=""><td>23.5%</td><td>11.0%</td><td>1.86%</td><td>%060.0</td></rl<>	23.5%	11.0%	1.86%	%060.0
Aldehydes	hydes													
14	Formaldehyde	50-00-0	φ	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	s	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	•	n/a	n/a	n/a	n/a		Not Dete	Not Detected - TIC	
18	2-Ethyl-hex-2-enal	645-62-5	347	Predicted ACD/Labs	0.1 ppm	•	n/a	n/a	n/a	n/a		Not Dete	Not Detected - TIC	

Table F.1. COPC Comparison to Historical BY-108 Measurements

							Lietori	Uistorical Maasuramante ¹	monte ¹		Z	Measurements in this study	s in this stur	~
	COPC Number and Name	CAS Number	Boiling Point (°E)	Boiling Point Source	Occupational Exposure Limit (OEL)	Number of Values	Maximum Value	Average Value	Maximum Value (%OFL)	Average Value (%OFL)	Max Inlet (%OEL)	Avg. Inlet (%0EL)	Max outlet (%OEL)	Approx. DL ¹³ (%OFI)
	•				1	2000			1.000-0-1					1/2011
Furans	15 ^A Carbotrap 300 TDU method		ĺ					ľ	Ī	Ī	Ī		ľ	
19	Furan ^A	110-00-9	88	Poling et al., 2007	1 ppb	5 6	<rl 547</rl 	23.1* <i>110*</i>	<rl 54700%</rl 	2310%* 11 <i>000</i> %*	819%	456%	698%	17.2%
20	2,3-Dihydrofuran	1191-99-7	130	Alfa Aesar ⁸	1 ppb	1	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>74.5%</td><td>36.9%</td><td><dl< td=""><td>1.81%</td></dl<></td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>74.5%</td><td>36.9%</td><td><dl< td=""><td>1.81%</td></dl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>74.5%</td><td>36.9%</td><td><dl< td=""><td>1.81%</td></dl<></td></rl<></td></rl<>	<rl< td=""><td>74.5%</td><td>36.9%</td><td><dl< td=""><td>1.81%</td></dl<></td></rl<>	74.5%	36.9%	<dl< td=""><td>1.81%</td></dl<>	1.81%
21	2,5-Dihydrofuran ^A	1708-29-8	152	Aldrich ⁹	1 ppb	5	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>278%</td><td>88.9%</td><td>377%</td><td>32.2%</td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>278%</td><td>88.9%</td><td>377%</td><td>32.2%</td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>278%</td><td>88.9%</td><td>377%</td><td>32.2%</td></rl<></td></rl<>	<rl< td=""><td>278%</td><td>88.9%</td><td>377%</td><td>32.2%</td></rl<>	278%	88.9%	377%	32.2%
22	2-Methylfuran ^A	534-22-5	147	Oxford safety data	1 ppb	5	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>39.2%</td><td>30.5%</td><td><rl< td=""><td>18.6%</td></rl<></td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>39.2%</td><td>30.5%</td><td><rl< td=""><td>18.6%</td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>39.2%</td><td>30.5%</td><td><rl< td=""><td>18.6%</td></rl<></td></rl<></td></rl<>	<rl< td=""><td>39.2%</td><td>30.5%</td><td><rl< td=""><td>18.6%</td></rl<></td></rl<>	39.2%	30.5%	<rl< td=""><td>18.6%</td></rl<>	18.6%
23	2,5-Dimethylfuran	625-86-5	199	Alfa Aesar	1 ppb	1	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td><dl< td=""><td>-DL</td><td><dl< td=""><td>3.16%</td></dl<></td></dl<></td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td><dl< td=""><td>-DL</td><td><dl< td=""><td>3.16%</td></dl<></td></dl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><dl< td=""><td>-DL</td><td><dl< td=""><td>3.16%</td></dl<></td></dl<></td></rl<></td></rl<>	<rl< td=""><td><dl< td=""><td>-DL</td><td><dl< td=""><td>3.16%</td></dl<></td></dl<></td></rl<>	<dl< td=""><td>-DL</td><td><dl< td=""><td>3.16%</td></dl<></td></dl<>	-DL	<dl< td=""><td>3.16%</td></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	cted - 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	cted - 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	cted - TIC	
27	2-Pentylfuran	3777-69-3	333	Alfa Aesar	1 ppb	1	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>3.57%</td><td>2.12%</td><td>2.48%</td><td>1.74%</td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>3.57%</td><td>2.12%</td><td>2.48%</td><td>1.74%</td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>3.57%</td><td>2.12%</td><td>2.48%</td><td>1.74%</td></rl<></td></rl<>	<rl< td=""><td>3.57%</td><td>2.12%</td><td>2.48%</td><td>1.74%</td></rl<>	3.57%	2.12%	2.48%	1.74%
28	2-Heptylfuran	3777-71-7	410	Alfa Aesar	1 ppb	1 3	<rl <i>61.2</i></rl 	<rl 29.7</rl 	<rl <i>6120</i>%</rl 	<rl 2970%</rl 	4.51%	2.14%	1.35%	1.15%
29	2-Propylfuran	4229-91-8	231	Alfa Aesar	1 ppb	1	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>11.1%</td><td>4.71%</td><td><dl< td=""><td>2.82%</td></dl<></td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>11.1%</td><td>4.71%</td><td><dl< td=""><td>2.82%</td></dl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>11.1%</td><td>4.71%</td><td><dl< td=""><td>2.82%</td></dl<></td></rl<></td></rl<>	<rl< td=""><td>11.1%</td><td>4.71%</td><td><dl< td=""><td>2.82%</td></dl<></td></rl<>	11.1%	4.71%	<dl< td=""><td>2.82%</td></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	cted - 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	cted - 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	cted - TIC	
Phthc	Phthalates													
33	Diethylphthalate	84-66-2	563	NIOSH	5 mg/m ³	4	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td><dl< td=""><td><dl< td=""><td><dl< td=""><td>0.017- 0.041%</td></dl<></td></dl<></td></dl<></td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td><dl< td=""><td><dl< td=""><td><dl< td=""><td>0.017- 0.041%</td></dl<></td></dl<></td></dl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><dl< td=""><td><dl< td=""><td><dl< td=""><td>0.017- 0.041%</td></dl<></td></dl<></td></dl<></td></rl<></td></rl<>	<rl< td=""><td><dl< td=""><td><dl< td=""><td><dl< td=""><td>0.017- 0.041%</td></dl<></td></dl<></td></dl<></td></rl<>	<dl< td=""><td><dl< td=""><td><dl< td=""><td>0.017- 0.041%</td></dl<></td></dl<></td></dl<>	<dl< td=""><td><dl< td=""><td>0.017- 0.041%</td></dl<></td></dl<>	<dl< td=""><td>0.017- 0.041%</td></dl<>	0.017- 0.041%

Table F.1. COPC Comparison to Historical BY-108 Measurements (continued)

							Histor	Historical Measurements ¹	ements ¹		~	Measurements in this study	in this stud	
	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Number of Values	Maximum Value	Average Value	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%0EL)	Max outlet (%OEL)	Approx. DL ¹³ (%OEL)
Nitriles	S													
34	Acetonitrile	75-05-8	179	HSOIN	20 ppm	5	<rl< th=""><th>0.116</th><th><rl< th=""><th>0.6%</th><th>0.77%</th><th>0.60%</th><th>9.45%</th><th>0.001%</th></rl<></th></rl<>	0.116	<rl< th=""><th>0.6%</th><th>0.77%</th><th>0.60%</th><th>9.45%</th><th>0.001%</th></rl<>	0.6%	0.77%	0.60%	9.45%	0.001%
35	Propanenitrile	107-12-0	207	HSOIN	6 ppm	4	<rl< th=""><th><rl< th=""><th><rl< th=""><th><rl< th=""><th>0.39%</th><th>0.32%</th><th>%06:0</th><th>0.003%</th></rl<></th></rl<></th></rl<></th></rl<>	<rl< th=""><th><rl< th=""><th><rl< th=""><th>0.39%</th><th>0.32%</th><th>%06:0</th><th>0.003%</th></rl<></th></rl<></th></rl<>	<rl< th=""><th><rl< th=""><th>0.39%</th><th>0.32%</th><th>%06:0</th><th>0.003%</th></rl<></th></rl<>	<rl< th=""><th>0.39%</th><th>0.32%</th><th>%06:0</th><th>0.003%</th></rl<>	0.39%	0.32%	%06:0	0.003%
36	Butanenitrile	109-74-0	244	NIOSH	8 ppm	4	<rl< th=""><th><rl< th=""><th><rl< th=""><th><rl< th=""><th>0.23%</th><th>0.17%</th><th>0.004%</th><th>0.003%</th></rl<></th></rl<></th></rl<></th></rl<>	<rl< th=""><th><rl< th=""><th><rl< th=""><th>0.23%</th><th>0.17%</th><th>0.004%</th><th>0.003%</th></rl<></th></rl<></th></rl<>	<rl< th=""><th><rl< th=""><th>0.23%</th><th>0.17%</th><th>0.004%</th><th>0.003%</th></rl<></th></rl<>	<rl< th=""><th>0.23%</th><th>0.17%</th><th>0.004%</th><th>0.003%</th></rl<>	0.23%	0.17%	0.004%	0.003%
37	Pentanenitrile	110-59-8	284	Alfa Aesar	6 ppm	4	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>0.19%</td><td>0.11%</td><td>0.008%</td><td>0.003%</td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>0.19%</td><td>0.11%</td><td>0.008%</td><td>0.003%</td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>0.19%</td><td>0.11%</td><td>0.008%</td><td>0.003%</td></rl<></td></rl<>	<rl< td=""><td>0.19%</td><td>0.11%</td><td>0.008%</td><td>0.003%</td></rl<>	0.19%	0.11%	0.008%	0.003%
38	Hexanenitrile	628-73-9	328	Predicted ACD/Labs	6 ppm	4	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>0.046%</td><td>0.035%</td><td><dl< td=""><td>0.003%</td></dl<></td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>0.046%</td><td>0.035%</td><td><dl< td=""><td>0.003%</td></dl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>0.046%</td><td>0.035%</td><td><dl< td=""><td>0.003%</td></dl<></td></rl<></td></rl<>	<rl< td=""><td>0.046%</td><td>0.035%</td><td><dl< td=""><td>0.003%</td></dl<></td></rl<>	0.046%	0.035%	<dl< td=""><td>0.003%</td></dl<>	0.003%
39	Heptanenitrile	629-08-3	368	Alfa Aesar	6 ppm	0	e/u	n/a	n/a	n/a		Not Dete	Not Detected - TIC	
6	2-Methylene butanenitrile	1647-11-6	Not available	Not available	0.3 ppm	0	n/a	n/a	n/a	n/a		Not Dete	Not Detected - TIC	
41	2,4-Pentadienenitrile	1615-70-9	278	Predicted ACD/Labs	0.3 ppm	0	e/u	n/a	n/a	n/a		Not Dete	Not Detected - TIC	
Amines	S													
42	Ethylamine	75-04-7	62	Poling et al., 2007	5 ppm	1	≺RL	≺RL	<rl< td=""><td><rl< td=""><td>3.63%</td><td>1.18%</td><td><rl< td=""><td>0.10% (RL)</td></rl<></td></rl<></td></rl<>	<rl< td=""><td>3.63%</td><td>1.18%</td><td><rl< td=""><td>0.10% (RL)</td></rl<></td></rl<>	3.63%	1.18%	<rl< td=""><td>0.10% (RL)</td></rl<>	0.10% (RL)
Nitros	Nitrosamines													
43	N-Nitrosodimethylamine	62-75-9	306	NIOSH	0.3 ppb	1	0.238	0.238	79%	79%	134%	79.5%	<rl< th=""><th>11.7% (RL)</th></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< td=""><td>24.4% (RL)</td></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< td=""><td>9.85% (RL)</td></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< td=""><td>3.58% (RL)</td></rl<>	3.58% (RL)
Organ	Organophospates													
47	47 Tributyl phosphate	126-73-8	552	NIOSH	0.2 ppm	4	٨	<rl< td=""><td>≺RL</td><td><rl< td=""><td>SDL</td><td>٩DL</td><td>٩</td><td>0.084%</td></rl<></td></rl<>	≺RL	<rl< td=""><td>SDL</td><td>٩DL</td><td>٩</td><td>0.084%</td></rl<>	SDL	٩DL	٩	0.084%
48	Dibutyl butylphosphonate	78-46-6	602	Predicted ACD/Labs	0.007 ppm	4	≺RL	<rl< td=""><td><rl< td=""><td><rl< td=""><td>SDL</td><td>٩DL</td><td>SDL</td><td>1.46%</td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>SDL</td><td>٩DL</td><td>SDL</td><td>1.46%</td></rl<></td></rl<>	<rl< td=""><td>SDL</td><td>٩DL</td><td>SDL</td><td>1.46%</td></rl<>	SDL	٩DL	SDL	1.46%
Halog	Halogenated													
6	Chlorinated Biphenyls	Varies	Varies	Varies	1 mg/m³	0	n/a	n/a	n/a	n/a		Not Dete	Not Detected - TIC	
22	2-Fluoropropene	1184-60-7	-11	SynQuest ¹¹	0.1 ppm	1	n/a 0.53	n/a 0.53	n/a 530%	n/a 530%		Not Dete	Not Detected - TIC	

Table F.1. COPC Comparison to Historical BY-108 Measurements (continued)

							Histor	Historical Measurements ¹	ments ¹		2	leasurement	Measurements in this study	
	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Number of Values	Number Maximum of Values Value	Average Value	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%0EL)	Avg. Inlet (%0EL)	Max outlet (%OEL)	Approx. DL ¹³ (%OEL)
Pyridines	nes													
51	Pyridine	110-86-1	240	HSOIN	1 ppm	5	<rl< td=""><td><rl< td=""><td><rl< td=""><td><rl< td=""><td>0.28%</td><td>0.23%</td><td><dl< td=""><td>0.15% (RL)</td></dl<></td></rl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td><rl< td=""><td>0.28%</td><td>0.23%</td><td><dl< td=""><td>0.15% (RL)</td></dl<></td></rl<></td></rl<></td></rl<>	<rl< td=""><td><rl< td=""><td>0.28%</td><td>0.23%</td><td><dl< td=""><td>0.15% (RL)</td></dl<></td></rl<></td></rl<>	<rl< td=""><td>0.28%</td><td>0.23%</td><td><dl< td=""><td>0.15% (RL)</td></dl<></td></rl<>	0.28%	0.23%	<dl< td=""><td>0.15% (RL)</td></dl<>	0.15% (RL)
52	2,4-Dimethylpyridine	108-47-4	318	Alfa Aesar	0.5 ppm	s	٨L	<r< td=""><td><rl< td=""><td>≺RL</td><td>0.54%</td><td>0.49%</td><td>-OL</td><td>0.22% (RL)</td></rl<></td></r<>	<rl< td=""><td>≺RL</td><td>0.54%</td><td>0.49%</td><td>-OL</td><td>0.22% (RL)</td></rl<>	≺RL	0.54%	0.49%	-OL	0.22% (RL)
Organ	Organonitrites													
<mark>8</mark> 3	Methyl nitrite	624-91-9	10	Oxford safety data	0.1 ppm	0	n/a	n/a	n/a	n/a		Not Detected - TIC	cted - 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	cted - TIC	
Organ	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	cted - TIC	
29	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	cted - TIC	
53	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	cted - TIC	
28	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	cted - TIC	
Isocyc	Isocyanates													
59	Methyl Isocyanate	624-83-9	103	HSOIN	20 ppb	0	n/a	n/a	n/a	n/a		Not Detected - TIC	cted - TIC	
¹ Histo	Historical data from TWINS industrial hygiene vapor database indicates that the value of the average would differ by a	r database and I differ by a fac	f SWIH data tor of 2 or m	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 foctor of 2 or more (in either direction) if non-reports were excluded.	nd dates of querie: If non-reports wen	s. Values in e excluded.	o italics includ	e those data	plus data froi	m the TWINS	headspace do	atabase, all si	amples earlie	r than May 2

"< 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

Poling, B. E.; Prausnitz, J. M.; O'Connell, J. P. The Properties of Gases and Liquids. McGraw Hill, 2007.

NIOSH: National Institute of Occupational Safety and Health

ACD/Labs software http://www.acdlabs.com/products/percepta/predictors.php CRC Handbook of Chemistry and Physics, CRC Press, 1989.

Oxford safety data from The Physical and Theoretical Chemistry Laboratory at Oxford University

Food and Agriculture Organization of the United Nations

Alfa Aesar: https://www.alfa.com/

Aidrich: 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 historical¹.

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 furans¹ 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.

		Sorbent Tube An	nalysis Methods ¹
Furans COPCs Name	CAS Number	'Furans' Tube (TENAX TA) ²	Carbotrap 300 Tube 2
Furan	110-00-9	X	Х
2,3-Dihydrofuran	1191-99-7	X	
2,5-Dihydrofuran	1708-29-8	Х	Х
2-Methylfuran	534-22-5	X	Х
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.

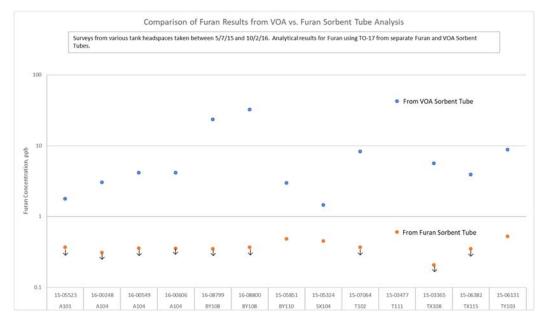


Figure G.1. Comparison of Selected SWIHD Furan Analysis Results from Two Sorbent Tubes. Data Points noted with \downarrow indicates measurements less than the detection limit.

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, 2,5dihydrofuran, and 2-methylfuran), respirator cartridge breakthrough analyses were re-assessed for the 11tank 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.

Test/Tank		Furans T	ube	Carbotrap 3	300 TDU Tube	
Headspace or Exhauster Slip Stream	COPC	Inlet Max Avg. (% of OEL)	Outlet Max (% of OEL)	Inlet Max Avg. (% of OEL)	Outlet Max (% of OEL)	— Carbotrap 200 TDU Tube Comments
AP Exhauster	Furan	2 2	1	392 355	<dl (16)<="" td=""><td></td></dl>	
A-101	Furan	5 3	1	42 26	<dl (16)<="" td=""><td></td></dl>	
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)<="" td=""><td></td></dl>	
AX-101	Furan	15 5	6	24 <dl (17)<="" td=""><td><dl (17)<="" td=""><td></td></dl></td></dl>	<dl (17)<="" td=""><td></td></dl>	
702-AZ Exhauster (non-waste disturbing)	Furan ¹	9 <dl (6)<="" td=""><td><dl (6)<="" td=""><td>62 27</td><td><dl (20)<="" td=""><td></td></dl></td></dl></td></dl>	<dl (6)<="" td=""><td>62 27</td><td><dl (20)<="" td=""><td></td></dl></td></dl>	62 27	<dl (20)<="" td=""><td></td></dl>	
702-AZ Exhauster (waste disturbing)	Furan ¹	5 3	<dl (2)<="" td=""><td>3084 1392</td><td>87</td><td>Breakthrough after 8 hours (SD1) and 10 hours (SC1)</td></dl>	3084 1392	87	Breakthrough after 8 hours (SD1) and 10 hours (SC1)
AW Exhauster	Furan	<dl (6)<="" <dl="" td="" =""><td><dl (6)<="" td=""><td>204 146</td><td><dl (17)<="" td=""><td></td></dl></td></dl></td></dl>	<dl (6)<="" td=""><td>204 146</td><td><dl (17)<="" td=""><td></td></dl></td></dl>	204 146	<dl (17)<="" td=""><td></td></dl>	
AN Exhauster	Furan	<dl (6)<="" <dl="" td="" =""><td><dl (6)<="" td=""><td>85 48</td><td><dl (18)<="" td=""><td></td></dl></td></dl></td></dl>	<dl (6)<="" td=""><td>85 48</td><td><dl (18)<="" td=""><td></td></dl></td></dl>	85 48	<dl (18)<="" td=""><td></td></dl>	
SX-101 (SD1/SC1)	Furan	<dl (4)<="" <dl="" td="" =""><td><dl (4)<="" td=""><td>169 75</td><td><dl (29)<="" td=""><td></td></dl></td></dl></td></dl>	<dl (4)<="" td=""><td>169 75</td><td><dl (29)<="" td=""><td></td></dl></td></dl>	169 75	<dl (29)<="" td=""><td></td></dl>	
SX-104 (TL/FR57) ²	Furan	<dl (3)<="" <dl="" td="" =""><td><dl (3)<="" td=""><td>100 39</td><td><dl (28)<="" td=""><td></td></dl></td></dl></td></dl>	<dl (3)<="" td=""><td>100 39</td><td><dl (28)<="" td=""><td></td></dl></td></dl>	100 39	<dl (28)<="" td=""><td></td></dl>	

 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

¹2-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.

Vapor-TDU VOA #2

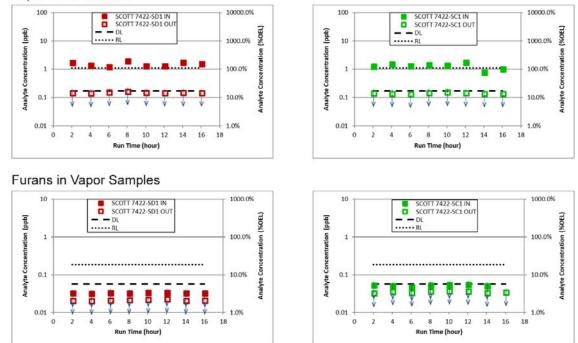
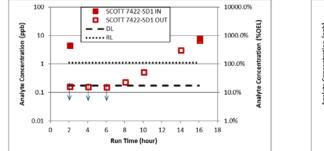
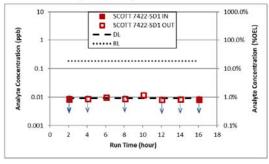


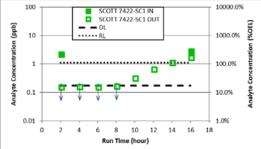
Figure G.2. Plots of Measured Furan Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested on an AW Exhauster Slipstream. Top panels represent Carbotrap 300 TDU sorbent tube results; bottom panels represent furans sorbent tube results.

Vapor-TDU VOA #2



Furans in Vapor Samples





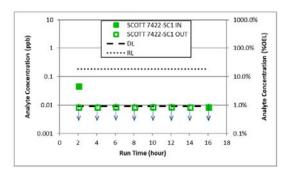


Figure G.3. Plots of Measured Furan Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested on BY-108 Headspace Vapors. Top panels represent Carbotrap 300 TDU sorbent tube results; bottom panels represent furans sorbent tube results. Vapor-TDU VOA #2

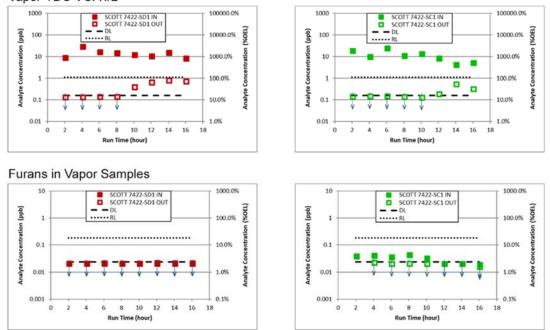


Figure G.4. Plots of Measured Furan Concentrations before the Inlets and after the Outlets of the Two Respirator Cartridges Tested on the 702-AZ Exhauster Slipstream under waste-disturbing conditions in 2017. Top panels represent Carbotrap 300 TDU sorbent tube results; bottom panels represent furans 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

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COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL RL?	Quality Code	Approx. DL (%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%		ſ	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%		1	17.2%
19	Furan	12	002-EF-F	6.8E-04	0.001	68.1%		L	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%		1	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 21	2,5-Dihydrofuran 2,5-Dihydrofuran	14 16	002-EF-G 002-EF-H	2.7E-04 3.2E-04	0.001 0.001	26.8% 32.2%	YES		32.2% 32.2%
	2,5-5	10	002-11-11	3.22-04	0.001	52.270	105		52.270
22 22	2-Methylfuran 2-Methylfuran	2 16	001-IN-A 001-IN-H	2.4E-04 3.9E-04	0.001	23.9% 39.2%		1	18.6% 18.6%
22	2-Methylfuran	2	001-IN-H		0.001	16.5%	YES	,	18.6%
22		4	001-EF-A 001-EF-B	1.7E-04 1.6E-04	0.001	16.5%	YES		18.6%
22	2-Methylfuran 2-Methylfuran	6	001-EF-B	1.6E-04	0.001	16.1%	YES		18.6%
22	2-Methylfuran	8	001-EF-C	1.6E-04	0.001	16.1%	YES		18.6%
22	2-Methylfuran	10	001-EF-D	1.6E-04	0.001	16.0%	YES		18.6%
22	2-Methylfuran	10	001-EF-E	1.02-04	0.001	10.076	163		18.6%
22	2-Methylfuran	12	001-EF-F	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%		ı	18.6%
22	2-Methylfuran	16	002-IN-H	2.5E-04	0.001	24.7%		i	18.6%
22	2-Methylfuran	2	002-EF-A	1.6E-04	0.001	15.9%	YES	1	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%

Table G3.Tank BY-108 Furan, 2,5-Dihydrofuran, and 2-Methylfuran Analytical Results using the
Carbotrap 300 TDU Tube Alternative Methodology.



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