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Analysis of Powered Air-Purifying Respirator (PAPR) Cartridge Performance Testing on Hanford Tanks SX-101 and SX-104

Volume 1

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Executive Summary

Washington River Protection Solutions (WRPS) conducted tests using two types of chemical cartridges for use in powered air-purifying respirators (PAPR) to determine the period of time that the cartridges would provide adequate performance[1] for PAPRs used to protect workers when exposed to a mixture of Chemicals of Potential Concern (COPCs) from vapors exiting the headspaces of Hanford tanks SX-101 and SX-104. The Occupational Safety and Health Administration (OSHA) considers cartridge testing to be a valid approach for establishing cartridge change schedules.[2] 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 the cartridge service life, including temperature, humidity, COPC concentration, breathing rate, and cartridge adsorption capacity.

Testing was conducted from June 16–17, 2017, from headspace vapors from Hanford tank SX-101 and from June 23–24, 2017, from Hanford tank SX-104. Headspace vapors were fed to a respirator cartridge test stand developed by WRPS in collaboration with HiLine Engineering (Richland, Washington). Multipurpose high-efficiency PAPR cartridges, MSA-TL (TL1) (MSA Safety Inc., Pittsburgh, Pennsylvania) and 3M FR-57 (TL2) (3M Company, Maplewood, Minnesota) were assessed on separate days. Sample media (i.e., sorbent tubes) were used to collect samples of the vapor stream entering and exiting the respirator cartridge and were subsequently analyzed for COPC concentrations. Pacific Northwest National Laboratory was tasked with conducting an independent analysis of the analytical results and making recommendations based on the results for respiratory cartridge performance and service life. The key conclusions from the analysis are described below.

Hanford Tank SX-101

Based on measured cartridge inlet vapor concentrations from tank SX-101, two COPCs—ammonia and N-nitrosodimethylamine (NDMA)—exceeded their corresponding Occupational Exposure Limits (OELs).[3] Four COPCs—mercury, N-nitrosodiethylamine (NDEA), N-nitrosomethylethylamine (NMEA), and N-nitrosomorpholine—had one or more inlet concentration measurements >10% of their OELs and greater than their analytical detection limits[4] (DL) or reporting limits (RL) but <100% of their OELs. All other COPC inlet and outlet measurements did not exceed 10% of their OELs or exceed their RLs.

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[1] "Adequate performance" refers to being below the breakthrough criterion used in this analysis, which is having a sustained cartridge outlet concentration above 10% of a compound's OEL. Ultimately, Industrial Hygiene professionals will use these results along with specific hazard assessments to determine service life, change schedules and cartridge use that provides the necessary performance.

[2] OSHA Respirator Change Schedules Mathematical Modeling, and Factors that Influence Cartridge Service Life, https://www.osha.gov/SLTC/etools/respiratory/change_schedule.html.

[3] OELs accepted for Hanford tank farm use are based on OELs established by a U.S. governmental agency or national professional organization (e.g., OSHA, National Institute for Occupational Safety and Health, American Conference of Governmental Industrial Hygienists), or if no U.S. OEL exists, standard toxicological practices are applied to develop OELs based on the best available science. The OEL for NDMA was established in 2005 based on the MAK (Maximale Arbeitsplatzkonzentration) Commission standard adopted in Europe.

[4] In this report, DL is used to refer either to an analytical RL 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.

- Maximum ammonia concentrations at the respirator cartridge inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were 628% and 796% of the OEL, respectively. These concentrations were higher than historic headspace and breather filter measurements from SX-101 by a factor of more than 30×. However, the historic headspace measurement was taken while an exhauster was operational in the SX Farm, and a vapor measurement from the breather filter may not have been representative of headspace concentrations. Ammonia breakthrough appeared to occur in the MSA-TL (TL1) cartridge above 10% of the OEL after 4 hours. However, the 4-hour sample concentration was unusual with a less-than-DL result. Interpolation between the 2- and 6-hour results suggests that breakthrough above 10% occurred between 2 and 4 hours. Breakthrough of the 3M FR-57 (TL2) cartridge above 10% of the OEL occurred within the first 2 hours.
- Maximum mercury concentrations at the inlets to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were 25% and 26% of the OEL, respectively. These concentrations were significantly higher than the historical measurements from SX-101, which were less than the analytical RL (0.2% of the OEL). All the cartridge outlet concentrations for mercury were below the RL, indicating that no breakthrough occurred.
- Maximum NDMA concentrations at the inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) respirator cartridges were 3358% and 3261% of the OEL, respectively. These concentrations are considerably higher than the available historical measurements, which were less than the RL (2.3% of the OEL). All measured outlet concentrations from both cartridges were less than the RL, indicating that no breakthrough occurred for either cartridge.
- Maximum NDEA, NMEA, and N-nitrosomorpholine concentrations at the inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were above 10% of their OELs, ranging from approximately 44% of the OEL for NDEA to 11% of OEL for N-nitrosomorpholine. Historic measurements for these three nitrosamines were all below their RLs (11%, 4%, and 1%, respectively). All outlet concentrations were less than the RLs, indicating that no breakthrough occurred for either cartridge.

Hanford Tank SX-104

Based on measured cartridge inlet vapor concentrations from tank SX-104, four COPCs—ammonia, furan, NDMA, and NMEA—exceeded their corresponding OELs. Five COPCs—mercury, dimethylfuran, 2,5- NDEA, and N-nitrosomorpholine—had one or more inlet concentration measurements that were >10% of their OELs and greater than their DLs or RLs, but <100% of their OELs. All other COPC inlet and outlet measurements did not exceed 10% of their OELs or exceed their RLs.

- Maximum ammonia concentrations at the respirator cartridge inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were 1126% and 1213% of the OEL, respectively. These concentrations are generally consistent with the historic SX-104 headspace measurements. All cartridge outlet concentrations for ammonia exceeded 10% of the OEL except for the first 2-hour measurement from the MSA-TL (TL1) cartridge, which was nearly 10%.. These data reflect breakthrough times of 2 hours for TL1 and less than 2 hours for TL2.
- Maximum mercury concentrations at the inlets to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were approximately 16% and 15% of the OEL, respectively. These concentrations were slightly lower but generally consistent with historic measurements, by approximately 0.5×. All cartridge outlet concentrations for mercury were below the RL, indicating that no breakthrough occurred.
- Maximum furan concentrations at the inlets to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were approximately 58% and 100% of the OEL, respectively. All cartridge outlet concentrations for furans were below the DL, indicating that no breakthrough occurred.

- All inlet and outlet concentrations of 2,5-dimethylfuran with the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were less than the RL (14% of the OEL), except for a single inlet measurement for TL2 of 25% of the OEL, and two outlet measurements for each of the TL1 and TL2 cartridges, which reached a maximum of 34% of OEL after 16 hours. However, several 2,5-dimethlyfuran measurements from the blank and baseline tubes also reported concentrations greater than RL, which puts the elevated inlet and outlet measurements for this COPC into question. The single available historic measurement of the SX-104 headspace was less than the RL (25% of the OEL).
- NDMA maximum concentrations at the inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) respirator cartridges were 6935% and 6416% of the OEL, respectively. These concentrations were generally consistent with historic measurements. The historic maximum of 9300% of the OEL occurred during a 2015 headspace sampling event. All measured outlet concentrations were less than the analytical RL of approximately 5.4% of the OEL, indicating that no breakthrough occurred for either cartridge.
- NDEA, NMEA, and N-nitrosomorpholine maximum concentrations at the inlet to either of the PAPR cartridges were 79%, 100%, and 29% of the OEL, respectively. These concentrations are all higher than the historical concentration measurements from the headspace, which were less than the RL for each COPC. However, all outlet concentrations were less than the RLs, indicating that no breakthrough occurred for any of these nitrosamine compounds with either cartridge tested.

Recommendations

Based on the measurements taken for this study, ammonia breakthrough, above 10% of its OEL, occurred earlier than any other COPC—within 2 to 6 hours for the MSA-TL (TL1) cartridge and within 2 hours for the 3M FR-57 (TL2) cartridge in Hanford tanks SX-101 and SX-104. The average inlet concentration of ammonia was >660% of the OEL and reached a maximum of 1213% of the OEL in SX-104 tests. These inlet concentrations correlate to the observed breakthrough times in a way that is consistent with past respirator cartridge results. As with previous cartridge performance studies on Hanford tank vapors, the experimental results in this study support using the breakthrough measurements for ammonia as an early indicator, compared to other COPCs, to inform an appropriate respirator cartridge change-out schedule.

- Variations in humidity, temperature, or cartridge inlet concentration for any COPCs, especially ammonia, compared to those measured in the current study could impact breakthrough time, and should be used to inform an Industrial Hygiene determination of an appropriate respirator cartridge change-out schedule for adequate worker protection. Cartridge service-life estimations based on ammonia, using the MSA Response Guide® Cartridge Life Expectancy Calculator, appeared to adequately account for environmental changes with reasonable accuracy.[31] The 3M FR-57 cartridge was not available in the 3M Service Life Software [1]; however, 3M consultants were able to provide estimates that were conservative compared to test results, which continues to give confidence in the use of ammonia with the manufacturers' calculators for service-life estimations.
- These tests on SX-101 and SX-104 represent both the first evaluations of PAPR cartridge performance on Hanford tank farm vapors and a limited data set of COPC inlet concentrations and test conditions, especially for COPCs such as furan for which inlet concentrations were highly variable. Additional PAPR tests at inlet concentrations of key COPCs representing the range of expected tank farm conditions is recommended to verify cartridge performance.

[1] http://extra8.3m.com/SLSWeb/chemicalInformationSLife.html?page=serviceLife&disclaimerPageFlag=Y, Version: 3.3

- Concerns about the 2,5-dimethylfuran data have been identified. Specifically, some measurements from the blank and baseline sorbent tubes exceeded RL values, which puts the current RL value into question. Thus, the protocol for 2,5-dimethylfuran testing should be evaluated to ensure that sorbent tubes are adequately clean/regenerated for future tests. Cartridge performance for several lower boiling point furan compounds including furan, 2,5-dihydrofuran, and 2-methyl furan was assessed using secondary analysis methods with superior quantitation capability, but higher DLs. Improvements in quantitation limits (both DL and RL) for these furans are recommended to improve cartridge performance evaluation.

The *Overview of 2017 Through 2018 Testing of Powered Air-Purifying (PAPR) Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhauster*[1] provides additional information on the use of the cartridge testing results for the first 10 PAPR cartridge tests with the manufacturers service life models and estimating methodologies.

[1] J Liu, C Clayton, LA Mahoney, MJ Minette, SK Nune, C Clayton, CL Bottenus, CJ Freeman, and TM Brouns. 2020. *Overview of 2017 Through 2018 Testing of Powered Air-Purifying (PAPR) Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhausters*. PNNL-29416 Revision 0, Pacific Northwest National Laboratory, Richland, Washington.

Revision History

Revision Number	Effective Date	Description of Change
A		Initial Draft
0	July 2020	This report has been revised to address external peer review comments on the draft PAPR reports and to correct data reporting errors. The principal changes included: 1. Addressing several external peer review comments including: a. Referencing the *Overview of 2017 Through 2018 Testing of Powered Air-Purifying (PAPR) Respirator Cartridge Performance on Multiple Hanford Tank Headspaces and Exhausters* (PNNL-29416 Revision 0), 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.

Acronyms and Abbreviations

ALS	ALS Environmental Salt Lake City
APR	air-purifying respirator
CAS	Chemical Abstract Service
CBAL	Columbia Basin Analytical Laboratory, part of the RJ Lee Group
CFR	Code of Federal Regulations
COPC	Chemicals of Potential Concern
CVAA	Cold Vapor Atomic Absorption
DL	detection limit
EPA	U.S. Environmental Protection Agency
GC–FID	Gas Chromatography–Flame Ionization Detector
GC/MS	Gas Chromatography/Mass Spectrometry
GC–TEA	Gas Chromatography–Thermal Energy Analyzer
HPLC	High Performance Liquid Chromatography
HPLC–UV	High Performance Liquid Chromatography–Ultraviolet
IC	ion chromatography
NDEA	N-nitrosodiethylamine
NDMA	N-nitrosodimethylamine
NIOSH	National Institute of Occupational Safety and Health
NMEA	N-nitrosomethylethylamine
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
SCBA	Self-Contained Breathing Apparatus
PAPR	powered air-purifying respirator
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
VOC	Volatile Organic Compound
WC	Water Column
WHL	Wastren Hanford Laboratory (222S)
WRPS	Washington River Protection Solutions

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1.0 Introduction/Project Description

As the Tank Operations Contractor for U.S. Department of Energy operations at the Hanford site in Washington State, Washington River Protection Solutions (WRPS) is responsible for managing highly radioactive wastes stored in tanks at Hanford. WRPS identified the need to test air-purifying respirator (APR) and powered air-purifying respirator (PAPR) 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 and PAPRs used to protect workers when exposed to a mixture of Chemicals of Potential Concern (COPC) from any vapors exiting headspaces in the storage tanks. Occupational Safety and Health Administration (OSHA) Standard 29 Code of the Federal Regulations (CFR) 1910.134(d)(3)(iii)(b)(2) specifies that for protection against gases and vapors, employers shall implement a 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 Cartridge Test Program is to obtain objective data to determine service lives for the APR and PAPR cartridges used at Hanford tank farms. WRPS contracted with Pacific Northwest National Laboratory to analyze the test data and offer an independent analysis and any recommendations. This report summarizes data analysis of PAPR cartridge testing on headspace vapors from Hanford SX-101 and SX-104 single-shell tanks. Two different PAPR cartridges—one from MSA Safety Inc. (Pittsburgh, Pennsylvania) and another from 3M (Maplewood, Minnesota)—were assessed on each tank headspace source. These data represent the first PAPR cartridge testing under the recent WRPS program, as testing to date had focused on APR cartridges.

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 supplied air respirators or SCBAs offers more protection, a tradeoff exists, particularly for SCBAs that employ a large, heavy (~30 pounds), back-mounted compressed air cylinder.[1]

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

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

- *Conduct experimental tests* – The first step is to gather all available information about the nature of all contaminants present in the workplace. Obtain breathing rates of workers and estimate worst-case exposures. For most employers, this approach is the most time consuming, and resources needed to perform these tests may not be available. If an employer has the resources needed to pursue this approach, it is the most reliable method of estimating cartridge service life. Concentrations at different points in time are obtained using actual respirator cartridges exposed to actual or simulated gases to gather service-life information. A safety factor that includes the assumptions made, variable factors, or conditions needs to be applied to the service life and used in the respiratory protection program. This approach is commonly used in situations where mixtures of contaminants are present and also can be used to validate an existing cartridge change-out schedule.
- *Use the manufacture's recommendation* – When information about 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 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 Hanford waste storage tanks, 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 of components. 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 products (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:
  - Number of cartridges used by the respirator
  - Mass of the sorbent used in each cartridge
  - Carbon micro-pore volume
  - Density of the packed bed
  - Maximum temperature
  - Maximum relative humidity
  - 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 take little time. However, the estimates are not as accurate as testing; sometimes modeling might result in a service-life estimate that is shorter than it needs to be because of conservative assumptions used during calculations.

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

- If the compound's boiling point is >70°C and the concentration is <200 ppm, a service life of 8 hours at a normal work rate can be expected.
- Service life is inversely proportional to worker breathing rate.
- Reducing the concentration of a contaminant by a factor of 10 will increase service life by a factor of 5.
- Relative humidity above 85% will reduce the service life by 50%.

These rules of thumb do not apply in certain situations, including for mixtures of hazardous contaminants (e.g., Hanford tank farm vapors) and inorganic gases such as ammonia, sulfur dioxide, and hydrogen sulfide, compositions that vary with time and location, and contaminants that undergo continuous reactions. However, some of the general drivers[1] can help in interpreting the results obtained from experimental testing of respirator cartridges.

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

3.0 Description of Testing Program

Based on the OSHA guidance described in Section 2, 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 PAPR cartridge-testing setup developed by WRPS and used for measurements of vapors from the SX-101 and SX-104 tanks.[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 design of the APR cartridge test rig [16-25] used previously was modified to accommodate the higher flow rates and larger PAPR cartridges.

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. Before the test stands were transported to the tank farms, WRPS Sampling Equipment Operators, Industrial Hygiene Technicians, and Field Work Supervisors underwent training at HiLine Engineering (Richland, Washington).

The PAPR 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.

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

- The flow rate through the cartridges was set at 95 L/min, which is equivalent to 190 L/min for a two-cartridge PAPR unit, or 285 L/min for a three-cartridge PAPR unit. These test flow rates are significantly higher than the minimum PAPR flow rate requirements.[1] The flow rate also is conservative relative to the 3M-specified flow rate of 220 L/min for use in service-life estimates of their Breathe Easy PAPR with FR-57 cartridge,[2] and slightly below MSA-specified flow rate of 205 L/min assigned in their Response® Guide cartridge life expectancy calculator for the Optimair TL PAPR with hood [27].
- Tank farm vapors source sampling was performed on headspace vapors rather than from Hanford tank farm atmospheric concentrations (i.e., source sampling versus the breathing zone).
- A threshold concentration of 10% of the OEL for each COPC was chosen.

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[1] PAPR cartridges have a minimum flow rate requirement of 115 L/min for a tight-fitting mask and 170 L/min for a loose-fitting hood [26]. The MSA PAPR uses two TL1 cartridges, and the 3M PAPR uses three FR-57 (TL2) cartridges. Testing at 95 L/min provided a conservatively high flow rate for the MSA cartridge (equivalent to 190 L/min = 12% higher than minimum for a loose-fitting hood), and the 3M cartridge (equivalent to 285 L/min = 68% higher than minimum for a loose-fitting hood).

[2] Email exchange on October 27, 2017, between J. Liu (PNNL scientist) and E.W. Johnson (3M Technical Service Specialist). See Figure G.1

Using the cartridge-testing setup described in Appendix A, separate test surveys were performed on two NIOSH-approved respiratory protection cartridges: MSA Optifilter TL (TL1) for Survey 1[1] and 3M FR-57 (TL2) for Survey 2.[2][27,28] These cartridges were chosen because they can capture organic vapors, acid gases, ammonia, formaldehyde, and particulates.[27,28] Vapor concentrations upstream and downstream of the PAPR cartridge were monitored with an array of sorbent tubes (see Appendix B). Influent (upstream) concentrations were measured at the beginning and end of each 16-hour verification survey. Downstream sorbent tubes were changed out every 2 hours until the experiment was finished. A measured quantity of sample air was drawn in through the sorbent tube (see Appendix A).[13,14] Compounds from the sorbent tubes were extracted and analyzed using analytical methods referenced in Appendix B.

The characteristics of 59 of 61 COPCs were the primary focus of the testing. The 61 COPCs represent a set of tank vapor chemicals found in a tank farm source of the OEL or are considered “known” or “probable” carcinogens by the International Agency for Research Cancer or other regulatory agencies.[29,30] A full listing of these COPCs is provided in Section 4.0.

[1] MSA OptiFilter TL (Part number 10143421; Reorder Number 10080456) is a multipurpose PAPR respirator cartridge for use with the OptimAir® TL PAPR, with NIOSH approval for AM/CL/CD/FM/HC/MA/SD/HE/HF application (P Jones October 2017). https://us.msasafety.com/Air-Purifying-Respirators-%28APR%29/Powered-Air-Purifying-Respirators-%28PAPR%29/OptimAir%C2%AE-TL-PAPR/p/000100003000001600.

[2] 3M FR-57 (Part number 453-03-02R06) is a multipurpose PAPR respirator cartridge for use with the 3M RRPAS 6000 series facepieces or BE-10 series hood powered supplied air respirator systems, with NIOSH approval for OV/SD/HC/CL/CD/HF/AM/MA/FM/HE application (P Jones October 2017). https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-High-Efficiency-Cartridge-FR-57-453-03-02R06-6-EA-Case/?N=5002385+3294780228&rt=rud.

4.0 Data Analysis

Respirator cartridge tests on vapors from the SX-101 and SX-104 tanks were conducted during two periods from June 16-17, 2017 and June 23-24, 2017, respectively. Each cartridge (MSA-TL (TL1) and 3M FR-57 (TL2)) was tested for approximately 16 hours of continuous run time. Testing and analyses focused on 59 of the 61 COPCs identified in Table 1 (SX-101) and Table 2 (SX-104) and other hazardous airborne contaminants.[1] Sorbent tubes were changed every 2 hours. More than 400 sorbent tubes were sent to the 222S Laboratory at Hanford and dispositioned for analyses.

In previously published cartridge reports, raw data for all contaminants analyzed during the tests were provided in Appendix C to the document. However, the extensive amount of data (over 900 pages for this report) resulted in unwieldy document file sizes. To solve this problem, the raw data are provided in a separate Volume 2. Appendix C in this document (Volume 1) still provides introductory information regarding Volume 2.

Appendix D of this report lists the corresponding calculated concentrations. The SX-101 slipstream temperature ranged from 55 to 92°F and the relative humidity ranged from 67 to 90%, while the SX-104 slipstream temperature ranged from 68 to 105°F and relative humidity ranged from 37 to 72%.

Tables 1 and 2 provide overviews of the results for each of the 59 COPCs for tanks SX-101 and SX-104, respectively. 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.

4.1 SX-101

Table 1 shows the measured concentrations in the current study using PAPR cartridges MSA-TL (TL1) and 3M FR-57 (TL2) for all of the COPCs tested on headspace vapors from SX-101. Inlet concentrations of two COPCs—ammonia and N-nitrosodimethylamine (NDMA)—exceeded their corresponding OELs. The inlet (or outlet) concentrations of four additional COPCs were lower than their corresponding OELs but exceeded 10%. These COPCs were mercury, N-nitrosodiethylamine (NDEA), N-nitrosomethylethylamine (NMEA), and N-nitrosomorpholine. All six of these COPCs are highlighted in yellow in Table 1 and are assessed in more detail in Section 5.1. Appendix E shows similar assessments for 11 additional COPCs with respirator cartridge inlet (or outlet) concentrations or detection limits (DL) <10% of their OELs but >2%. These COPCs were formaldehyde, furan, 2,3-dihydrofuran, 2,5-dihydrofuran, 2-methylfuran, 2,5-dimethylfuran, 2-pentylfuran, 2-heptylfuran, 2-propylfuran, acetonitrile and 2-nitro-2-methylpropane. All of the other COPCs had inlet (or outlet) concentrations <2% of their OELs or their DLs.

[1] At the time of testing in June 2017, the tank farm COPC list included 59 chemical compounds. In September 2017, after testing but prior to completion of data analysis and reporting, dimethylmercury and 2-propenal were added to the tank farm COPC list, thereby increasing the number of COPCs to 61. Dimethylmercury was not measured in these tests because it requires special sampling and analysis methods. 2-Propenal is regularly addressed in Industrial Hygiene sampling as part of the aldehydes sorbent tube suite of compounds. For completeness, these two new COPCs are listed in Table 1 after COPC #18 and #59.

Table 1. Summary of Analyzed COPCs- SX-101

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) <DL or <RL	Highest Detected Value Compared to OEL
Inorganic						
1 Ammonia	7664-41-7	199 ppm	25 ppm	2.37%		Up to 796% of OEL for inlet values. All outlets ≤761%.
2 Nitrous Oxide	10024-97-2	Not Measured	50 ppm			
3 Mercury	7439-97-6	6.48 ug/m3	25 ug/m3	6.79%		Up to 26% of OEL for inlet values. All outlets <DL.
Hydrocarbons						
4 1,3-Butadiene	106-99-0	0.0189 ppm	1 ppm	1.89%	X	
5 Benzene	71-43-2	0.0020 ppm	0.5 ppm	0.025%		Up to 0.4% of OEL for inlet values. All outlets ≤0.06%.
6 Biphenyl	92-52-4	0.0002 ppm	0.2 ppm	0.084%	X	
Alcohols						
7 1-Butanol	71-36-3	0.0249 ppm	20 ppm	0.001%		Up to 0.1% of OEL for inlet values. All outlets ≤0.01%.
8 Methanol	67-56-1	2.03 ppm	200 ppm	1.01%	X	
Ketones						
9 2-Hexanone	591-78-6	0.0106 ppm	5 ppm	0.002%		Up to 0.2% of OEL for inlet values. All outlets <DL.
10 3-Methyl-3-butene-2-one	814-78-8	Not Detected	0.02 ppm	TIC[2]	X	
11 4-Methyl-2-hexanone	105-42-0	0.0006 ppm	0.5 ppm	0.018%		Up to 0.1% of OEL for inlet values. All outlets <DL.
12 6-Methyl-2-heptanone	928-68-7	Not Detected	8 ppm	TIC	X	
13 3-Buten-2-one	78-94-4	0.0012 ppm	0.2 ppm	0.12%		Up to 0.6% of OEL for inlet values. All outlets <DL
Aldehydes						
14 Formaldehyde	50-00-0	0.0113 ppm	0.3 ppm	0.57%		Up to 3.8% of OEL for inlet values. All outlets ≤0.8%.
15 Acetaldehyde	75-07-0	0.0782 ppm	25 ppm	0.005%		Up to 0.3% of OEL for inlet values. All outlets ≤0.2%.
16 Butanal	123-72-8	0.0025 ppm	25 ppm	0.001%		Up to 0.01% of OEL for inlet values. All outlets <DL.
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	
New 2-Propenal	107-02-8	0.0009 ppm	0.1 ppm	0.91%	X	

[1] Approximate DL is calculated using the reported DLs (or reporting limits [RL]) from the analytical laboratory and the average volume (from flowrate x time) of vapor exposed to the sorbent tube. For the furans, both DL and RL values [25] are reported as "DL/RL."

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

[3] Furan, 2, 5-dihydrofuran, and 2-methylfuran are quantified using the Carbotrap 300 TDU sorbent media tube. All other substituted furans are quantified using the furans tube. Appendix B and C for more information.

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) <DL or <RL	Highest Detected Value Compared to OEL
Furans						
19 Furan	110-00-9	0.28 ppb	1 ppb	DL/RL[1] 28.5%/114%[3]	X	
20 2,3-Dihydrofuran	1191-99-7	0.04 ppb	1 ppb	2.18%/18.8%	X (<RL)	Up to 2.1% of OEL (<DL) for inlet values. All outlets <4.3%.
21 2,5-Dihydrofuran	1708-29-8	0.53 ppb	1 ppb	52.5%/111%[3]	X	
22 2-Methylfuran	534-22-5	0.13 ppb	1 ppb	12.6%/94.4%[3]	X	
23 2,5-Dimethylfuran	625-86-5	0.04 ppb	1 ppb	4.11%/13.7%	X	
24 2-Ethyl-5-methylfuran	1703-52-2	Not Detected	1 ppb	TIC	X	
25 4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9	Not Detected	1 ppb	TIC	X	
26 3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4	Not Detected	1 ppb	TIC	X	
27 2-Pentylfuran	3777-69-3	0.07 ppb	1 ppb	3.38%/9.53%	X (<RL)	Up to 6.9% of OEL for inlet values. All outlets <5.0%.
28 2-Heptylfuran	3777-71-7	0.03 ppb	1 ppb	2.56%/7.92%	X	
29 2-Propylfuran	4229-91-8	0.03 ppb	1 ppb	2.55%/12.0%	X	
30 2-Octylfuran	4179-38-8	Not Detected	1 ppb	TIC	X	
31 2-(3-Oxo-3-phenylprop-1-enyl)furan	717-21-5	Not Detected	1 ppb	TIC	X	
32 2-(2-Methyl-6-oxoheptyl)furan	51595-87-0	Not Detected	1 ppb	TIC	X	
Phthalates						
33 Diethylphthalate	84-66-2	0.0019 mg/m3	5 mg/m3	0.038%	X	
Nitriles						
34 Acetonitrile	75-05-8	0.619 ppm	20 ppm	0.002%		Up to 2.1% of OEL for all inlet values. All outlet values ≤3.1%.
35 Propanenitrile	107-12-0	0.0028 ppm	6 ppm	0.006%		Up to 0.05% of OEL for inlet values. All outlets <DL.
36 Butanenitrile	109-74-0	0.0041 ppm	8 ppm	0.002%		Up to 0.05% of OEL for inlet values. All outlets <DL.
37 Pentanenitrile	110-59-8	0.0030 ppm	6 ppm	0.002%		Up to 0.05% of OEL for inlet values. All outlets ≤0.003%.
38 Hexanenitrile	628-73-9	0.0012 ppm	6 ppm	0.003%		Up to 0.02% of OEL for inlet values. All outlets <DL.
39 Heptanenitrile	629-08-3	Not Detected	6 ppm	TIC	X	
40 2-Methylene butanenitrile	1647-11-6	Not Detected	0.3 ppm	TIC	X	
41 2,4-Pentadienenitrile	1615-70-9	Not Detected	0.3 ppm	TIC	X	

Table 1. (continued)

COPC Number and Name	CAS Number	Highest Measured Value (this study)	Occupational Exposure Limit (OEL)	Approximate Analytical Detection Limit, DL[1] (% of OEL)	All Data Values (inlet and outlet) <DL or <RL	Highest Detected Value Compared to OEL
Amines						
42 Ethylamine	75-04-7	0.0046 ppm	5 ppm	0.091%	X	
Nitrosamines						
43 N-Nitrosodimethylamine	62-75-9	10.1 ppb	0.3 ppb	5.12%		Up to 3358% of OEL for inlet values. All outlets <DL.
44 N-Nitrosodiethylamine	55-18-5	0.04 ppb	0.1 ppb	11.1%		Up to 43.8% of OEL for inlet values. All outlets <DL.
45 N-Nitrosomethylethylamine	10595-95-6	0.09 ppb	0.3 ppb	4.30%		Up to 30.9% of OEL for inlet values. All outlets <DL.
46 N-Nitrosomorpholine	59-89-2	0.06 ppb	0.6 ppb	1.48%		Up to 10.6% of OEL for inlet values. All outlets <DL.
Organophosphates						
47 Tributyl phosphate	126-73-8	0.14 ppb	200 ppb	0.068%	X	
48 Dibutyl butylphosphonate	78-46-6	0.09 ppb	7 ppb	1.33%	X	
Halogenated						
49 Chlorinated Biphenyls	Varies	Not Detected	1 mg/m3	TIC	X	
50 2-Fluoropropene	1184-60-7	Not Detected	0.1 ppm	TIC	X	
Pyridines						
51 Pyridine	110-86-1	0.40 ppb	1000 ppb	0.016%		Up to 0.04% of OEL for inlet values. All outlets <DL.
52 2,4-Dimethylpyridine	108-47-4	0.21 ppb	500 ppb	0.043%	X	
Organonitrites						
53 Methyl nitrite	624-91-9	Not Detected	0.1 ppm	TIC	X	
54 Butyl nitrite	544-16-1	Not Detected	0.1 ppm	TIC	X	
Organonitrates						
55 Butyl nitrate	928-45-0	0.0004 ppm	2.5 ppm	TIC		Up to 0.02% of OEL for single inlet values. All outlets non-detect.
56 1,4-Butanediol, dinitrate	3457-91-8	Not Detected	0.05 ppm	TIC	X	
57 2-Nitro-2-methylpropane	594-70-7	0.0063 ppm	0.3 ppm	TIC		Up to 2.1% of OEL for single inlet values. All outlets non-detect.
58 1,2,3-Propanetriol, 1,3-dinitrate	623-87-0	Not Detected	0.05 ppm	TIC	X	
Isocyanates						
59 Methyl Isocyanate	624-83-9	Not Detected	20 ppb	TIC	X	
Organometallic						
New Dimethylmercury	593-74-8	Not Measured	10 ug/m3			

4.2 SX-104

Table 2 shows the measured concentrations in the current study using PAPR cartridges MSA-TL (TL1) and 3M FR-57 (TL2) for all of the COPCs tested on headspace vapors from SX-104. Inlet concentrations of three COPCs—ammonia, NDMA, and NMEA—exceeded their corresponding OELs. The inlet (or outlet) concentrations of five additional COPCs were lower than their corresponding OELs but >10%. These COPCs were mercury, furan, 2-5-dimethylfuran, NDEA, and N-nitrosomorpholine. All eight of these COPCs are highlighted in yellow in Table 2 and are assessed in more detail in Section 5.2. Appendix E shows similar assessments for 9 additional COPCs with respirator cartridge inlet (or outlet) concentrations or DLs <10% of their OELs but >2%. These COPCs were formaldehyde, 2,3-dihydrofuran, 2,5-dihydrofuran, 2-methylfuran, 2-pentylfuran, 2-heptylfuran, 2-propylfuran, acetonitrile, and dibutyl butylphosphonate. All of the other COPCs had inlet (or outlet) concentrations <2% of their OELs or their DLs.

Table 2. Summary of Analyzed COPCs-SX-104

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) <DL or <RL	Highest Detected Value Compared to OEL
Inorganic						
1 Ammonia	7664-41-7	303 ppm	25 ppm	2.41%		Up to 1213% of OEL for inlet values. All outlets ≤1163%.
2 Nitrous Oxide	10024-97-2	Not Measured	50 ppm			
3 Mercury	7439-97-6	3.88 ug/m3	25 ug/m3	7.59%		Up to 15.5% of OEL for inlet values. All outlets <DL.
Hydrocarbons						
4 1,3-Butadiene	106-99-0	0.020 ppm	1 ppm	1.98%	X	
5 Benzene	71-43-2	0.0026 ppm	0.5 ppm	0.044%		Up to 0.5% of OEL for inlet values. All outlets ≤0.07%.
6 Biphenyl	92-52-4	0.0007 ppm	0.2 ppm	0.33%		<DL for all inlet values. All outlets ≤0.09% of OEL.
Alcohols						
7 1-Butanol	71-36-3	0.078 ppm	20 ppm	0.002%		Up to 0.4% of OEL for inlet values. All outlets <0.02%.
8 Methanol	67-56-1	2.06 ppm	200 ppm	1.03%	X	
Ketones						
9 2-Hexanone	591-78-6	0.0197 ppm	5 ppm	0.003%		Up to 0.4% of OEL for inlet values. All outlets <DL.
10 3-Methyl-3-butene-2-one	814-78-8	Not Detected	0.02 ppm	TIC	X	
11 4-Methyl-2-hexanone	105-42-0	0.0003 ppm	0.5 ppm	0.026%		Up to 0.06% of OEL for inlet values. All outlets <DL.
12 6-Methyl-2-heptanone	928-68-7	Not Detected	8 ppm	TIC	X	
13 3-Buten-2-one	78-94-4	0.0025 ppm	0.2 ppm	0.16%		Up to 1.2% of OEL for inlet values. All outlets <DL.
Aldehydes						
14 Formaldehyde	50-00-0	0.0165 ppm	0.3 ppm	0.58%		Up to 5.5% of OEL for inlet values. All outlets ≤1.7%.
15 Acetaldehyde	75-07-0	0.139 ppm	25 ppm	0.007%		Up to 0.6% of OEL for inlet values. All outlets <0.4%.
16 Butanal	123-72-8	0.0137 ppm	25 ppm	0.001%		Up to 0.06% of OEL for inlet values. All outlets <DL.
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	
New 2-Propenal	107-02-8	0.0009 ppm	0.1 ppm	0.93%	X	

[1] Approximate DL is calculated using the reported DLs (or RLs) from the analytical laboratory and the average volume (from flow rate x time) of vapor exposed to the sorbent tube. For the furans, both DL and RL values [25] are reported as "DL / RL."

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

[3] Furan, 2, 5-dihydrofuran, and 2-methylfuran are quantified using the Carbotrap 300 TDU sorbent media tube. All other substituted furans are quantified using the furans tube. See Appendix B and C for more information.

Table 2. (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) <DL or <RL	Highest Detected Value Compared to OEL
Furans						
19 Furan	110-00-9	1.00 ppb	1 ppb	DL/RL[1] 28.5%/114%[3]		Up to 100% of OEL for inlet values. All outlets <DL.
20 2,3-Dihydrofuran	1191-99-7	0.07 ppb	1 ppb	2.15%/18.5%	X (<RL)	Up to 6.6% of OEL for inlet values. All outlets <DL.
21 2,5-Dihydrofuran	1708-29-8	0.53 ppb	1 ppb	52.5%/111%[3]	X	
22 2-Methylfuran	534-22-5	0.21 ppb	1 ppb	21.1%/94.4%[3]	X	
23 2,5-Dimethylfuran	625-86-5	0.34 ppb	1 ppb	4.05%/13.5%		Up to 25.2% of OEL for inlet values. All outlet ≤34%.
24 2-Ethyl-5-methylfuran	1703-52-2	Not Detected	1 ppb	TIC	X	
25 4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9	Not Detected	1 ppb	TIC	X	
26 3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4	Not Detected	1 ppb	TIC	X	
27 2-Pentylfuran	3777-69-3	0.06 ppb	1 ppb	3.33%/9.39%	X (<RL)	Up to 5.7% of OEL for inlet values. All outlets ≤3.7%.
28 2-Heptylfuran	3777-71-7	0.03 ppb	1 ppb	2.52%/7.81%	X	
29 2-Propylfuran	4229-91-8	0.03 ppb	1 ppb	2.51%/11.8%	X	
30 2-Octylfuran	4179-38-8	Not Detected	1 ppb	TIC	X	
31 2-(3-Oxo-3-phenylprop-1-enyl)furan	717-21-5	Not Detected	1 ppb	TIC	X	
32 2-(2-Methyl-6-oxoheptyl)furan	51595-87-0	Not Detected	1 ppb	TIC	X	
Phthalates						
33 Diethylphthalate	84-66-2	0.0074 mg/m3	5 mg/m3	0.15%		Up to .04% of OEL for single inlet value. All outlets <DL.
Nitriles						
34 Acetonitrile	75-05-8	0.523 ppm	20 ppm	0.002%		Up to 2.6% of OEL for all inlet values. All outlets ≤1.3%.
35 Propanenitrile	107-12-0	0.0048 ppm	6 ppm	0.006%		Up to 0.08% of OEL for inlet values. All outlet <DL.
36 Butanenitrile	109-74-0	0.0044 ppm	8 ppm	0.003%		Up to 0.06% of OEL for inlet values. All outlets <DL.
37 Pentanenitrile	110-59-8	0.0011 ppm	6 ppm	0.003%		Up to 0.02% of OEL for inlet values. All outlets ≤DL.
38 Hexanenitrile	628-73-9	0.0010 ppm	6 ppm	0.002%		Up to 0.02% of OEL for inlet values. All outlets <DL.
39 Heptanenitrile	629-08-3	Not Detected	6 ppm	TIC	X	
40 2-Methylene butanenitrile	1647-11-6	Not Detected	0.3 ppm	TIC	X	
41 2,4-Pentadienenitrile	1615-70-9	Not Detected	0.3 ppm	TIC	X	

Table 2. (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) <DL or <RL	Highest Detected Value Compared to OEL
Amines						
42 Ethylamine	75-04-7	0.017 ppm	5 ppm	0.092%		Up to 0.3% of OEL for inlet values. All outlets <DL.
Nitrosamines						
43 N-Nitrosodimethylamine	62-75-9	20.8 ppb	0.3 ppb	5.45%		Up to 6935% of OEL for inlet values. All outlets <DL
44 N-Nitrosodiethylamine	55-18-5	0.08 ppb	0.1 ppb	12.0%		Up to 79.4% of OEL for inlet values. All outlets <DL.
45 N-Nitrosomethylethylamine	10595-95-6	0.30 ppb	0.3 ppb	4.58%		Up to 100% of OEL for inlet values. All outlets <DL.
46 N-Nitrosomorpholine	59-89-2	0.17 ppb	0.6 ppb	1.74%		Up to 29.2% of OEL for inlet values. All outlets <DL.
Organophosphates						
47 Tributyl phosphate	126-73-8	0.54 ppb	200 ppb	0.27%	X	
48 Dibutyl butylphosphonate	78-46-6	0.37 ppb	7 ppb	5.24%	X	
Halogenated						
49 Chlorinated Biphenyls	Varies	Not Detected	1 mg/m3	TIC	X	
50 2-Fluoropropene	1184-60-7	Not Detected	0.1 ppm	TIC	X	
Pyridines						
51 Pyridine	110-86-1	0.96 ppb	1000 ppb	0.038%		Up to 0.1% of OEL for inlet values. All outlets <DL.
52 2,4-Dimethylpyridine	108-47-4	0.22 ppb	500 ppb	0.044%	X	
Organonitrites						
53 Methyl nitrite	624-91-9	Not Detected	0.1 ppm	TIC	X	
54 Butyl nitrite	544-16-1	Not Detected	0.1 ppm	TIC	X	
Organonitrates						
55 Butyl nitrate	928-45-0	Not Detected	2.5 ppm	TIC	X	
56 1,4-Butanediol, dinitrate	3457-91-8	Not Detected	0.05 ppm	TIC	X	
57 2-Nitro-2-methylpropane	594-70-7	Not Detected	0.3 ppm	TIC	X	
58 1,2,3-Propanetriol, 1,3-dinitrate	623-87-0	Not Detected	0.05 ppm	TIC	X	
Isocyanates						
59 Methyl Isocyanate	624-83-9	Not Detected	20 ppb	TIC	X	
Organometallic						
New Dimethylmercury	593-74-8	Not Measured	10 ug/m3			

5.0 Plots of COPCs with Significant Detected Values

5.1 SX-101

This section provides more detail on the six COPCs, from the SX-101 testing, identified in Table 1 as having concentrations (inlet or outlet to the cartridge) >10% of the corresponding OEL. Plots of the corresponding data are given, as well as the associated analyses. Note that Appendix E shows plots and/or descriptions for other COPCs with measured inlet or outlet concentrations or DLs between 2% and 10% of their corresponding OELs.

Ammonia *(see Figure 1)* – The DL for ammonia corresponds to approximately 2.4% of its OEL. Inlet concentrations were measured for every 2 hours throughout the testing period. For both the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges, the inlet ammonia concentrations were relatively constant—ranging from 539% to 796% of the OEL. Outlet concentrations from the MSA-TL (TL1) cartridge exceeded 10% of the OEL after 4 hours, while outlet concentrations from the 3M FR-57 (TL2) cartridge exceeded 10% of the OEL within the first 2 hours of testing. The 4-hour measurement for the TL1 cartridge was unusually low (less than the DL), which could have been due to sampling or analytical error. Therefore, it is likely that breakthrough occurred between 2 and 6 hours for TL1.

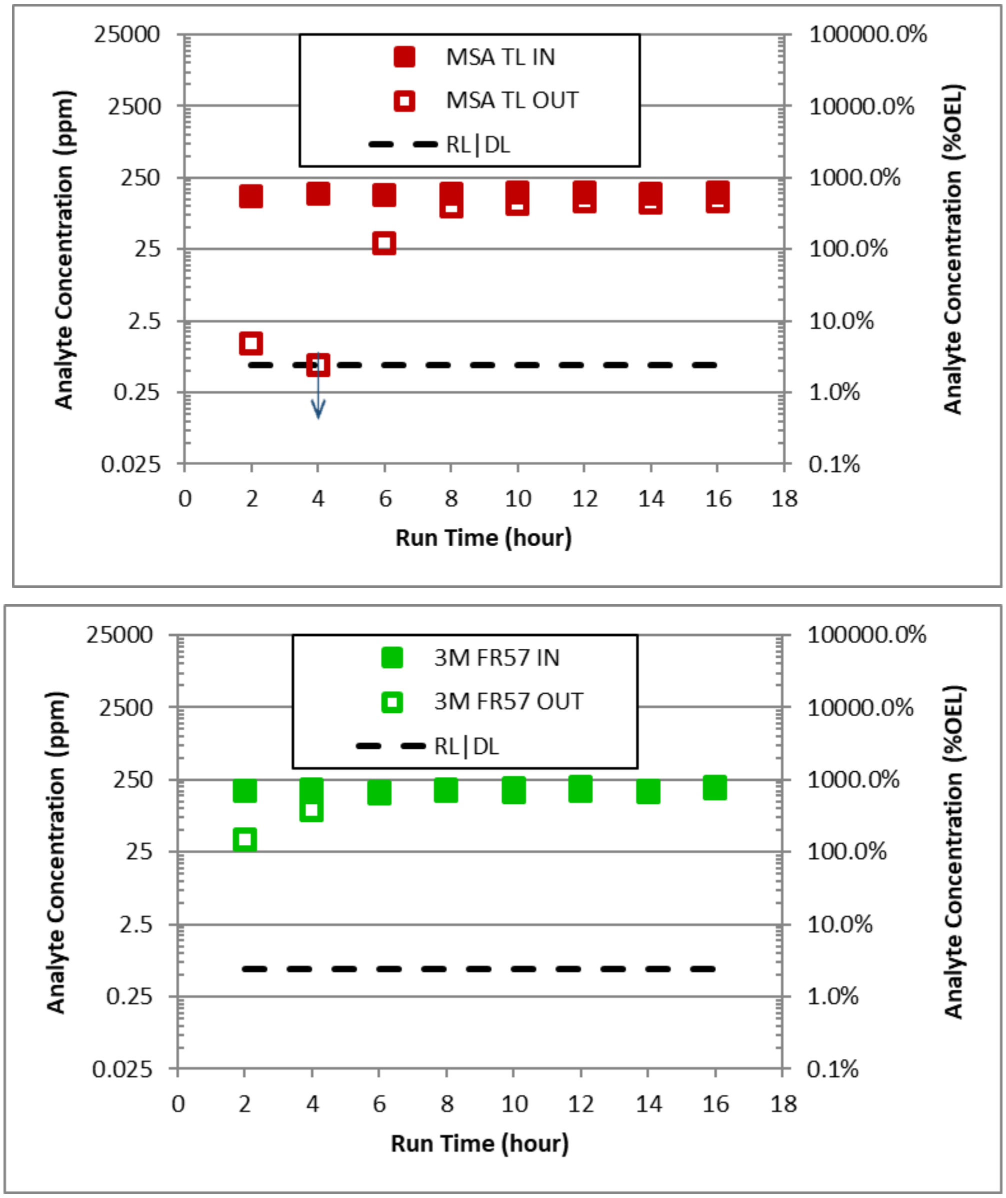


Figure 1. Plots of Measured Ammonia Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-101. Data points noted with ↓ indicate measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

***Mercury** (see Figure 2)* – The DL for mercury corresponds to approximately 6.8% of its OEL. Inlet concentrations measured throughout the testing period for the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges remained relatively similar, ranging between 22 to 26% of the OEL. All of the outlet measurements were below the analytical DL for both respirator cartridges. Thus, there is no evidence of breakthrough over the measured time period for either cartridge tested.

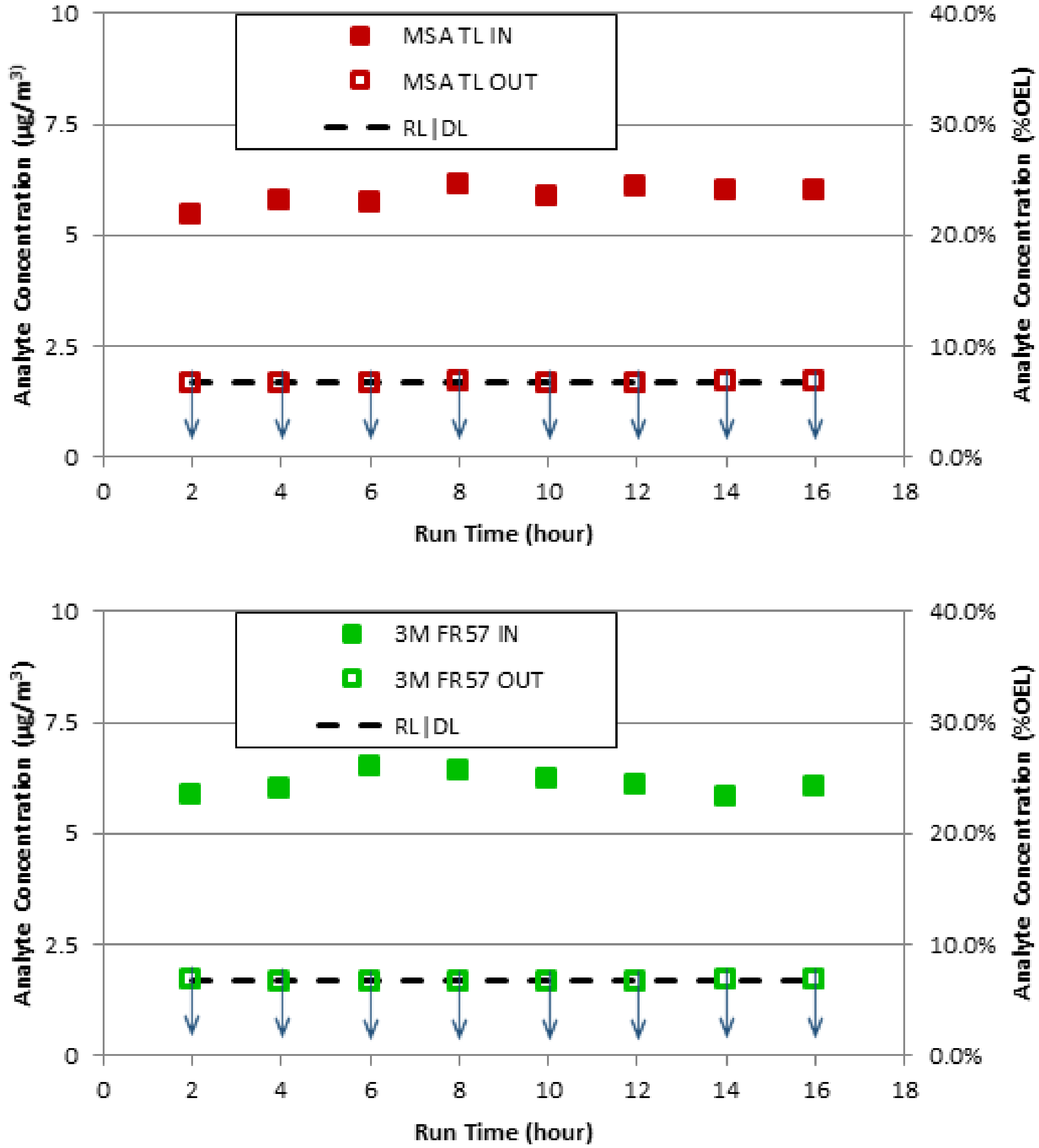


Figure 2. Plots of Measured Mercury Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-101. Data points noted with ↓ indicate measurements less than the DL or RL.

***N-nitrosodimethylamine** (see Figure 3)* – The DL for NDMA corresponds to approximately 5.1% of its OEL. All inlet measurements for both cartridge tests were significantly greater than the OEL and more than 1450% of the OEL, ranging from 1498% to 3358% of the OEL. All outlet measurements from both cartridges tested were below the analytical DL. Based on the data, there is no evidence of breakthrough over the measured time period for either cartridge tested.

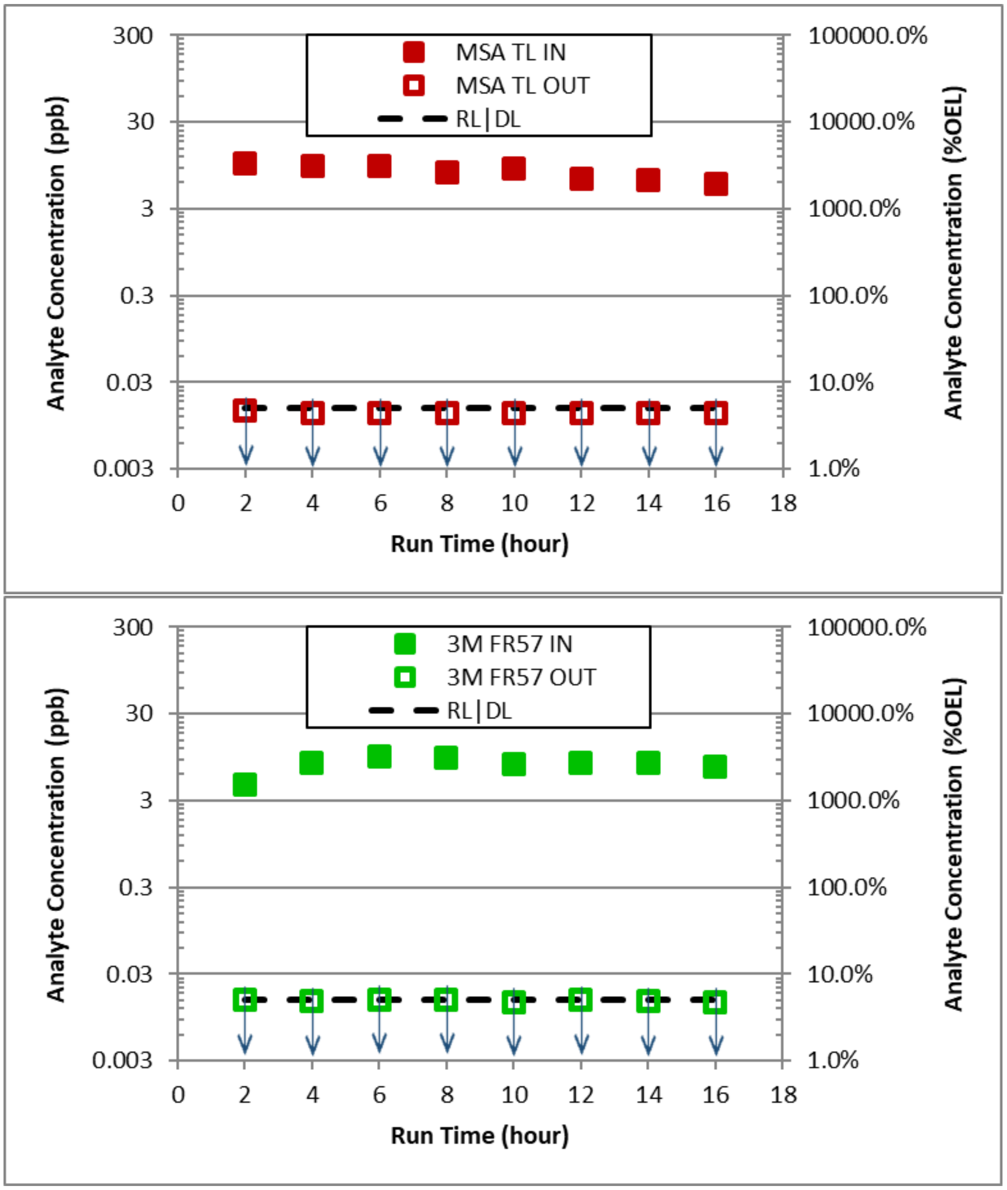


Figure 3. Plots of Measured N-nitrosodimethylamine Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-101. Data points noted with ↓ indicate measurements less than the DL or RL.

N-nitrosodiethylamine *(see Figure 4)* – The DL for NDEA corresponds to approximately 11.1% of its OEL. Inlet measurements for MSA-TL (TL1) were relatively constant, greater than the DL, with concentrations reaching as high as 36% of the OEL. The inlet concentrations for 3M FR-57 (TL2) were relatively scattered with concentrations ranging from less than the DL to 44% of the OEL. All of the outlet measurements were below the analytical DL for both respirator cartridges. Thus, there is no evidence of breakthrough over the measured time period for either cartridge tested.

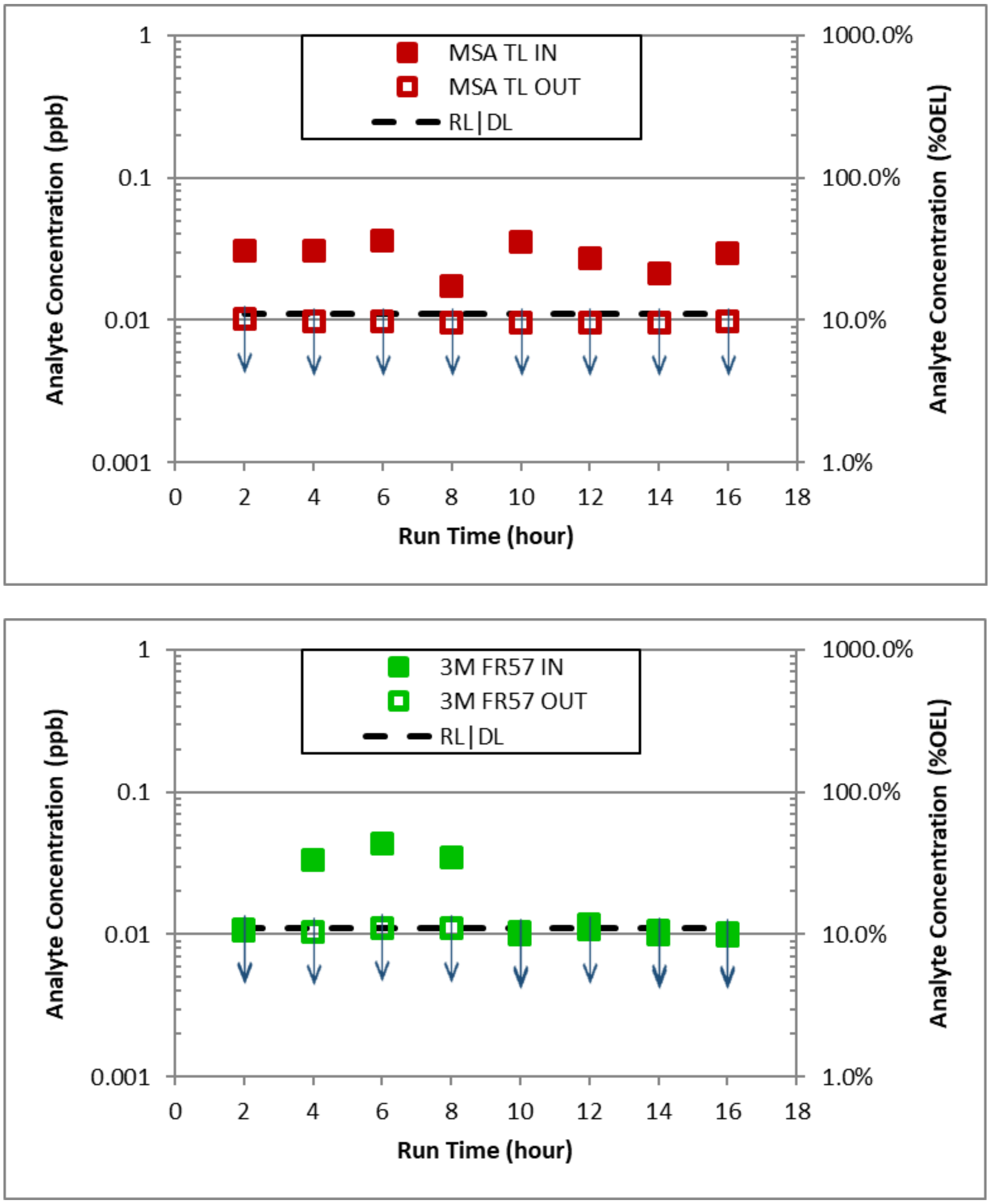


Figure 4. Plots of Measured N-nitrosodiethylamine Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-101. Data points noted with ↓ indicate measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

N-nitrosomethylethylamine *(see Figure 5)* – The DL for NMEA corresponds to approximately 4.3% of its OEL. All inlet measurements for both respirator cartridges were higher than the DL, exceeding 10% of the OEL. Initial measurements for MSA-TL (TL1) were relatively constant, with concentrations reaching as high as 23% of the OEL. The inlet concentrations for 3M FR-57 (TL2) varied more, with concentrations ranging from 11% to 31% of the OEL. All of the respirator outlet measurements were below the DL. Therefore, there is no evidence of breakthrough over the measured time period for either cartridge tested.

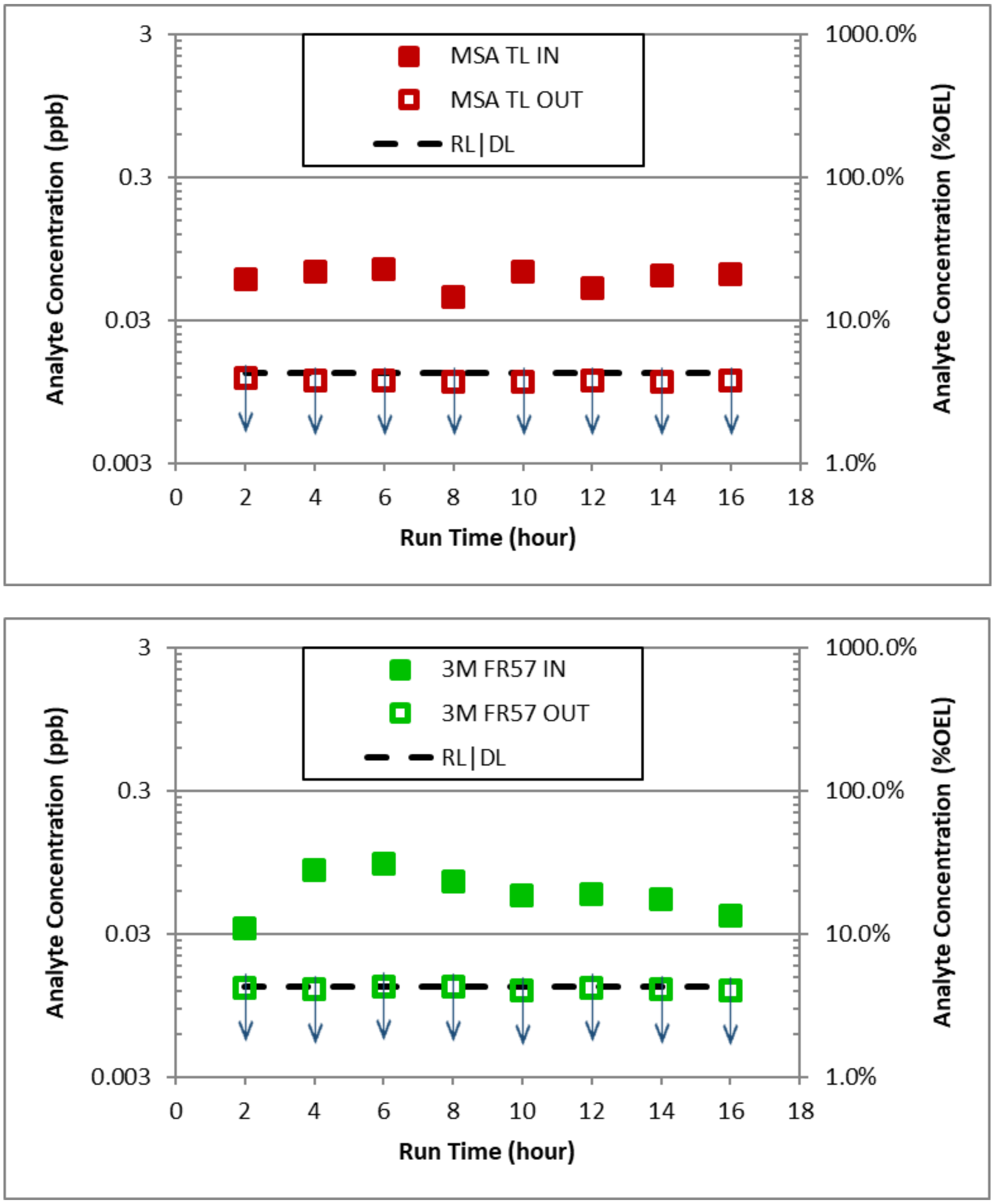
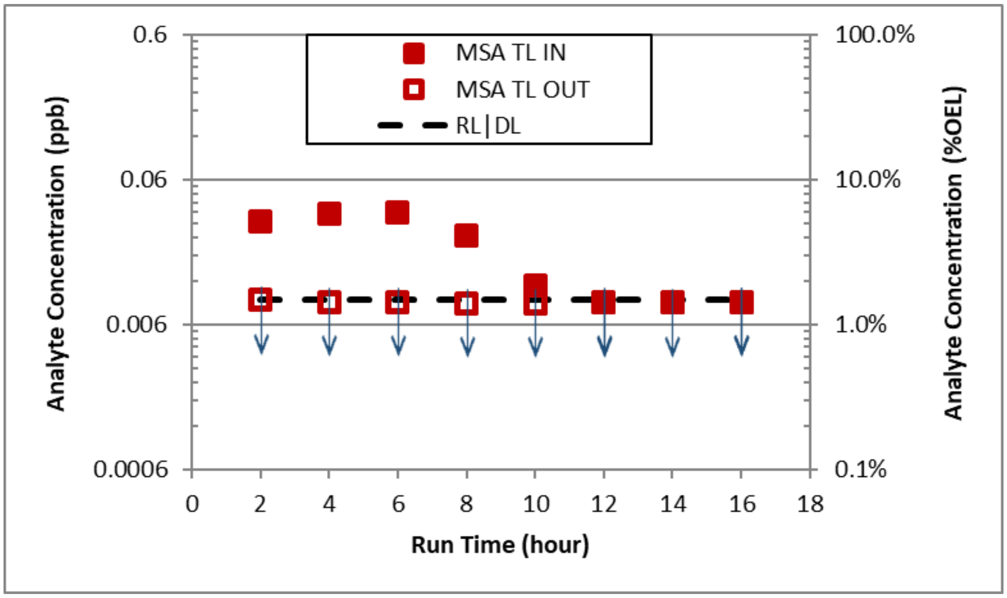


Figure 5. Plots of Measured N-nitrosomethylethylamine Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-101. Data points noted with ↓ indicate measurements less than the DL or RL.

N-nitrosomorpholine *(see Figure 6)* – The DL for N-nitrosomorpholine corresponds to approximately 1.5% of its OEL. Initial inlet concentrations for MSA-TL (TL1) cartridge were higher than the DL, with concentrations reaching as high as 6.0% of the OEL but decreased to less than the DL by the end of 16 hours. The inlet concentrations for 3M FR-57 (TL2) varied, ranging from 2% to 11% of OEL. All of the respirator outlet measurements for both cartridges were below the DL. Therefore, there is no evidence of breakthrough over the measured time period for either cartridge tested.



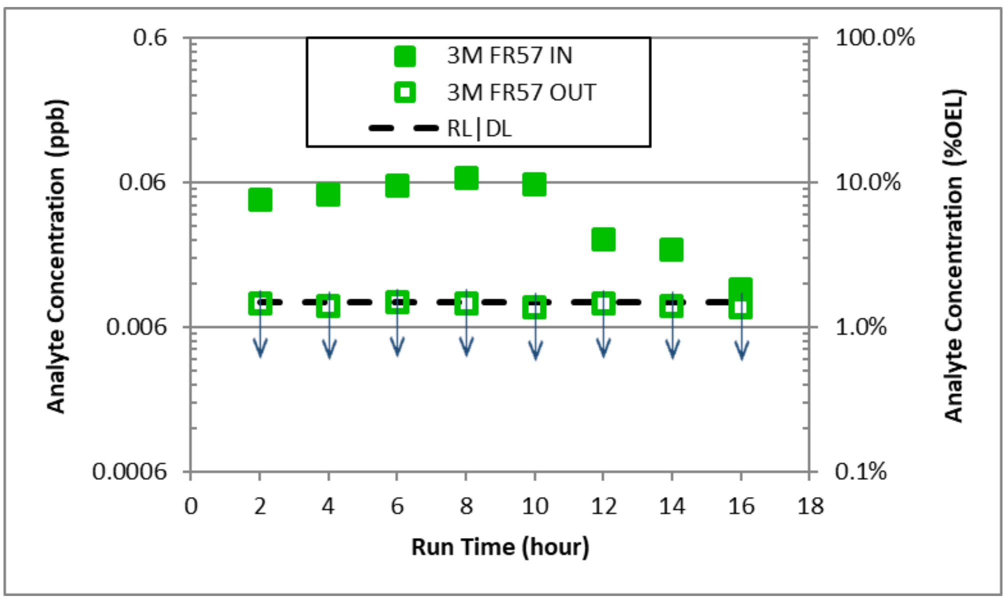


Figure 6. Plots of Measured N-nitrosomorpholine Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-101. Data points noted with ↓ indicate measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

5.2 SX-104

This section provides more detail on the eight COPCs, from the SX-104 testing, identified in Table 2 as having concentrations (inlet or outlet to the cartridge) >10% of the corresponding OEL. Plots of the corresponding data are given, as well as the associated analyses. Note that Appendix E shows plots and/or descriptions for other COPCs with measured inlet or outlet concentrations or DLs between 2% and 10% of their corresponding OELs.

Ammonia *(see Figure 7)* – The DL for ammonia corresponds to approximately 2.4% of its OEL. For both the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges, the inlet ammonia concentrations were relatively constant ranging from 856% to 1213% of the OEL, with the exception of a single inlet concentration of 450% of OEL at 8 hours for the TL2 cartridge. The outlet concentration for the MSA-TL (TL1) cartridge measured 10% of OEL for the 2-hour sample and measured near the inlet concentrations for all other sample times. All outlet concentrations for the 3M FR-57 (TL2) cartridge exceeded 10% of the OEL, including the 2-hour sample, which measured 434% of OEL. These data reflect breakthrough times of 2 hours for TL1 cartridge and <2 hours for the TL2 cartridge.

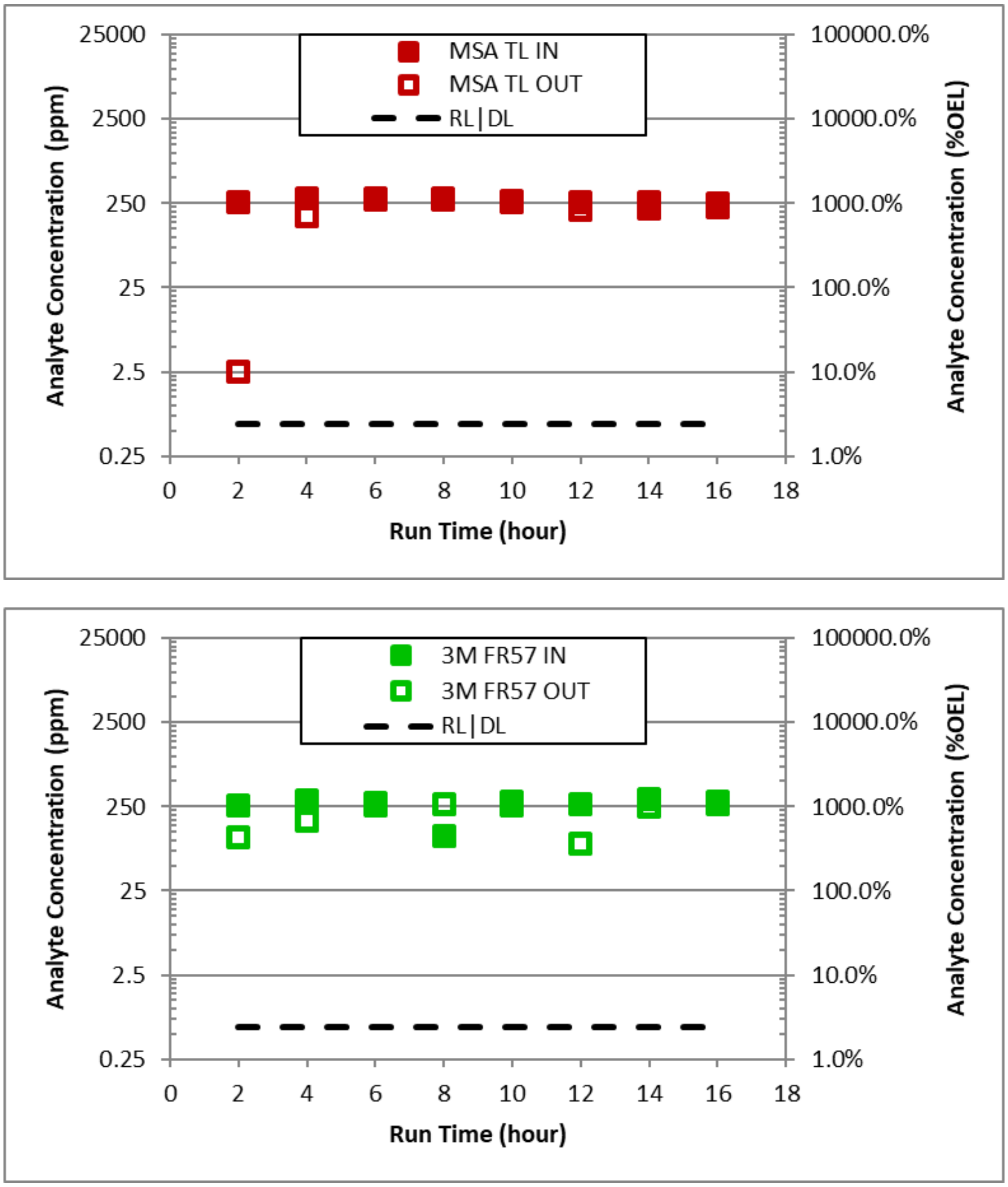


Figure 7. Plots of Measured Ammonia Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-104. Outlet data points not visible are obscured by the inlet data points.

__Mercury__ *(see Figure 8)* – The DL for mercury corresponds to approximately 7.6% of its OEL. Inlet concentrations measured throughout the testing period for MSA-TL (TL1) and 3M FR-57 (TL2) cartridges ranged from 11 to 16% of the OEL, with a single measurement less than the DL for TL2. All of the outlet measurements were below the analytical DL for both respirator cartridges. Thus, there is no evidence of breakthrough over the measured time period for either cartridge tested.

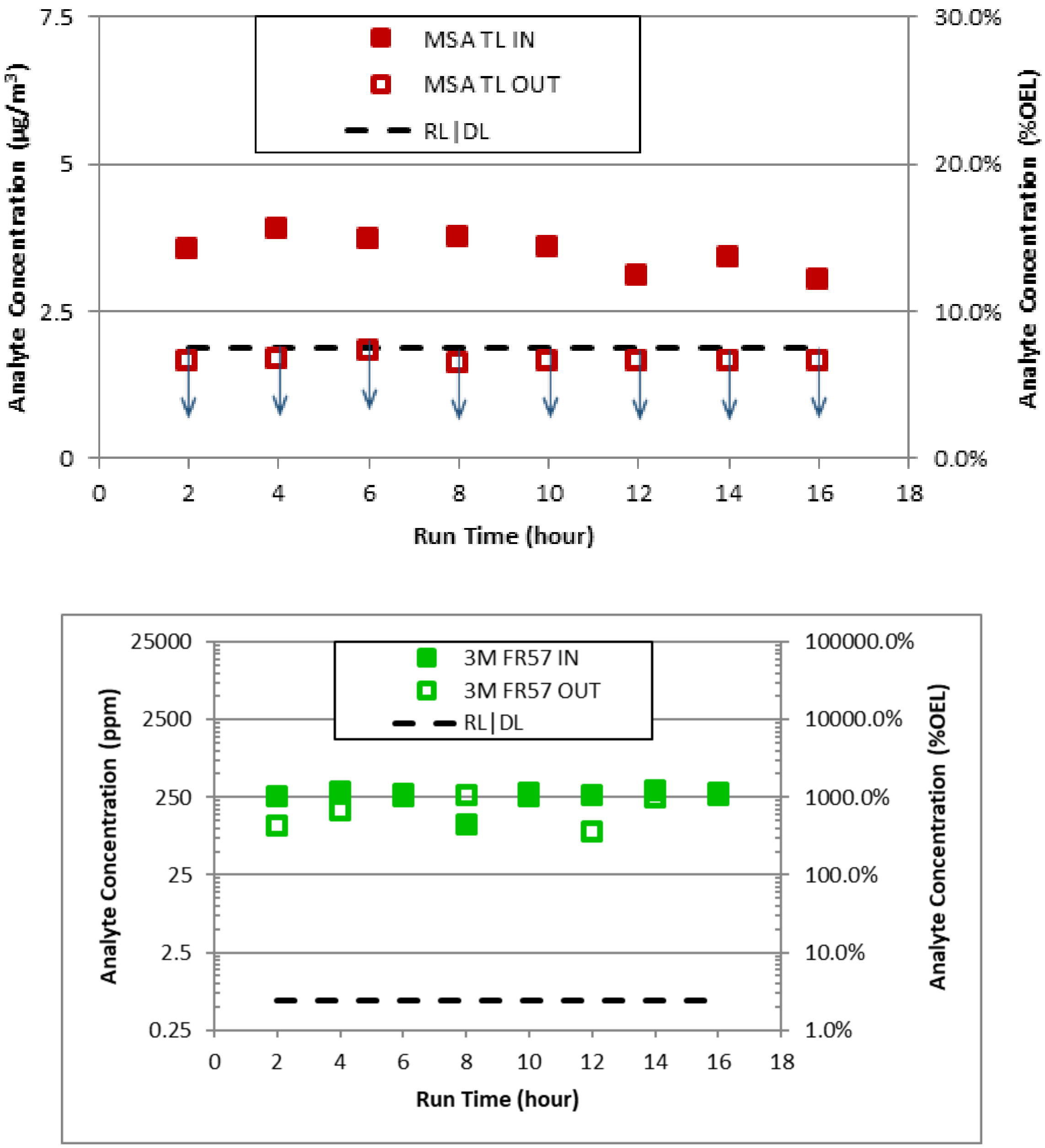
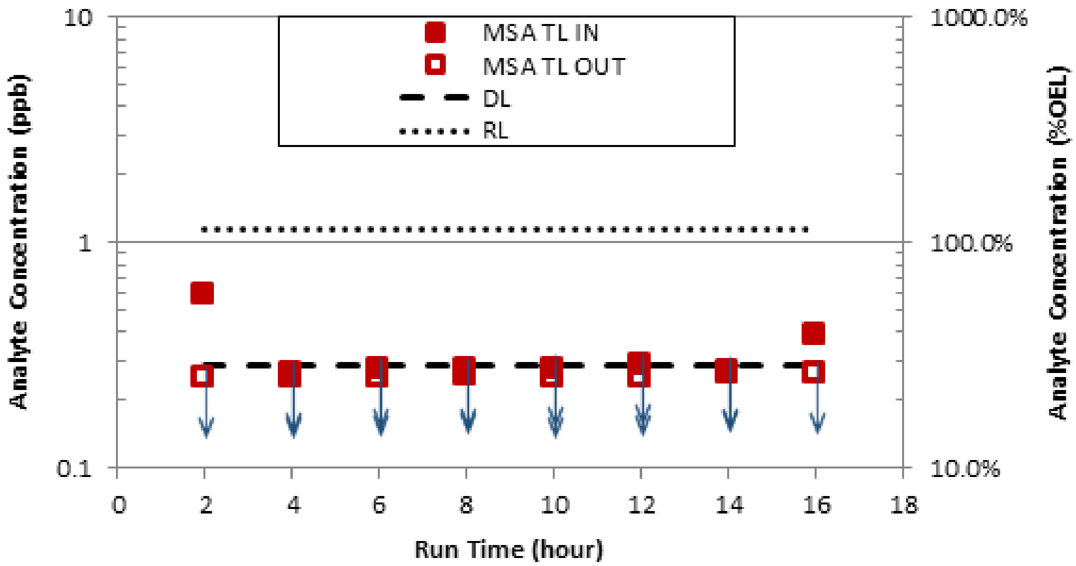


Figure 8. Plots of Measured Mercury Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-104. Data points noted with ↓ indicate measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

***Furan** (see Figure 9)* – The DL for furan corresponds to approximately 28.5% of its OEL, and the RL corresponds to approximately 114% of its OEL. Initial inlet concentrations for both respirator cartridges were higher than DL but decreased for much of the test to less than the DL. Inlet concentrations for the MSA-TL [TL1] cartridge remained below DL until the final 16-hour measurement of 39% of OEL. For the 3M FR-57 [TL2] cartridge, the inlet concentration increased from less than the DL to approximately 100% of the OEL after 12 hours. All of the outlet measurements were below the analytical DL for both respirator cartridges. Thus, there is no evidence of breakthrough over the measured time period for either cartridge tested.



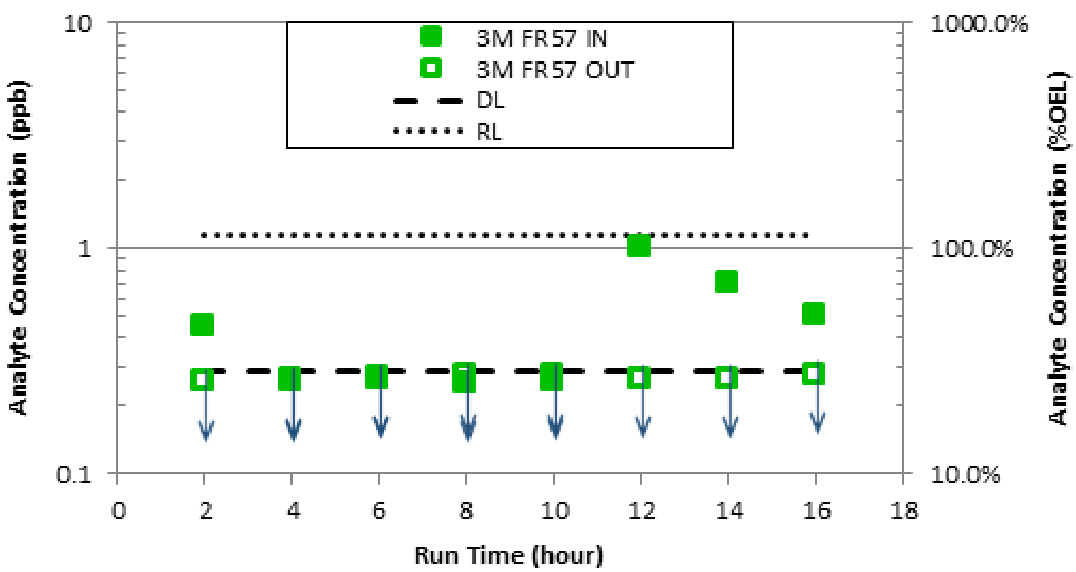


Figure 9. Plot of Measured Furan Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-104. Data points noted with ↓ indicates measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

2,5-Dimethylfuran *(see Figure 10)* – The DL for 2,5-dimethylfuran corresponds to approximately 4.1% of its OEL, and the RL corresponds to approximately 13.5% of its OEL. All inlet values measured for the MSA-TL (TL1) cartridge were less than the DL. All outlet concentrations were also less than the DL, except for two measurements at 10 and 12 hours that reached a maximum of 19% of OEL. All inlet concentrations measured for 3M FR-57 (TL2) were also below the DL, except for the 4-hour sample measurement of 25% of the OEL. Outlet concentrations from TL2 were also less than the DL except for the 4-hour measurement of approximately 16% of OEL and a 16-hour outlet measurement at 34% of the OEL. Note that measurements of several of the blank and baseline samples also showed elevated 2,5-dimethylfuran concentrations that exceeded the DL and RL values, which makes the observed measurements from the cartridges suspect, as well as any corresponding evidence of breakthrough.

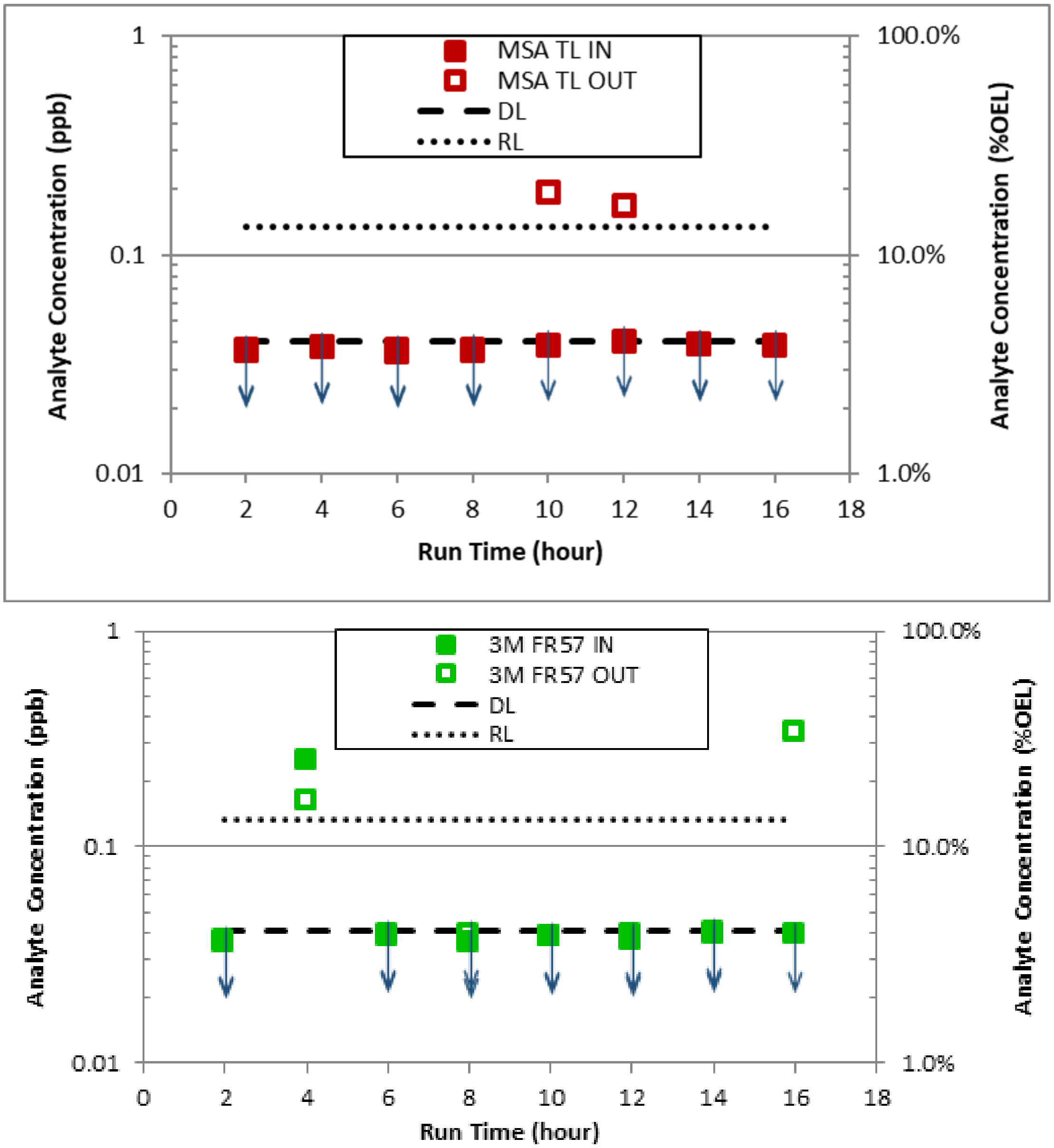


Figure 10. Plots of Measured 2,5-Dimethylfuran Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-104. Data points noted with ↓ indicate measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

***N-nitrosodimethylamine** (see Figure 11)* – The DL for NDMA corresponds to approximately 5.4% of its OEL. All inlet concentrations for both the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were significantly greater than the OEL, ranging from 1498% to 6935% of the OEL. All outlet measurements were below the analytical DL for both cartridges. Thus, there is no evidence of breakthrough over the measured time period for either cartridge tested.

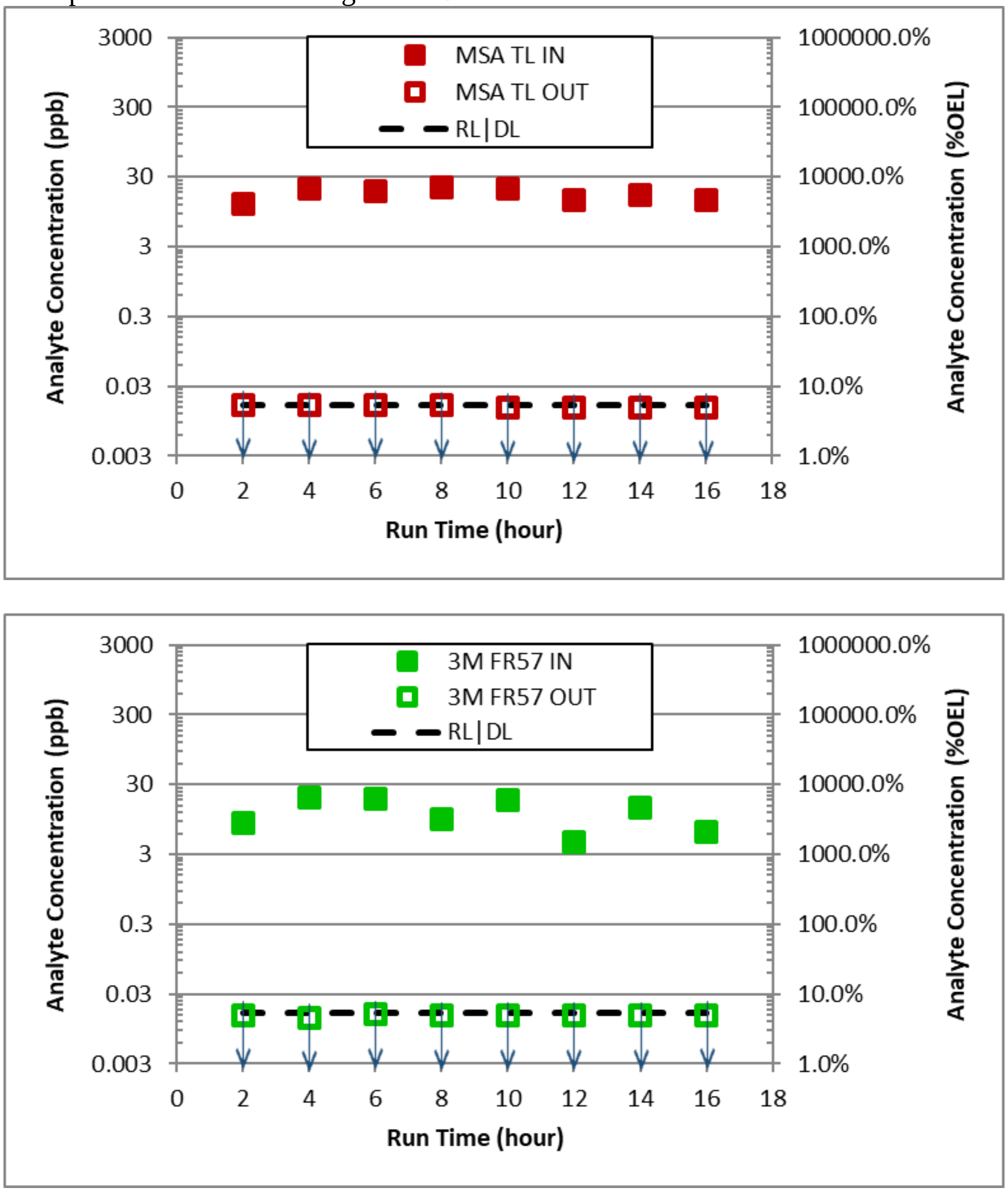


Figure 11. Plots of Measured N-nitrosodimethylamine Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-104. Data points noted with ↓ indicate measurements less than the DL or RL.

***N-nitrosodiethylamine** (see Figure 12)* – The DL for NDEA corresponds to approximately 12% of its OEL. Inlet concentrations for both the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were consistently above 10% of the OEL, ranging from 34 to 79% of the OEL. All of the outlet measurements were below the analytical DL for both respirator cartridges. Thus, there is no evidence of breakthrough over the measured time period for either cartridge tested.

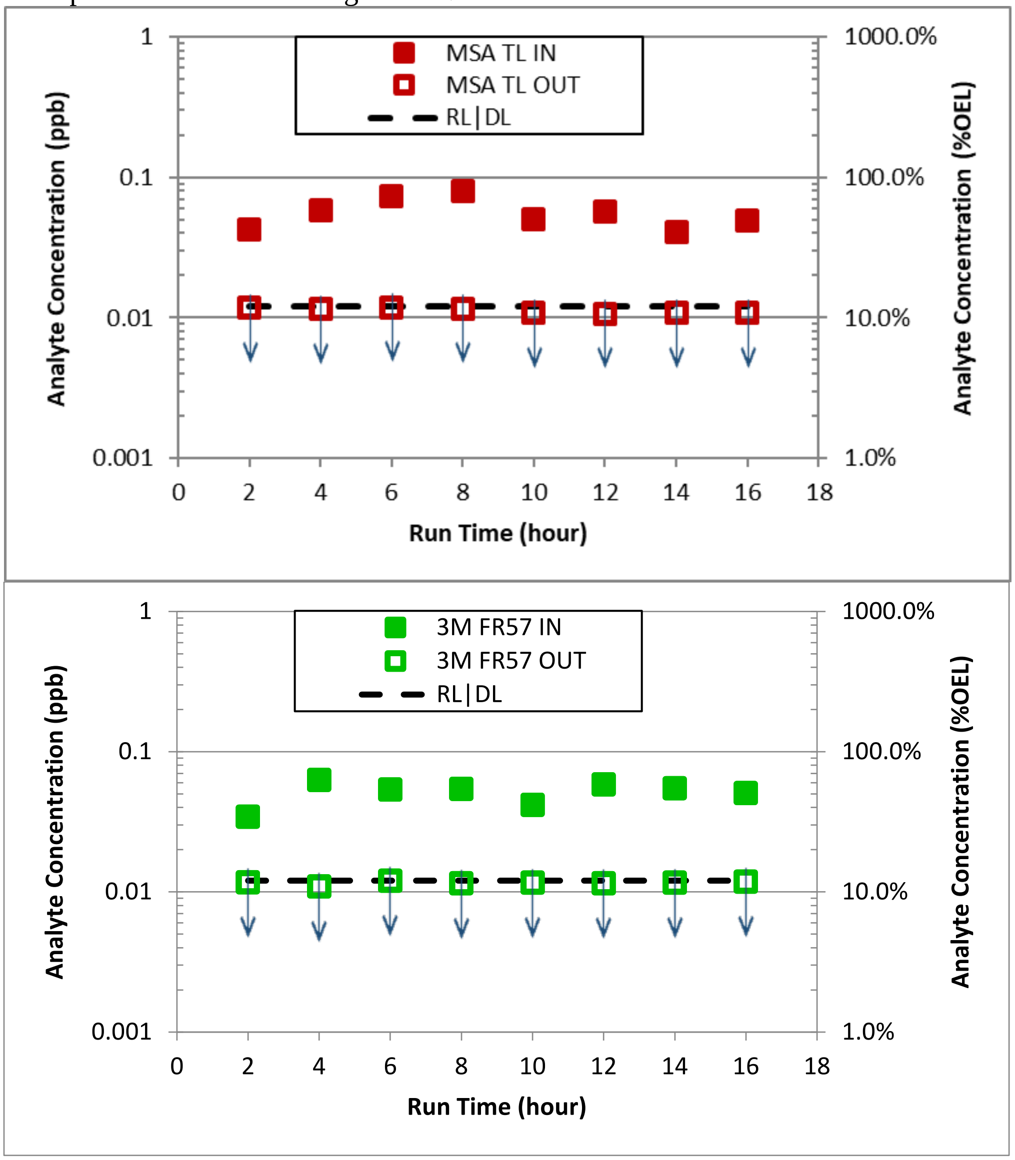


Figure 12. Plots of Measured N-nitrosodiethylamine Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-104. Data points noted with ↓ indicate measurements less than the DL or RL.

N-nitrosomethylethylamine *(see Figure 13)* – The DL for NMEA corresponds to approximately 4.6% of its OEL. Inlet measurements for both MSA-TL (TL1) and 3M FR-57 (TL2) cartridges exceeded the OEL during testing, with concentrations ranging from 42 to 100% of the OEL. All of the outlet measurements were below the analytical DL for both respirator cartridges. Thus, there is no evidence of breakthrough over the measured time period for either cartridge tested.

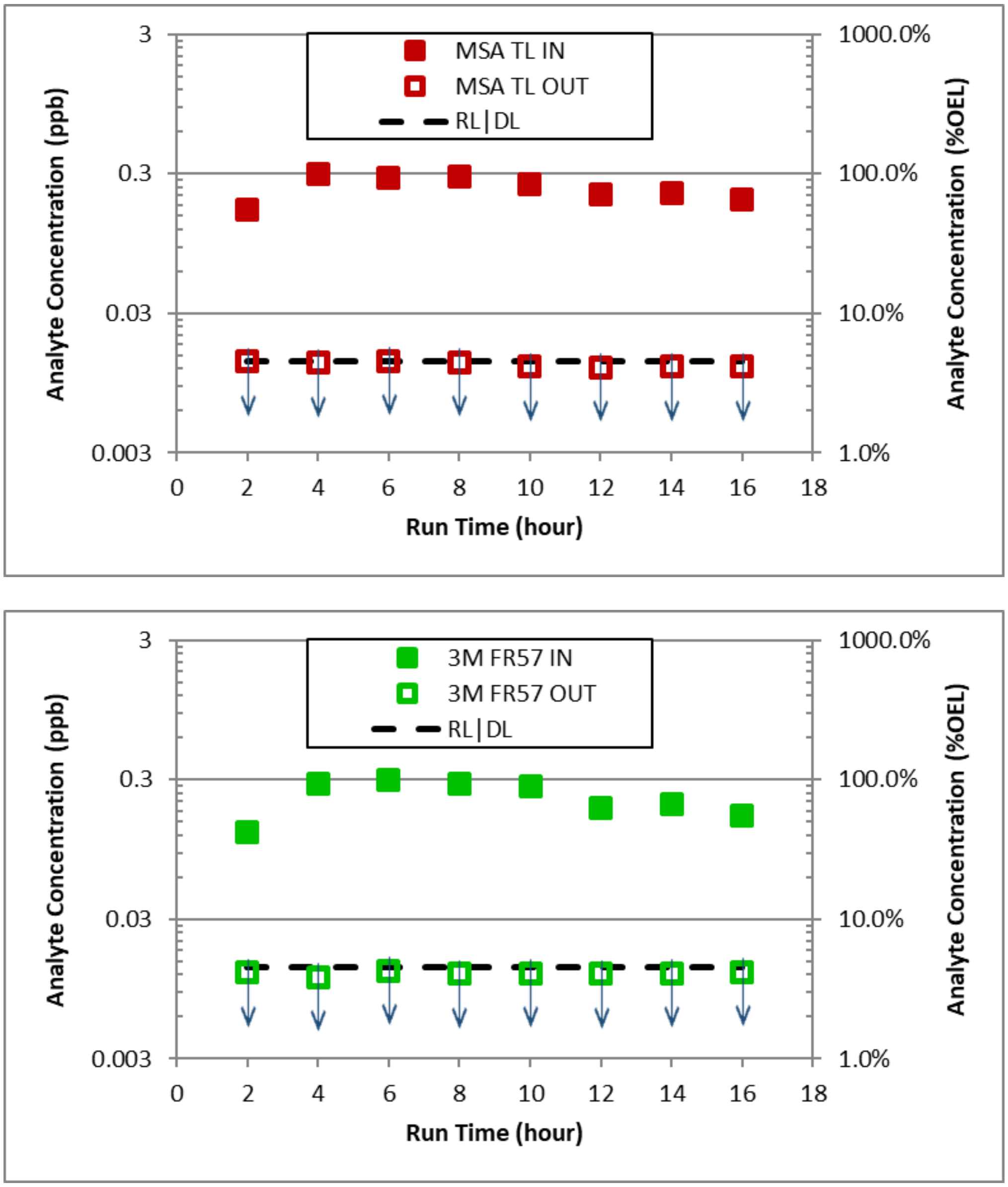


Figure 13. Plots of Measured N-nitrosomethylethylamine Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-104. Data points noted with ↓ indicate measurements less than the DL or RL.

***N*-nitrosomorpholine** *(see Figure 14)* – The DL for N-nitrosomorpholine corresponds to approximately 1.7% of its OEL. Inlet concentrations for both cartridges tested were consistently greater than the DL, with concentrations ranging from approximately 6% to a maximum of 29% of the OEL. All of the outlet measurements were below the analytical DL for both respirator cartridges. Thus, there is no evidence of breakthrough over the measured time period for either cartridge tested.

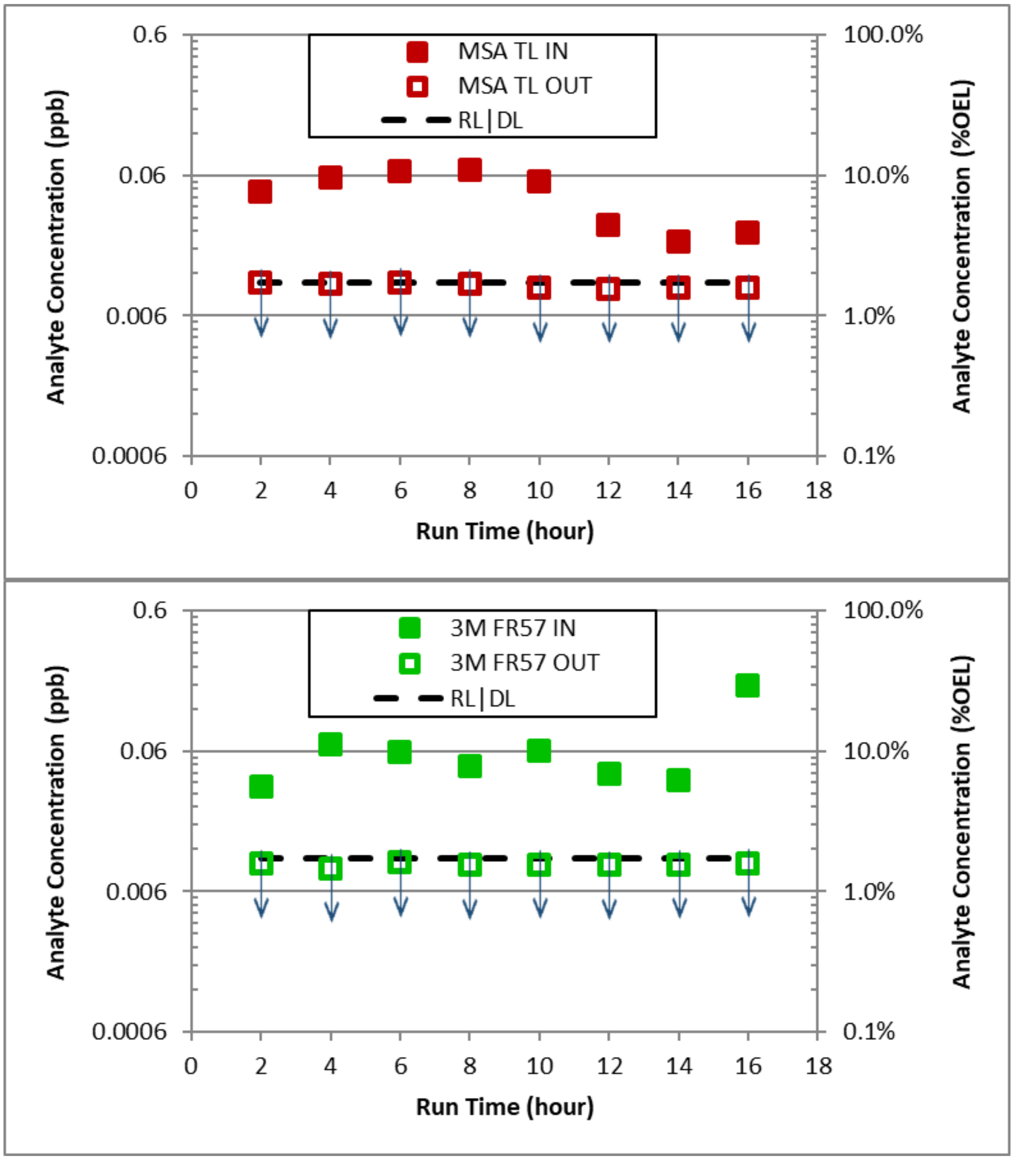


Figure 14. Plots of Measured N-nitrosomorpholine Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]) on SX-104. Data points noted with ↓ indicate measurements less than the DL or RL.

6.0 Factoring in Historical Concentration Data

To fully assess respirator performance for COPC removal, historical data were reviewed to determine if the recent inlet measurements were representative of typical values. Historical SX-101 and SX-104 headspace data from the Tank Waste Information Network System and the Site-Wide Industrial Hygiene Database were used for this assessment. In addition, Hanford tank activity data available from the Tank Waste Information Network System were reviewed to assess whether any exhauster historic maxima may have resulted from waste-disturbing activities not relevant to cartridge test conditions.[22]

Two complete tables with historical and measured results for all 59 COPCs and their boiling point data are shown in Appendix F for both the SX-101 and SX-104 tanks, along with a description of the historic source data that were used. Because a low boiling point can be a general indicator of poor adsorption on solid media, Tables 3 and 4 show a subset of SX-101 and SX-104 data for COPCs with boiling points below 70°C.

Table 3. Historical SX-101 Data for COPCs with Boiling Points less than 70°C (158°F)

				Historical Measurements[1]					Measurements in this Study	
COPC Number and Name	**CAS Number**	**Boiling Point (°F)**	**Occupational Exposure Limit (OEL)**	**# of Values**	**Maximum Value (in OEL units)**	**Average Value (in OEL units)**	**Max. Value (% OEL)**	**Average Value (% OEL)**	**Max Inlet Value (% OEL)**	**Highest Value from Cartridge Outlet (% OEL)**
2 Nitrous Oxide	10024-97-2	-127	50 ppm	1	2.1	2.1	4.2%	4.2%	Not Measured	
1 Ammonia	7664-41-7	-28	25 ppm	1	6.2	6.2	25%	25%	796%	761%
50 2-Fluoropropene	1184-60-7	-11	0.1 ppm	1 (0)	<0.0022	<0.0022	<2.2%	<2.2%	Not Detected - TIC	
14 Formaldehyde	50-00-0	-6	0.3 ppm	1	0.014	0.014	4.6%	4.6%	3.8%	0.81%
53 Methyl nitrite	624-91-9	10	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC	
4 1,3-Butadiene	106-99-0	24	1 ppm	1 (0)	<0.0021	<0.0021	<0.21%	<0.21%	1.9% (RL)[2]	1.9% (RL)
42 Ethylamine	75-04-7	62	5 ppm	0	n/a	n/a	n/a	n/a	0.09% (RL)	0.09% (RL)
15 Acetaldehyde	75-07-0	69	25 ppm	0	n/a	n/a	n/a	n/a	0.3%	0.2%
19 Furan	110-00-9	88	1 ppb	2 (0)	<2.3	<2.2	<230%	<216%	28% (DL)[3]	29% (DL)
59 Methyl Isocyanate	624-83-9	103	0.02 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC	
New[5] 2-Propenal	107-02-8	127	0 ppm	0	n/a	n/a	n/a	n/a	0.9% (DL)	0.9% (DL)
20 2,3-Dihydrofuran	1191-99-7	130	1 ppb	0	n/a	n/a	n/a	n/a	2.1% (DL)[4]	4.3%
22 2-Methylfuran	534-22-5	147	1 ppb	2 (0)	<13	<7.2	<1300%	<719%	12% (DL)[3]	13% (DL)
8 Methanol	67-56-1	148	200 ppm	0	n/a	n/a	n/a	n/a	1.0% (RL)	1.0% (RL)
21 2,5-Dihydrofuran	1708-29-8	152	1 ppb	2 (0)	<7.3	<4.5	<730%	<452%	52% (DL)[3]	53% (DL)

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

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

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

Plain font in the table indicates that only the recent databases (SWIHD headspace and TWINS Industrial Hygiene) were included. Italics mean that the pre-2006 TWINS headspace data were also included.

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

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

[3] *Furans measured using VOA (Volatile Organic Analysis) method.*

[4] *Measured using Furan method.*

[5] *2-Propenal and Dimethyl Mercury were added to the COPC List in September, 2017.*

Table 4. Historical SX-104 Data for COPCs with Boiling Points less than 70°C (158°F)

COPC Number and Name	CAS Number	Boiling Point (°F)	Occupational Exposure Limit (OEL)	Historical Measurements[1] # of Values	Maximum Value (in OEL units)	Average Value (in OEL units)	Max. Value (% OEL)	Average Value (% OEL)	Measurements in this Study Max Inlet Value (% OEL)	Highest Value from Cartridge Outlet (% OEL)
2 Nitrous Oxide	10024-97-2	-127	50 ppm	1 (1)	17.3	17.3	35%	35%	Not Measured	
1 Ammonia	7664-41-7	-28	25 ppm	2 (2)	393	220	1572%	880%	1213%	1163%
50 2-Fluoropropene	1184-60-7	-11	0.1 ppm	1 (0)	<0.003	<0.003	<3.0%	<3.0%	Not Detected - TIC	
14 Formaldehyde	50-00-0	-6	0.3 ppm	2 (2)	0.014	0.0094	4.7%	3.1%	5.5%	1.7%
53 Methyl nitrite	624-91-9	10	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC	
4 1,3-Butadiene	106-99-0	24	1 ppm	2 (1)	0.293	0.15 (0.29)	29%	15% (29%)	1.9% (RL)[2]	2.0% (RL)
42 Ethylamine	75-04-7	62	5 ppm	2 (0)	<0.034	<0.026	<0.68%	<0.53%	0.34%	0.09% (RL)
15 Acetaldehyde	75-07-0	69	25 ppm	1 (1)	0.23	0.23	0.91%	0.91%	0.56%	0.36%
19 Furan	110-00-9	88	1 ppb	4 (2)	<3.1 (1.4)	1.7 (0.94)	<310% (143%)	170% (94%)	100%[3]	27% (DL)
59 Methyl Isocyanate	624-83-9	103	0.02 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC	
New[5] 2-Propenal	107-02-8	127	0 ppm	1 (0)	<0.0009	<0.0009	<0.90%	<0.90%	0.91% (DL)	0.93% (DL)
20 2,3-Dihydrofuran	1191-99-7	130	1 ppb	1 (0)	<0.34	<0.34	<34%	<34%	6.6%[4]	2.1% (DL)
22 2-Methylfuran	534-22-5	147	1 ppb	3 (0)	<18	<6.5	<1800%	<651%	20% (DL)[3]	21% (DL)
8 Methanol	67-56-1	148	200 ppm	0	n/a	n/a	n/a	n/a	1.0% (RL)	1.0% (RL)
21 2,5-Dihydrofuran	1708-29-8	152	1 ppb	3 (0)	<9.8	<3.9	<980%	<390%	53% (DL)[3]	50% (DL)

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

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

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

Plain font in the table indicates that only the recent databases (SWIHD headspace and TWINS Industrial Hygiene) were included. Italics mean that the pre-2006 TWINS headspace data were also included.

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

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

[3] Furans measured using VOA (Volatile Organic Analysis) method.

[4] Measured using Furan method.

[5] 2-Propenal and Dimethyl Mercury were added to the COPC List in September, 2017.

6.1 SX-101

Ammonia is the only COPC that was previously measured in the SX-101 headspace at concentrations above 10% of its OEL and above the analytical RL. In contrast, in headspace vapors analyzed during PAPR cartridge testing, six COPCs—ammonia, mercury, NDMA, NDEA, N-nitrosomorpholine, and NMEA—were measured at concentrations above 10% of their respective OELs and RLs. Following are summaries of the results from analyses of these six COPCs:

- Ammonia average inlet concentrations measured in this cartridge study were significantly higher than the historic headspace and breather filter measurements from SX-101 by a factor of more than 30×. The most recent historic measurement of ammonia was from an SX-101 breather filter in 2006 (25% of the OEL) and is comparable to a 1995 headspace maximum concentration[1]. However, the historic headspace measurement was taken while an exhauster was operational in the SX Farm, and because only passive ventilation is used now, the current ventilation rate is much lower. Also note that the latter breather filter measurement is likely to report lower concentrations than headspace levels, especially if the tank was not venting.[2] Therefore, the difference between cartridge inlets and

[1] Inlet concentrations were considered generally consistent if they were within a factor of 2 (-50% to +100%) of historic maximum or average headspace measurements.

[2] Prior to 2004, the SX tank farm was actively ventilated using a "sludge cooler" to reduce the temperature of high-heat-generating wastes. Breather filter samples are taken outside the tank headspace near the surface of the

historic headspace maxima may be a result of either a very limited sample taken under conditions that are not representative of those during cartridge testing, or of location and sampling methods that did not recover a representative headspace vapor sample.

- Similar to ammonia, mercury concentrations measured in this cartridge study were significantly higher than the historic maxima from breather filter and headspace samples. The historic mercury concentration was below the RL (<0.2% of OEL), whereas the cartridge maxima was above the RL by a factor of 130×.
- Nitrosamines including NDMA, NDEA, NMEA, and N-nitrosomorpholine had maximum cartridge inlet concentrations significantly greater than the RL obtained from historic measurements of these COPCs. NDMA was more than 1430× higher than the <RL obtained from the single historic measurement of these COPCs, whereas NDEA, NMEA, and N-nitrosomorpholine were approximately 9× to 16× higher than the historic RL.

Overall, the limited historic record of SX-101 headspace measurements, combined with the historic exhauster operations in SX Farm provide little valuable insight or context for the current cartridge-testing results.

6.2 SX-104

Seven COPCs have been previously measured in the SX-104 headspace at concentrations above 10% of their respective OELs and above analytical RLs. These COPCs include ammonia, nitrous oxide, mercury, 1,3-butadiene, furan, acetonitrile, and NDMA. Of these seven COPCs, five were detected in the cartridge study above 10% of their OELs or RLs. Details are provided below:

- Ammonia average and maximum inlet concentrations measured in this cartridge study were generally consistent with the historic SX-104 headspace measurements.[1] Only two historic analysis results were available in the historic record (i.e., from 2015 and 2007). The most recent measurement was less than 1.3× higher—at 1572% of OEL—than the maximum cartridge inlet concentration of 1213% of the OEL.
- Mercury average and maximum inlet concentrations from cartridge testing were slightly lower but generally consistent with historic measurements, by approximately 0.5×.
- Furan average and maximum inlet concentrations from cartridge testing also were slightly lower but generally consistent with historic measurements by approximately 0.4 to 0.7×. No other substituted furans have been historically detected above their RLs, and those detected in cartridge testing, such as 2,3-dihydrofuran, 2,5-dimethylfuran, and 2-pentylfuran, were at levels either comparable to or below historic RL or had >RL concentrations that were suspect due to elevated blanks and machine baseline results.
- Acetonitrile inlet concentrations during cartridge testing were well below 10% of OEL, whereas the historic maximum of 14% of the OEL was approximately 5× the maximum cartridge inlet concentration.
- NDMA average and maximum inlet concentrations from cartridge testing were generally consistent with historic measurements. The historic maximum of 9300% of the OEL occurred during a 2015

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high-efficiency particulate air filter on a passive breather filter assembly. Depending on weather conditions, sample placement, and passive venting behavior of the tank at the time of sampling, the concentrations measured could be significantly different than headspace concentrations. Personal communication with Joe Meacham, WRPS.

[1] Inlet concentrations were considered generally consistent if they were within a factor of 2 (-50% to +100%) of historic maximum or average headspace measurements.

headspace sampling event and was approximately 32% higher than the maximum cartridge inlet concentration of 6935% of the OEL. Other nitrosamines including NDEA, N-nitrosomorpholine, and NMEA were not detected above their RLs in historic measurements but were measured above their RLs in the cartridge inlet. The NDEA maximum from cartridge testing was approximately 2× higher than the historic less-than-RL (<37% of the OEL) measurement. NMEA and N-nitrosomorpholine were detected at concentrations approximately 7× and 5× the historic <RL measurements, respectively.

- Nitrous oxide and 1,3-butadiene were detected in the historic measurements but not in cartridge testing above 10% of their OELs or analytical RLs. Nitrous oxide was not measured during cartridge testing because it is not susceptible to respirator filtration. The historic maximum of 35% of the OEL resulted from a single measurement in 2006. The historic maxima for 1,3-butadiene of 29% of the OEL was obtained in 2015 and is the only measurement from SX-104 that is above the RL. All cartridge measurements were below the RLs. The historic maxima for neither nitrous oxide nor 1,3-butadiene exceeded the Industrial Hygiene action level for the tank farms (50% of the OEL).

7.0 Conclusions

Testing was conducted from June 16–17, 2017, from headspace vapors from Hanford tank SX-101 and from June 23–24, 2017, from Hanford tank SX-104. Headspace vapors were fed to a respirator cartridge test stand developed by WRPS in collaboration with HiLine Engineering (Richland, Washington). Multipurpose high-efficiency PAPR cartridges, MSA-TL (TL1) (MSA Safety Inc., Pittsburgh, Pennsylvania) and 3M FR-57 (TL2) (3M Company, Maplewood, Minnesota) were assessed on separate days. Sample media (i.e., 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 to independently analyze the collected data and make recommendations based on the results for respiratory cartridge performance and service life. The key conclusions from the analysis are described below.

7.1 SX-101

Based on measured cartridge inlet vapor concentrations from tank SX-101, two COPCs—ammonia and NDMA—exceeded their corresponding OELs. Four COPCs—mercury, NDEA, NMEA, and N-nitrosomorpholine—had one or more inlet concentration measurements >10% of their OELs, but <100%. All other COPC inlet and outlet measurements did not exceed 10% of their OELs.

- Maximum ammonia concentrations at the respirator cartridge inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were 628% and 796% of the OEL, respectively. These concentrations were higher than historic headspace and breather filter measurements from SX-101 by a factor of more than 30×. However, the historic headspace measurement was taken while an exhauster was operational in the SX Farm, and a vapor measurement from the breather filter may not have been representative of headspace concentrations. Ammonia breakthrough appeared to occur in the MSA-TL (TL1) cartridge above 10% of the OEL after 4 hours. However, the 4-hour outlet concentration was suspect (less than the DL). Therefore, interpolation between the 2- and 6-hour results suggests that breakthrough above 10% occurred between 2 and 4 hours. Breakthrough of the 3M FR-57 (TL2) cartridge above 10% of the OEL occurred within the first 2 hours. Note that ammonia was the only COPC for which breakthroughs were confirmed during SX-101 PAPR testing.
- Maximum mercury concentrations at the inlets to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were 25% and 26% of the OEL, respectively. These concentrations were significantly higher than the historical measurements from SX-101, which were less than the RL of 0.2%. All the cartridge outlet concentrations for mercury were below the RL, indicating that no breakthrough occurred.
- Maximum NDMA concentrations at the inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) respirator cartridges were 3358% and 3261% of the OEL, respectively. These concentrations are considerably higher than the available historical measurements, which were less than the RL (2.3% of the OEL). All measured outlet concentrations from both cartridges were less than the RL, indicating that no breakthrough occurred for either cartridge.
- Maximum NDEA, NMEA, and N-nitrosomorpholine concentrations at the inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were above 10% of their OELs, ranging from approximately 44% of the OEL for NDEA to 11% of OEL for N-nitrosomorpholine. Historic measurements for these three nitrosamines were all below their RLs (11%, 4%, and 1%, respectively). All outlet concentrations were less than the RLs, indicating that no breakthrough occurred for either cartridge.

7.2 SX-104

Based on measured cartridge inlet vapor concentrations from SX-104 tank, ammonia, furan, NDMA, and NMEA exceeded their corresponding OELs. Five COPCs—mercury, 2,5-dimethylfuran, NDEA, and N-nitrosomorpholine—had one or more inlet concentration measurements that were >10% of their OELs, but <100%. All other COPC inlet and outlet measurements did not exceed 10% of their OELs.

- Maximum ammonia concentrations at the respirator cartridge inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were 1126% and 1213% of the OEL, respectively.[1] These concentrations generally are consistent with the historic SX-104 headspace measurements. All cartridge outlet concentrations for ammonia exceeded 10% of the OEL except for the first 2-hour measurement from the MSA-TL (TL1) cartridge, which was nearly 10%. These data reflect breakthrough times of 2 hours for the TL1 cartridge and less than 2 hours for the TL2 cartridge and were the only confirmed breakthroughs observed in the SX-104 PAPR testing.
- Maximum mercury concentrations at the inlets to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were approximately 16% and 15% of the OEL, respectively. These concentrations were slightly lower but generally consistent with historic measurements by approximately 0.5×. All cartridge outlet concentrations for mercury were below the RL, indicating that no breakthrough occurred.
- Maximum furan concentrations at the inlets to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were approximately 58% and 100% of the OEL, respectively. All cartridge outlet concentrations for furans were below the RL, indicating that no breakthrough occurred.
- All inlet and outlet concentrations of 2,5-dimethylfuran with the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were less than the RL (14% of the OEL), except for a single inlet measurement for the TL2 cartridge of 25% of the OEL, and two outlet measurements for each of the TL1 and TL2 cartridges, which reached a maximum of 34% of the OEL after 16 hours. However, several 2,5-dimethlyfuran measurements from the blank and baseline tubes also reported concentrations greater than the RL, which makes all of the elevated measurements for this COPC questionable. The single available historic measurement of the SX-104 headspace was less than the RL (25% of the OEL).
- NDMA maximum concentrations at the inlet to the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were 6935% and 6416% of the OEL, respectively. These concentrations generally were consistent with historic measurements. The historic maximum of 9300% of the OEL occurred during a 2015 headspace sampling event. All measured outlet concentrations were less than the analytical RL of approximately 5.4% of the OEL, indicating that no breakthrough occurred for either cartridge.
- Maximum concentrations of NDEA, NMEA, and N-nitrosomorpholine at the inlet to either of the PAPR cartridges were 79%, 100%, and 29% of the OEL, respectively. These concentrations are all higher than the historical concentration measurements from the headspace, which were less than the RL for each COPC. However, all outlet concentrations were less than the RLs, indicating that no breakthrough occurred for any of these nitrosamine compounds with either cartridge tested.

[1] One cartridge inlet measurement exceeded the upper limit recommended by the Centers for Disease Control and Prevention−National Institute for Occupational Safety and Health for APR use. However, cartridge testing was performed with tank headspace concentrations that are higher than predicted and measured breathing zone concentrations into which respirator cartridges would be deployed.

8.0 Recommendations

Based on the measurements taken for this study, ammonia breakthrough, above 10% of its OEL, occurred earlier than any other COPC—within 2 to 6 hours for the MSA-TL (TL1) cartridge and within 2 hours for the 3M FR-57 (TL2) cartridge in Hanford tanks SX-101 and SX-104. The average inlet concentration of ammonia was >660% of the OEL, and reached a maximum of 1213% of the OEL in SX-104 tests. These inlet concentrations correlate to the observed breakthrough times in a way that is consistent with past respirator cartridge results. As with previous cartridge performance studies on Hanford tank vapors, the experimental results in this study support using the breakthrough measurements for ammonia as an early indicator, compared to other COPCs, to inform an appropriate respirator cartridge change-out schedule.

- Variations in humidity, temperature, or cartridge inlet concentration for any COPCs, especially ammonia, compared to those measured in the current study could impact breakthrough time, and should be used to inform an Industrial Hygiene determination of an appropriate respirator cartridge change-out schedule for adequate worker protection.
- These tests on SX-101 and SX-104 represent both the first evaluations of PAPR cartridge performance on Hanford tank farm vapors and a limited data set of COPC inlet concentrations and test conditions, especially for COPCs such as furan for which inlet concentrations were highly variable. Additional PAPR tests at inlet concentrations of key COPCs representing the range of expected tank farm conditions is recommended to verify cartridge performance.
- There were some analytical concerns identified with the 2,5-dimethylfuran data. Specifically, some measurements of this COPC from the blank and baseline sorbent tubes exceeded RL values. This puts the current RL value into question. Thus, it is recommended that the protocol for 2,5-dimethylfuran testing be evaluated to ensure that sorbent tubes are adequately clean/regenerated for future tests. Cartridge performance for several lower boiling point furan compounds including furan, 2,5-dihydrofuran, and 2-methyl furan was assessed using secondary analysis methods with superior quantitation capability, but higher DLs. Improvements in quantitation limits (both DL and RL) for these furans are recommended to improve cartridge performance evaluation.

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Appendix A

Description of Respirator Cartridge-Testing Setup

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Description of Respirator Cartridge-Testing Setup

The respirator cartridge-testing system was developed by Washington River Protection Solutions and HiLine Engineering (Richland, Washington) as a means to comprehensively test respirator cartridge performance with actual Hanford tank headspace or exhauster slipstream gases. Tank headspace or exhauster slipstream 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.[1-12] 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). It 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 a vapor stream both before and after the cartridge, so performance for a given Chemical of Potential Concern (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. Vapor-sampling canisters also are used to augment the sorbent tubes for specific COPCs.

Figure A.1 is a general schematic diagram for the respirator cartridge test apparatus, and Figure A.2 shows photographs of the two test stands that have been deployed for air purifying respirator (APR) and pressurized air purifying respirator (PAPR) cartridge testing. For the PAPR tests, the following modifications were made to the original APR test stand design:

- The cartridge housing was enlarged, and the mounting was modified to support the larger PAPR cartridge.
- An additional sampling line and control valve was added to accommodate 12 simultaneous inlet and outlet sorbent tubes versus 11 for the original APR test stand. The additional sampling line provides added flexibility, including accommodation of a methanol-specific sorbent tube.
- To measure effluent conditions, another set of instruments was added to directly measure pressure, temperature, and relative humidity immediately after the cartridge filter.

The test system uses 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.[3-12]

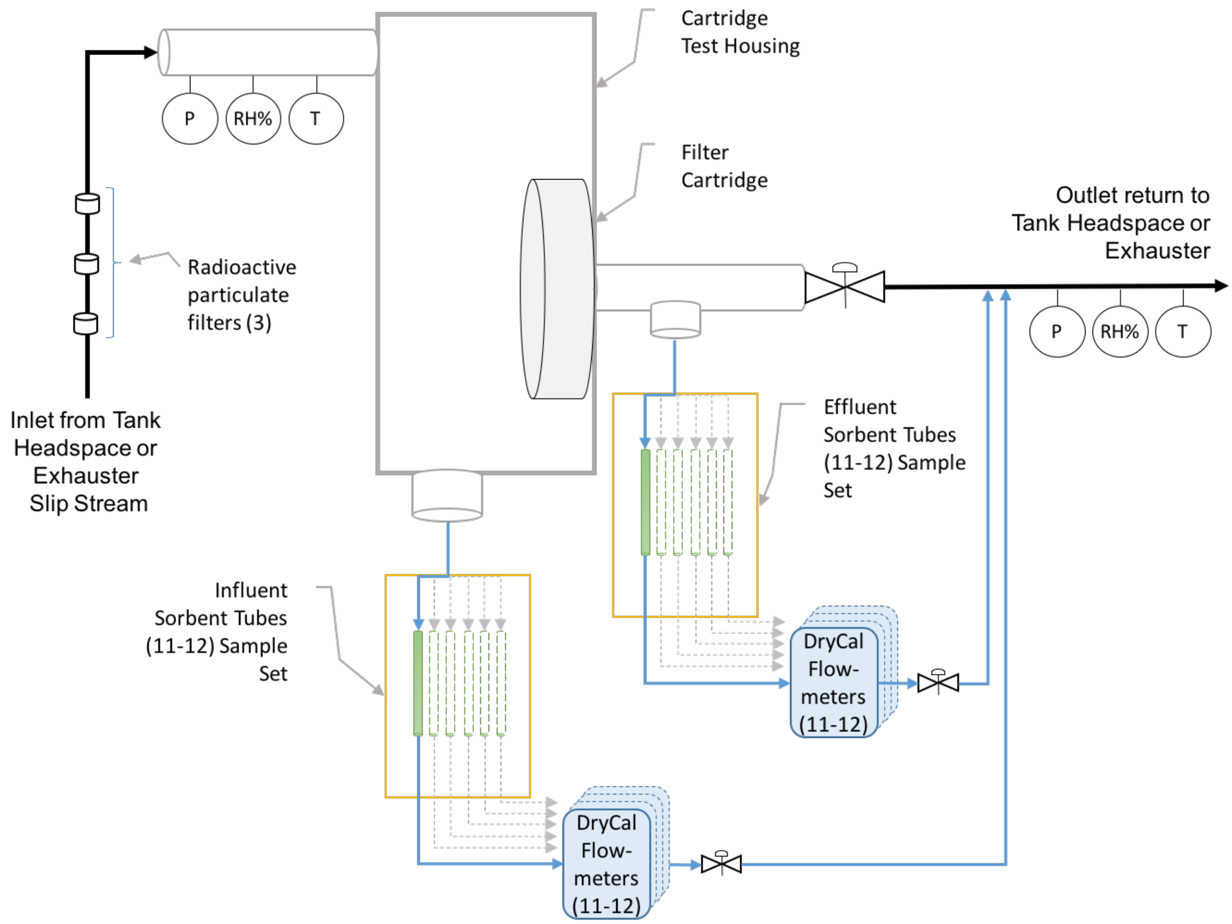

Figure A.1. General Schematic of Respirator Cartridge Test Apparatus

Flows through the respirator cartridge and through each sorbent tube are set and controlled/maintained using manual flow control valves on the outlet of each rotameter, and rotameters are calibrated against DryCal primary flow calibrators before and after testing. DryCal flow meters also are used downstream of the sorbent tubes to measure the flow through each sorbent tube (see Figure A.3). All equipment connections are leak tested before a test begins. Temperature, relative humidity, and pressure of the inlet gas/vapor stream are monitored by calibrated instrumentation.

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

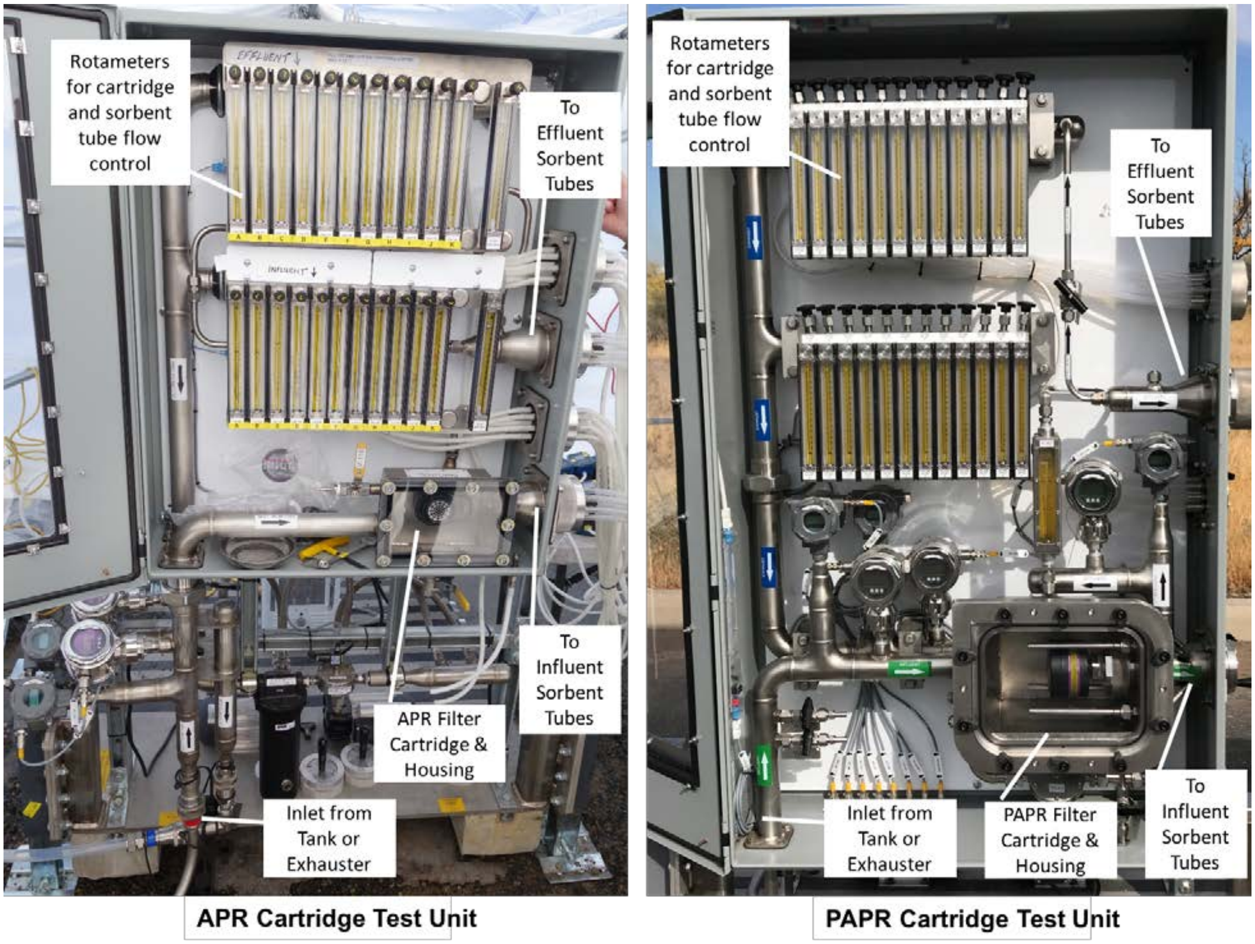

Figure A.2. Photographs of the APR (left) and PAPR (right) Cartridge Test Equipment

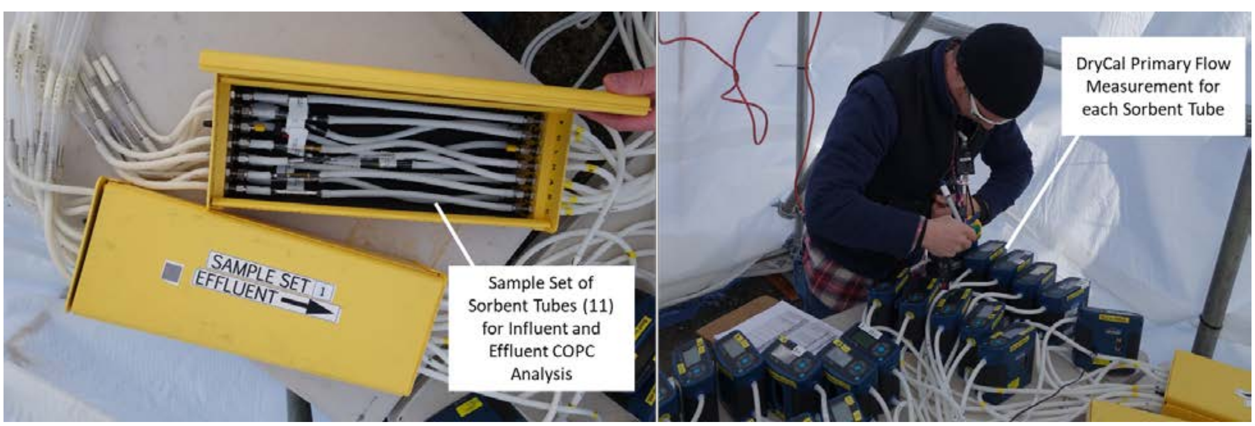

Figure A.3. Photographs of the Sorbent Tube Sampling Test Equipment

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Appendix B

Analytical Testing

Appendix B

Analytical Testing

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

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

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

Analyte Category	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	50	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
Methanol	Silica Gel, SKC-226-51	33	NIOSH-2000	GC–FID	ALS
Ammonia	Anasorb 747 (sulfuric acid), SKC-226-29	200	OSHA-ID-188	IC	WHL
1,3-butadiene	Charcoal, SKC-226-37, (Parts A and B)	200	NIOSH-1024	GC–FID	ALS
Aldehyde	DNPH Treated Silica Gel, SKC-226-119	200	EPA TO-11A	HPLC	ALS
Pyridine	Coconut Shell Charcoal, SKC-226-01	1000	NIOSH-1613	GC–FID	ALS

Analyte Category	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	100	OSHA-ID-34, 36, 40,and 41	HPLC–UV	ALS

[a] Analytical Method

NIOSH: National Institute of Occupation Safety and Health
EPA: U.S. Environmental Protection Agency
OSHA: Occupational Safety and Health Administration

[b] Instrument Used

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

[c] Analysis Location

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

Appendix C

Raw Analytical Data

Appendix C

Raw Analytical Data

In previously published cartridge reports, raw data for all contaminants analyzed during testing were provided in Appendix C to the document. However, the extensive amount of data (over 900 pages for this report) resulted in unwieldy document file sizes. To solve this problem, the raw data are provided in a separate Volume 2. Appendix C in this document (Volume 1) still provides introductory information regarding the content of Volume 2, but to review the complete raw data set, readers are referred to Volume 2.

C.1 Description

This appendix includes raw data of flow rate, temperature, pressure, and humidity, as well as analytical data for tanks SX-101 and SX-104 headspace data sets. Calculations using this data are given in Appendix D.

The raw analytical data are included only 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 measurements listed in Results spreadsheet columns were transferred from entries labeled ‘result’ in the raw analytical .pdf files. 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 set at the DL or RL.

The use of the RL or a DL varied among analytical laboratories. The term RL (equivalent to a limit of quantification) was used instead of a DL by ALS Environmental Salt Lake City, Columbia Basin Analytical Laboratory, and 222S–Wastren Hanford Laboratory (see Table F.1 in Appendix F for a complete correlation of which Chemicals of Potential Concern used an RL or a DL). The WRPS laboratory provided a DL rather 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 provided by the respective analytical laboratory.

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:

‘BL’ means blank measurements obtained from sorbent tubes that have not had any vapor stream passed through them. ‘BA’ with either ‘IN’ or ‘EF’ means measurements obtained for ambient air (i.e., fresh air not tank vapor) running through the test system from the inlet (IN) or effluent (EF) locations before initiation of tank vapor testing.

‘SD1’ designations correspond to testing with the SCOTT 7422-SD1 respirator cartridge, ‘SC1’ designations correspond to testing with the SCOTT 7422-SC1 respirator cartridge, ‘TL1’ designations correspond to testing with the MSA Optifilter TL respirator cartridge, and ‘TL2’ designations correspond to testing with the 3M FR-57 respirator cartridge.

Position designations ‘IN’ with ‘1’ and ‘EF’ with ‘1’ correspond to the respirator cartridge inlet and outlet measurements, respectively, at 0- to 2-hour time intervals. Position designations ‘2’ through ‘8’ correspond to the subsequent 2-hour measurements for inlet (IN) and outlet (EF): ‘2’ (2 to 4 hours), ‘3’ (4 to 6 hours), ‘4’ (6 to 8 hours), ‘5’ (8 to 10 hours), ‘6’ (10 to 12 hours), ‘7’ (12 to 14 hours), and ‘8’ (14 to 16 hours).

The sample IDs embed the information given above. For example, sample ID 17-04569-1-TL2-IN-2 corresponds to a particular cartridge survey (17-04569) identified as the 3M FR-57 cartridge with the (TL2), sample media line 1, influent (IN) sample bundle, and the second (2 to 4 hours) sample (-2).

The target flow rate passing through the respirator cartridge was 30 L/min for the APR tests, and 95 L/min for the PAPR tests. 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 as Excel files according to Table C.1.

Table C.1. Filenames of Sample Media Volumes Provided by WRPS

Tank	Cartridge	Filename
SX-104	3M FR-57	SX-104 3M FR-57 TL2 6_24_17.xlsx
SX-104	MSA-TL	SX-104 MSA-TL TL1 6_23-17.xlsx
SX-104	Scott 7422-SC1	SX-104 SCOTT SC1 6_17_17.xlsx
SX-104	Scott 7422-SD1	SX-104 SCOTT SD1 6_16_17.xlsx
SX-101	3M FR-57	SX-101 3M FR-57 TL2 6_17_17.xlsx
SX-101	MSA-TL	SX-101 MSA-TL TL1 6_16_17.xlsx
SX-101	Scott 7422-SC1	SX-101 SCOTT SC1 6_24_17.xlsx
SX-101	Scott 7422-SD1	SX-101 SCOTT SD1 6_23-17.xlsx

WRPS provided the temperature and humidity information in files listed in Table C.2. The information is shown in the Section C.3. Several terms used in the DRI files are described below.

- Pre’ and ‘Post’ indicate the general time signature when the direct read instrument measurements were taken. ‘Pre’ refers to the beginning of the 2-hour sample duration, and ‘Post’ refers to the end of the 2-hour sample duration.
- ‘Influent’ and ‘Effluent’ indicate the location of the measurement within the test system. ‘Influent’ measurements are taken at the inlet of the system upstream of the respirator cartridge. ‘Effluent’ measurements are taken downstream of the respirator cartridge. The pressure, temperature, and humidity effluent sensors are located at the end of the test system near the vacuum pump, whereas the DRI measurements for ammonia and 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 A DRI measurements were taken immediately after the Sample A sorbent tubes were taken and replaced with Sample B sorbent tubes).

- Prior to testing with the waste tank vapors, a 2-hour "baseline" 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.

Table C.2. Files Containing Temperature, Pressure, Relative Humidity, and DRI Data

Tank	Cartridge	Filename
SX-101	Scott 7422-SC1	SX-101 SC1 6-24-17.xlsx
SX-101	Scott 7422-SD1	SX-101 SD1 6-23-17.xlsx
SX-101	MSA-TL	SX-101 TL1 GME 6-16-17.xlsx
SX-101	3M FR-57	SX-101 TL2 FR57 6-17-17.xlsx
SX-104	Scott 7422-SC1	SX-104 3M FR57 TL2 6_24_17.xlsx
SX-104	Scott 7422-SD1	SX-104 MSA-TL TL1 6_23-17.xlsx
SX-104	MSA-TL	SX-104 SCOTT SC1 6_17_17.xlsx
SX-104	3M FR-57	SX-104 SCOTT SD1 6_16_17.xlsx

The raw analytical data for chemicals in each analyte category are summarized in Section C.4. Some analytes are measured using more than one method (primary and secondary). A crosswalk of COPC to analyte category, media, and analytical method for both primary and secondary methods is provided in Table C.3. In general, the primary method was used for cartridge performance analysis except in cases for which the secondary method provides improved quantitation for the specific COPC and its concentration range during a specific test.

C.2 Miscellaneous Notes

All analytical flags assigned by each analytical laboratory are provided in Appendix D. Sample lines occasionally experienced flow control issues, and these instances are documented in Appendix D with a quality flag of 'S*' associated with the impacted data point.

Methanol was measured in the powered air-purifying respirator test rig only. A thirteenth sample media line was added to the new rig so methanol could be measured using a dedicated sorption tube.

C.3 Experimental Parameters

See PNNL-27558, Volume 2.

C.4 Raw Data

See PNNL-27558, Volume 2.

Table C.3. Crosswalk of COPCs with Primary and Secondary Analyte Category, Media, and Analytical Method

COPC#	Analyte Name	Primary Analysis Method (Analyte Category ǀ Media ǀ Method)	Secondary Analysis Method (Analyte Category ǀ Media ǀ Method)
1	Ammonia	Ammonia ǀ Anasorb 747 ǀ OSHA-ID-188	
2	Nitrous Oxide	Not Measured	
3	Mercury	Mercury ǀ Anasorb C300 ǀ NIOSH-6009	
4	1,3-Butadiene	1,3-butadiene ǀ Charcoal ǀ NIOSH 1024	
5	Benzene	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
6	Biphenyl	SVOC ǀ Carbotrap 150 ǀ EPA TO-17 Mod	
7	1-Butanol	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
8	Methanol	Methanol ǀ Silica Gel ǀ NIOSH 2000	
9	2-Hexanone	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
10	3-Methyl-3-butene-2-one	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
11	4-Methyl-2-hexanone	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
12	6-Methyl-2-heptanone	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
13	3-Buten-2-one	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
14	Formaldehyde	Aldehyde ǀ DNPH Treated Silica Gel ǀ EPA TO-11A	
15	Acetaldehyde	Aldehyde ǀ DNPH Treated Silica Gel ǀ EPA TO-11A	
16	Butanal/Butyraldehyde	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	Aldehyde ǀ DNPH Treated Silica Gel ǀ EPA TO-11A
17	2-Methyl-2-butenal	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
18	2-Ethyl-hex-2-enal	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
New	2-Propenal/Acrolein	Aldehyde ǀ DNPH Treated Silica Gel ǀ EPA TO-11A	
19	Furan[b]	Furans ǀ Tenax TA ǀ EPA TO-17 Mod	VOC ǀ Carbotrap 300ǀ EPA TO-17 Mod
20	2,3-Dihydrofuran	Furans ǀ Tenax TA ǀ EPA TO-17 Mod	
21	2,5-Dihydrofuran[b]	Furans ǀ Tenax TA ǀ EPA TO-17 Mod	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod
22	2-Methylfuran[b]	Furans ǀ Tenax TA ǀ EPA TO-17 Mod	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod
23	2,5-Dimethylfuran	Furans ǀ Tenax TA ǀ EPA TO-17 Mod	
24	2-Ethyl-5-methylfuran	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
25	4-(1-Methylpropyl)-2,3-dihydrofuran	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
26	3-(1,1-Dimethylethyl)-2,3-dihydrofuran	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
27	2-Pentylfuran	Furans ǀ Tenax TA ǀ EPA TO-17 Mod	
28	2-Heptylfuran	Furans ǀ Tenax TA ǀ EPA TO-17 Mod	
29	2-Propylfuran	Furans ǀ Tenax TA ǀ EPA TO-17 Mod	
30	2-Octylfuran	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
31	2-(3-Oxo-3-phenylprop-1-enyl)furan	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
32	2-(2-Methyl-6-oxoheptyl) furan	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
33	Diethylphthalate	SVOC ǀ Carbotrap 150 ǀ EPA TO-17 Mod	
34	Acetonitrile	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	Acetonitrile ǀ Charcoal ǀ NIOSH 1606
35	Propanenitrile	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
36	Butanenitrile	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
37	Pentanenitrile	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
38	Hexanenitrile	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
39	Heptanenitrile	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
40	2-Methylene butanenitrile	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
41	2,4-Pentadienenitrile	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
42	Ethylamine	Ethylamine ǀ XAD-7 ǀ OSHA-ID-34,36,40,41	
43	N-nitrosodimethylamine	Nitrosamines ǀ Thermasorb/N ǀ NIOSH-2522 Mod	

COPC#	Analyte Name	Primary Analysis Method (Analyte Category ǀ Media ǀ Method)	Secondary Analysis Method (Analyte Category ǀ Media ǀ Method)
44	N-nitrosodiethylamine	Nitrosamines ǀ Thermasorb/N ǀ NIOSH-2522 Mod	
45	N-nitrosomethylethylamine	Nitrosamines ǀ Thermasorb/N ǀ NIOSH-2522 Mod	
46	N-nitrosomorpholine	Nitrosamines ǀ Thermasorb/N ǀ NIOSH-2522 Mod	
47	Tributyl phosphate	SVOC ǀ Carbotrap 150 ǀ EPA TO-17 Mod	
48	Dibutyl butylphosphonate	SVOC ǀ Carbotrap 150 ǀ EPA TO-17 Mod	
49	Chlorinated Biphenyls	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
50	2-Fluoropropene	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
51	Pyridine	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	Pyridines ǀ Coconut Shell Charcoal ǀ NIOSH-1613
52	2,4-Dimethylpyridine	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	Pyridines ǀ Coconut Shell Charcoal ǀ NIOSH-1613
53	Methyl nitrite	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
54	Butyl nitrite	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
55	Butyl nitrate	VOC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
56	1,4-Butanediol, dinitrate	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
57	2-Nitro-2-methylpropane	VOCTIC ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
58	1,2,3-Propanetriol, 1,3-dinitrate	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
59	Methyl Isocyanate	VOCTIC[a] ǀ Carbotrap 300 ǀ EPA TO-17 Mod	
New	Dimethyl Mercury	Not Measured	

[a] Tentatively Identified Compound (TIC) indicates that a mass spectrometry “peak” not associated with calibrated compounds has been tentatively assigned to a compound based on an adequate match to the analytical methods reference library. Reference standards for the compound are not available to accurately quantify, assign an analytical DL, or definitively confirm the identity of the TIC. TICs are reported when the peak area is sufficiently large, estimated as ≥5 nanograms of TIC mass, and other analytical criteria are met. For the respirator cartridge testing, this mass of TIC represents an approximate concentration of <1.0 ppb, based on the average of all TICs in the COPC list. TIC compounds are measured through both the Carbotrap 300: EPA TO-17 and Carbotrap 150: EPA TO-17 modified methods. A few compounds are measured in the TIC analysis and another analytical technique. In these cases, the TIC analysis results were not retained because they are qualitative only and inferior to the other calibrated method.

[b] Furan, 2,5-dihydrofuran, and 2-methylfuran are quantified using the secondary method, as the primary method was determined to perform inadequately for these lower-boiling point furan compounds.

Appendix D

Data Reduction Steps

Appendix D

Data Reduction Steps

D.1 Test Data Processing

1. Only chemicals in the current Chemicals of Potential Concern (COPC) list were included in the calculated data (Tables D.1 and D.2). Nitrous oxide and methanol were not measured in the study. Any other missing COPCs were analyzed as “Tentatively Identified Compounds (TIC).”
2. The COPCs are ranked in the order of their COPC number. Within the data section for each COPC, data are sorted by cartridge (001, which corresponds to MSA TL, followed by 002, which corresponds to 3M FR-57). Within every survey, data are ranked in the order of inlet (IN) and outlet (EF) and following the time sequence (A though H indicate 2-hour intervals that end at 2 through 16 hours).
3. Except for mercury, COPC concentrations were converted into parts per million (ppm) using their molecular weights and corresponding flow rates after volume correction as shown in the following equation:

$$C = 24.14\frac{r}{M\,V}$$

   where *C* is the concentration of COPC in ppmv; *r* is the analytical result with units of µg/sample (if the analytical result unit is expressed in mg/sample, the value of *C* needs to be multiplied by 1000; if the analytical result unit is in ng/sample, the value of *C* needs to be divided by 1000); *V* is the collected volume in 2 hours expressed in liters; *M* is the molecular weight of COPC expressed as g/mol. When the ratio between concentration and the corresponding Occupational Exposure Limit (OEL) is larger than 10%, the fraction is shown in red.
4. The reported volume measurements in Appendix C were made via DryCal devices placed downstream of each sample media tube. This allowed for precise volume measurements through each of the tubes. The DryCal devices were set to convert the measured values to standard flow conditions. The standard flow conditions are user-defined at 70°F and 1 atm pressure.
5. The analytical detection limit (DL)—or reporting limit (RL) in some cases—for every COPC was obtained from the SX-101 and SX-104 analytical data. Here, the average flow rate was used to calculate the approximate analytical DL 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 columns in Tables D.1 and D.2 indicate if the original readings were less than the DL or not.
   - For ammonia and mercury, only the results obtained from the total vapors of ammonia and mercury were used.
   - For furan, results from the furan tube instead of the Carbotrap 300 TDU tube were used, except for furan, 2,5-dihydrofuran and 2-methylfuran. For acetonitrile, results from the Carbotrap 300 TDU tube were used. For butanal, the results from the Carbotrap 300 TDU tube instead of the aldehydes tube were used. For pyridine and 2,4-dimethylpyridine, the results from the Carbotrap 300 TDU tube were used.
   - For N-nitrosodimethylamine 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.

- Analytical results frequently have data qualifier flags documented for specific sample analyses. Depending on the data qualifier, specific data may be considered for deletion or removal from the analysis, or results described with appropriate clarifying language to indicate whether there are possible limitations to the data. Flags identified below were found to be associated with at least one of the COPC compounds analyzed through this effort. Here, key qualifier codes are given, along with their definitions and how they are being handled with the cartridge-testing analysis. The list does not include all flags that the analytical team may assign, but it does include the flags associated with the data set compiled within this report. In addition, specific samples were identified at the time of sampling as potentially suspect by the test operator due to potential sample volume or sample tube media issues. These samples have been flagged with a project-specific qualifier code in the data set.

Action	Flag	Flag Description
Retain (Result is treated in the analysis as a valid data point)	J	The "J" flag is applied to results that are considered estimates. Some examples of when a "J" flag are applied include (but are not limited to): • Results with concentrations greater than or equal to the method DL but less than the RL. When results are reported based on the RL, the "J" is removed from the reported data. R702-AZ data are left as received from the chemist. • Unknown constituents—tentatively identified compounds (TIC) or positively identified compounds.
	E	The "E" flag is applied to each analyte that exceeded the calibration range of the instrument.
	U	The "U" flag is applied to analytes that were analyzed for, but were not detected, or were detected below the method DL. If results are reported based on RL, this flag is removed from the reported data.
	D	The "D" flag is applied to all analytes in a sample that were diluted prior to analysis.
Retain/Evaluate (Result is treated in the analysis as a valid data point, but evaluated on a case-by-case basis to determine whether clarification is needed in the analysis report to document the uncertainty or potential limitations of the data)	L	The "L" flag is applied to analyte results (both detected and not detected) within a sample batch that included a low-level standard with a percent recovery for that analyte that was outside the analytical method specified range.
	Y	The "Y" flag is a user-defined flag and is applied to results that require written descriptions or qualifying comments. This flag is used by the chemist, PC, or other technical authority to identify data that is questionable or may be inaccurate because of interferences, sampling problems, sample collection media (e.g., tubes or summa canisters) certification failures, or instrumentation limitations.
	S*	The "S*" flag is a project-specific user-defined flag applied to samples that were identified by the test operator as suspect due to potentially low sample volume/flow rate issues, or other sample tube media problems
Delete (Result is seriously suspect and should be screened out and not reported)	N/A	

Tables D.1 and D.2 show the calculated concentrations for each of the COPC measurements conducted in this study. Red highlighted values reflect measurements that were >10% of the respective OEL values. COPCs with these highlights are plotted and shown in Section 5.0. Green highlighted values reflect measurements in the 2 to 10% of the OEL range. COPCs with these highlights (only) are plotted and/or discussed in Appendix E. The three elements of position (fourth column) include the survey (001 for the MSA TL [TL1] cartridge, and 002 for the 3M FR-57 [TL2] cartridge), inlet (IN) or outlet (EF), and the time sequence (A though H indicate 2-hour intervals corresponding to 2 through 16 hours similar to third column). Calculated results from the primary analytical methods are listed first in each table. A red bar in each table indicates the beginning of analytical results from the secondary methods, when available.

Table D.1. SX-101 Calculated Data

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
1	Ammonia	2	001-IN-A	1.3E+02	25.000	539%			2.37%
1	Ammonia	4	001-IN-B	1.5E+02	25.000	587%			2.37%
1	Ammonia	6	001-IN-C	1.4E+02	25.000	567%			2.37%
1	Ammonia	8	001-IN-D	1.5E+02	25.000	608%			2.37%
1	Ammonia	10	001-IN-E	1.5E+02	25.000	614%			2.37%
1	Ammonia	12	001-IN-F	1.5E+02	25.000	618%			2.37%
1	Ammonia	14	001-IN-G	1.5E+02	25.000	597%			2.37%
1	Ammonia	16	001-IN-H	1.6E+02	25.000	628%			2.37%
1	Ammonia	2	001-EF-A	1.2E+00	25.000	4.82%			2.37%
1	Ammonia	4	001-EF-B	5.9E-01	25.000	2.37%	YES		2.37%
1	Ammonia	6	001-EF-C	3.1E+01	25.000	124%			2.37%
1	Ammonia	8	001-EF-D	9.9E+01	25.000	398%			2.37%
1	Ammonia	10	001-EF-E	1.1E+02	25.000	430%			2.37%
1	Ammonia	12	001-EF-F	1.2E+02	25.000	474%			2.37%
1	Ammonia	14	001-EF-G	1.1E+02	25.000	451%			2.37%
1	Ammonia	16	001-EF-H	1.2E+02	25.000	468%			2.37%
1	Ammonia	2	002-IN-A	1.7E+02	25.000	694%			2.37%
1	Ammonia	4	002-IN-B	1.8E+02	25.000	731%			2.37%
1	Ammonia	6	002-IN-C	1.6E+02	25.000	639%			2.37%
1	Ammonia	8	002-IN-D	1.8E+02	25.000	722%			2.37%
1	Ammonia	10	002-IN-E	1.9E+02	25.000	769%			2.37%
1	Ammonia	12	002-IN-F	2.0E+02	25.000	782%			2.37%
1	Ammonia	14	002-IN-G	1.8E+02	25.000	716%			2.37%
1	Ammonia	16	002-IN-H	2.0E+02	25.000	796%			2.37%
1	Ammonia	2	002-EF-A	3.7E+01	25.000	148%			2.37%
1	Ammonia	4	002-EF-B	9.4E+01	25.000	374%			2.37%
1	Ammonia	6	002-EF-C	1.7E+02	25.000	678%			2.37%
1	Ammonia	8	002-EF-D	1.8E+02	25.000	708%			2.37%
1	Ammonia	10	002-EF-E	1.7E+02	25.000	670%			2.37%
1	Ammonia	12	002-EF-F	1.7E+02	25.000	692%			2.37%
1	Ammonia	14	002-EF-G	1.7E+02	25.000	666%			2.37%
1	Ammonia	16	002-EF-H	1.9E+02	25.000	761%			2.37%
3	Mercury	2	001-IN-A	6.6E-04	0.003	21.8%			6.79%
3	Mercury	4	001-IN-B	6.9E-04	0.003	23.0%			6.79%
3	Mercury	6	001-IN-C	6.9E-04	0.003	23.0%			6.79%
3	Mercury	8	001-IN-D	7.4E-04	0.003	24.5%			6.79%
3	Mercury	10	001-IN-E	7.0E-04	0.003	23.3%			6.79%
3	Mercury	12	001-IN-F	7.3E-04	0.003	24.2%			6.79%
3	Mercury	14	001-IN-G	7.2E-04	0.003	23.9%			6.79%
3	Mercury	16	001-IN-H	7.2E-04	0.003	23.9%			6.79%
3	Mercury	2	001-EF-A	2.0E-04	0.003	6.67%	YES		6.79%
3	Mercury	4	001-EF-B	2.0E-04	0.003	6.60%	YES		6.79%
3	Mercury	6	001-EF-C	2.0E-04	0.003	6.66%	YES		6.79%
3	Mercury	8	001-EF-D	2.0E-04	0.003	6.68%	YES		6.79%
3	Mercury	10	001-EF-E	2.0E-04	0.003	6.64%	YES		6.79%
3	Mercury	12	001-EF-F	2.0E-04	0.003	6.63%	YES		6.79%
3	Mercury	14	001-EF-G	2.0E-04	0.003	6.67%	YES		6.79%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
3	Mercury	16	001-EF-H	2.0E-04	0.003	6.70%	YES		6.79%
3	Mercury	2	002-IN-A	7.0E-04	0.003	23.4%			6.79%
3	Mercury	4	002-IN-B	7.2E-04	0.003	23.9%			6.79%
3	Mercury	6	002-IN-C	7.8E-04	0.003	25.9%			6.79%
3	Mercury	8	002-IN-D	7.7E-04	0.003	25.5%			6.79%
3	Mercury	10	002-IN-E	7.5E-04	0.003	24.9%			6.79%
3	Mercury	12	002-IN-F	7.3E-04	0.003	24.4%			6.79%
3	Mercury	14	002-IN-G	7.0E-04	0.003	23.2%			6.79%
3	Mercury	16	002-IN-H	7.3E-04	0.003	24.2%			6.79%
3	Mercury	2	002-EF-A	2.0E-04	0.003	6.79%	YES		6.79%
3	Mercury	4	002-EF-B	2.0E-04	0.003	6.59%	YES		6.79%
3	Mercury	6	002-EF-C	2.0E-04	0.003	6.56%	YES		6.79%
3	Mercury	8	002-EF-D	2.0E-04	0.003	6.54%	YES		6.79%
3	Mercury	10	002-EF-E	2.0E-04	0.003	6.52%	YES		6.79%
3	Mercury	12	002-EF-F	2.0E-04	0.003	6.58%	YES		6.79%
3	Mercury	14	002-EF-G	2.0E-04	0.003	6.72%	YES		6.79%
3	Mercury	16	002-EF-H	2.0E-04	0.003	6.70%	YES		6.79%
4	1,3-Butadiene	2	001-IN-A	1.9E-02	1.000	1.87%	YES		1.89%
4	1,3-Butadiene	4	001-IN-B	1.9E-02	1.000	1.89%	YES		1.89%
4	1,3-Butadiene	6	001-IN-C	1.9E-02	1.000	1.87%	YES		1.89%
4	1,3-Butadiene	8	001-IN-D	1.8E-02	1.000	1.84%	YES		1.89%
4	1,3-Butadiene	10	001-IN-E	1.8E-02	1.000	1.82%	YES		1.89%
4	1,3-Butadiene	12	001-IN-F	1.8E-02	1.000	1.84%	YES		1.89%
4	1,3-Butadiene	14	001-IN-G	1.8E-02	1.000	1.84%	YES		1.89%
4	1,3-Butadiene	16	001-IN-H	1.8E-02	1.000	1.85%	YES		1.89%
4	1,3-Butadiene	2	001-EF-A	1.9E-02	1.000	1.87%	YES		1.89%
4	1,3-Butadiene	4	001-EF-B	1.9E-02	1.000	1.89%	YES		1.89%
4	1,3-Butadiene	6	001-EF-C	1.8E-02	1.000	1.83%	YES		1.89%
4	1,3-Butadiene	8	001-EF-D	1.8E-02	1.000	1.83%	YES		1.89%
4	1,3-Butadiene	10	001-EF-E	1.8E-02	1.000	1.81%	YES		1.89%
4	1,3-Butadiene	12	001-EF-F	1.9E-02	1.000	1.86%	YES		1.89%
4	1,3-Butadiene	14	001-EF-G	1.9E-02	1.000	1.86%	YES		1.89%
4	1,3-Butadiene	16	001-EF-H	1.9E-02	1.000	1.86%	YES		1.89%
4	1,3-Butadiene	2	002-IN-A	1.8E-02	1.000	1.83%	YES		1.89%
4	1,3-Butadiene	4	002-IN-B	1.8E-02	1.000	1.85%	YES		1.89%
4	1,3-Butadiene	6	002-IN-C	1.8E-02	1.000	1.83%	YES		1.89%
4	1,3-Butadiene	8	002-IN-D	1.8E-02	1.000	1.83%	YES		1.89%
4	1,3-Butadiene	10	002-IN-E	1.8E-02	1.000	1.82%	YES		1.89%
4	1,3-Butadiene	12	002-IN-F	1.8E-02	1.000	1.80%	YES		1.89%
4	1,3-Butadiene	14	002-IN-G	1.9E-02	1.000	1.87%	YES		1.89%
4	1,3-Butadiene	16	002-IN-H	1.9E-02	1.000	1.89%	YES		1.89%
4	1,3-Butadiene	2	002-EF-A	1.9E-02	1.000	1.85%	YES		1.89%
4	1,3-Butadiene	4	002-EF-B	1.9E-02	1.000	1.88%	YES		1.89%
4	1,3-Butadiene	6	002-EF-C	1.8E-02	1.000	1.83%	YES		1.89%
4	1,3-Butadiene	8	002-EF-D	1.8E-02	1.000	1.82%	YES		1.89%
4	1,3-Butadiene	10	002-EF-E	1.8E-02	1.000	1.79%	YES		1.89%
4	1,3-Butadiene	12	002-EF-F	1.8E-02	1.000	1.80%	YES		1.89%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
4	1,3-Butadiene	14	002-EF-G	1.8E-02	1.000	1.82%	YES		1.89%
4	1,3-Butadiene	16	002-EF-H	1.8E-02	1.000	1.81%	YES		1.89%
5	Benzene	2	001-IN-A	1.6E-03	0.500	0.316%			0.025%
5	Benzene	4	001-IN-B	1.5E-03	0.500	0.301%			0.025%
5	Benzene	6	001-IN-C	1.6E-03	0.500	0.327%			0.025%
5	Benzene	8	001-IN-D	1.8E-03	0.500	0.359%			0.025%
5	Benzene	10	001-IN-E	1.7E-03	0.500	0.340%			0.025%
5	Benzene	12	001-IN-F	1.8E-03	0.500	0.360%			0.025%
5	Benzene	14	001-IN-G	1.8E-03	0.500	0.352%			0.025%
5	Benzene	16	001-IN-H	1.7E-03	0.500	0.345%			0.025%
5	Benzene	2	001-EF-A	1.1E-04	0.500	0.022%	YES	U	0.025%
5	Benzene	4	001-EF-B	3.1E-04	0.500	0.061%			0.025%
5	Benzene	6	001-EF-C	1.2E-04	0.500	0.024%	YES	U	0.025%
5	Benzene	8	001-EF-D	1.2E-04	0.500	0.025%	YES	U	0.025%
5	Benzene	10	001-EF-E	1.2E-04	0.500	0.025%	YES	U	0.025%
5	Benzene	12	001-EF-F	1.2E-04	0.500	0.023%	YES	U	0.025%
5	Benzene	14	001-EF-G	1.2E-04	0.500	0.024%	YES	U	0.025%
5	Benzene	16	001-EF-H	1.2E-04	0.500	0.023%	YES	U	0.025%
5	Benzene	2	002-IN-A	1.8E-03	0.500	0.356%			0.025%
5	Benzene	4	002-IN-B	1.5E-03	0.500	0.309%			0.025%
5	Benzene	6	002-IN-C	1.5E-03	0.500	0.303%			0.025%
5	Benzene	8	002-IN-D	1.7E-03	0.500	0.336%			0.025%
5	Benzene	10	002-IN-E	1.7E-03	0.500	0.341%			0.025%
5	Benzene	12	002-IN-F	1.7E-03	0.500	0.334%			0.025%
5	Benzene	14	002-IN-G	1.5E-03	0.500	0.307%			0.025%
5	Benzene	16	002-IN-H	2.0E-03	0.500	0.394%			0.025%
5	Benzene	2	002-EF-A	1.1E-04	0.500	0.022%	YES	U	0.025%
5	Benzene	4	002-EF-B	2.1E-04	0.500	0.042%		J	0.025%
5	Benzene	6	002-EF-C	1.1E-04	0.500	0.022%	YES	U	0.025%
5	Benzene	8	002-EF-D	1.1E-04	0.500	0.022%	YES	U	0.025%
5	Benzene	10	002-EF-E	1.2E-04	0.500	0.024%	YES	U	0.025%
5	Benzene	12	002-EF-F	1.1E-04	0.500	0.022%	YES	U	0.025%
5	Benzene	14	002-EF-G	1.1E-04	0.500	0.022%	YES	U	0.025%
5	Benzene	16	002-EF-H	1.1E-04	0.500	0.023%	YES	U	0.025%
6	Biphenyl	2	001-IN-A	1.6E-04	0.200	0.079%	YES	U	0.08%
6	Biphenyl	4	001-IN-B	1.6E-04	0.200	0.080%	YES	U	0.08%
6	Biphenyl	6	001-IN-C	1.5E-04	0.200	0.076%	YES	U	0.08%
6	Biphenyl	8	001-IN-D	1.6E-04	0.200	0.079%	YES	U	0.08%
6	Biphenyl	10	001-IN-E	1.6E-04	0.200	0.082%	YES	U	0.08%
6	Biphenyl	12	001-IN-F	1.5E-04	0.200	0.076%	YES	U	0.08%
6	Biphenyl	14	001-IN-G	1.5E-04	0.200	0.076%	YES	U	0.08%
6	Biphenyl	16	001-IN-H	1.6E-04	0.200	0.079%	YES	U	0.08%
6	Biphenyl	2	001-EF-A	1.5E-04	0.200	0.073%	YES	U	0.08%
6	Biphenyl	4	001-EF-B	1.6E-04	0.200	0.079%	YES	U	0.08%
6	Biphenyl	6	001-EF-C	1.6E-04	0.200	0.079%	YES	U	0.08%
6	Biphenyl	8	001-EF-D	1.6E-04	0.200	0.082%	YES	U	0.08%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
6	Biphenyl	10	001-EF-E	1.6E-04	0.200	0.082%	YES	U	0.08%
6	Biphenyl	12	001-EF-F	1.6E-04	0.200	0.081%	YES	U	0.08%
6	Biphenyl	14	001-EF-G	1.6E-04	0.200	0.079%	YES	U	0.08%
6	Biphenyl	16	001-EF-H	1.5E-04	0.200	0.077%	YES	U	0.08%
6	Biphenyl	2	002-IN-A	1.5E-04	0.200	0.075%	YES	U	0.08%
6	Biphenyl	4	002-IN-B	1.5E-04	0.200	0.073%	YES	U	0.08%
6	Biphenyl	6	002-IN-C	1.6E-04	0.200	0.078%	YES	U	0.08%
6	Biphenyl	8	002-IN-D	1.6E-04	0.200	0.080%	YES	U	0.08%
6	Biphenyl	10	002-IN-E	1.7E-04	0.200	0.084%	YES	U	0.08%
6	Biphenyl	12	002-IN-F	1.6E-04	0.200	0.079%	YES	U	0.08%
6	Biphenyl	14	002-IN-G	1.6E-04	0.200	0.080%	YES	U	0.08%
6	Biphenyl	16	002-IN-H	1.5E-04	0.200	0.077%	YES	U	0.08%
6	Biphenyl	2	002-EF-A	1.5E-04	0.200	0.073%	YES	U	0.08%
6	Biphenyl	4	002-EF-B	1.5E-04	0.200	0.073%	YES	U	0.08%
6	Biphenyl	6	002-EF-C	1.5E-04	0.200	0.075%	YES	U	0.08%
6	Biphenyl	8	002-EF-D	1.6E-04	0.200	0.080%	YES	U	0.08%
6	Biphenyl	10	002-EF-E	1.6E-04	0.200	0.078%	YES	U	0.08%
6	Biphenyl	12	002-EF-F	1.5E-04	0.200	0.076%	YES	U	0.08%
6	Biphenyl	14	002-EF-G	1.5E-04	0.200	0.076%	YES	U	0.08%
6	Biphenyl	16	002-EF-H	1.6E-04	0.200	0.078%	YES	U	0.08%
7	1-Butanol	2	001-IN-A	1.7E-02	20.000	0.083%			0.0011%
7	1-Butanol	4	001-IN-B	1.3E-02	20.000	0.063%			0.0011%
7	1-Butanol	6	001-IN-C	1.9E-02	20.000	0.094%			0.0011%
7	1-Butanol	8	001-IN-D	2.1E-02	20.000	0.103%			0.0011%
7	1-Butanol	10	001-IN-E	1.6E-02	20.000	0.081%			0.0011%
7	1-Butanol	12	001-IN-F	1.5E-02	20.000	0.073%			0.0011%
7	1-Butanol	14	001-IN-G	1.5E-02	20.000	0.076%			0.0011%
7	1-Butanol	16	001-IN-H	2.0E-02	20.000	0.099%			0.0011%
7	1-Butanol	2	001-EF-A	4.2E-04	20.000	0.002%			0.0011%
7	1-Butanol	4	001-EF-B	7.1E-04	20.000	0.004%			0.0011%
7	1-Butanol	6	001-EF-C	4.5E-04	20.000	0.002%			0.0011%
7	1-Butanol	8	001-EF-D	3.9E-04	20.000	0.002%			0.0011%
7	1-Butanol	10	001-EF-E	1.2E-03	20.000	0.006%			0.0011%
7	1-Butanol	12	001-EF-F	9.9E-04	20.000	0.005%		J	0.0011%
7	1-Butanol	14	001-EF-G	2.1E-03	20.000	0.011%			0.0011%
7	1-Butanol	16	001-EF-H	2.2E-04	20.000	0.001%	YES	U	0.0011%
7	1-Butanol	2	002-IN-A	1.3E-02	20.000	0.065%			0.0011%
7	1-Butanol	4	002-IN-B	1.5E-02	20.000	0.077%			0.0011%
7	1-Butanol	6	002-IN-C	1.7E-02	20.000	0.084%			0.0011%
7	1-Butanol	8	002-IN-D	1.7E-02	20.000	0.084%			0.0011%
7	1-Butanol	10	002-IN-E	1.7E-02	20.000	0.086%			0.0011%
7	1-Butanol	12	002-IN-F	1.8E-02	20.000	0.092%			0.0011%
7	1-Butanol	14	002-IN-G	1.7E-02	20.000	0.085%			0.0011%
7	1-Butanol	16	002-IN-H	2.5E-02	20.000	0.125%			0.0011%
7	1-Butanol	2	002-EF-A	1.7E-03	20.000	0.008%		J	0.0011%
7	1-Butanol	4	002-EF-B	4.9E-04	20.000	0.002%		J	0.0011%
7	1-Butanol	6	002-EF-C	1.8E-03	20.000	0.009%		J	0.0011%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
7	1-Butanol	8	002-EF-D	2.2E-04	20.000	0.001%		J	0.0011%
7	1-Butanol	10	002-EF-E	2.3E-04	20.000	0.001%	YES	U	0.0011%
7	1-Butanol	12	002-EF-F	2.1E-04	20.000	0.001%	YES	U	0.0011%
7	1-Butanol	14	002-EF-G	2.1E-04	20.000	0.001%	YES	U	0.0011%
7	1-Butanol	16	002-EF-H	2.8E-04	20.000	0.001%		J	0.0011%
8	Methanol	2	001-IN-A	1.8E+00	200.00	0.892%	YES		1.01%
8	Methanol	4	001-IN-B	1.8E+00	200.00	0.883%	YES		1.01%
8	Methanol	6	001-IN-C	1.9E+00	200.00	0.927%	YES		1.01%
8	Methanol	8	001-IN-D	1.9E+00	200.00	0.939%	YES		1.01%
8	Methanol	10	001-IN-E	1.9E+00	200.00	0.970%	YES		1.01%
8	Methanol	12	001-IN-F	2.0E+00	200.00	0.990%	YES		1.01%
8	Methanol	14	001-IN-G	1.9E+00	200.00	0.971%	YES		1.01%
8	Methanol	16	001-IN-H	2.0E+00	200.00	0.990%	YES		1.01%
8	Methanol	2	001-EF-A	1.8E+00	200.00	0.885%	YES		1.01%
8	Methanol	4	001-EF-B	2.0E+00	200.00	0.986%	YES		1.01%
8	Methanol	6	001-EF-C	2.0E+00	200.00	1.01%	YES		1.01%
8	Methanol	8	001-EF-D	1.9E+00	200.00	0.968%	YES		1.01%
8	Methanol	10	001-EF-E	1.9E+00	200.00	0.969%	YES		1.01%
8	Methanol	12	001-EF-F	2.0E+00	200.00	0.998%	YES		1.01%
8	Methanol	14	001-EF-G	2.0E+00	200.00	0.978%	YES		1.01%
8	Methanol	16	001-EF-H	1.9E+00	200.00	0.973%	YES		1.01%
8	Methanol	2	002-IN-A	1.7E+00	200.00	0.829%	YES		1.01%
8	Methanol	4	002-IN-B	1.8E+00	200.00	0.897%	YES		1.01%
8	Methanol	6	002-IN-C	2.0E+00	200.00	1.01%	YES		1.01%
8	Methanol	8	002-IN-D	1.9E+00	200.00	0.930%	YES		1.01%
8	Methanol	10	002-IN-E	1.9E+00	200.00	0.946%	YES		1.01%
8	Methanol	12	002-IN-F	2.0E+00	200.00	0.979%	YES		1.01%
8	Methanol	14	002-IN-G	2.0E+00	200.00	1.01%	YES		1.01%
8	Methanol	16	002-IN-H	1.9E+00	200.00	0.963%	YES		1.01%
8	Methanol	2	002-EF-A	2.0E+00	200.00	0.982%	YES		1.01%
8	Methanol	4	002-EF-B	1.9E+00	200.00	0.967%	YES		1.01%
8	Methanol	6	002-EF-C	1.9E+00	200.00	0.936%	YES		1.01%
8	Methanol	8	002-EF-D	1.9E+00	200.00	0.974%	YES		1.01%
8	Methanol	10	002-EF-E	2.0E+00	200.00	0.976%	YES		1.01%
8	Methanol	12	002-EF-F	2.0E+00	200.00	0.977%	YES		1.01%
8	Methanol	14	002-EF-G	1.9E+00	200.00	0.967%	YES		1.01%
8	Methanol	16	002-EF-H	1.9E+00	200.00	0.975%	YES		1.01%
9	2-Hexanone	2	001-IN-A	4.6E-03	5.000	0.093%			0.0019%
9	2-Hexanone	4	001-IN-B	1.1E-02	5.000	0.211%			0.0019%
9	2-Hexanone	6	001-IN-C	3.6E-03	5.000	0.072%		Q	0.0019%
9	2-Hexanone	8	001-IN-D	3.8E-03	5.000	0.075%		Q	0.0019%
9	2-Hexanone	10	001-IN-E	6.2E-03	5.000	0.125%			0.0019%
9	2-Hexanone	12	001-IN-F	5.7E-03	5.000	0.113%			0.0019%
9	2-Hexanone	14	001-IN-G	4.2E-03	5.000	0.085%			0.0019%
9	2-Hexanone	16	001-IN-H	3.6E-03	5.000	0.072%		Q	0.0019%
9	2-Hexanone	2	001-EF-A	8.7E-05	5.000	0.002%	YES	U	0.0019%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
9	2-Hexanone	4	001-EF-B	9.0E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	6	001-EF-C	9.5E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	8	001-EF-D	9.6E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	10	001-EF-E	9.7E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	12	001-EF-F	9.2E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	14	001-EF-G	9.4E-05	5.000	0.002%	YES	QU	0.0019%
9	2-Hexanone	16	001-EF-H	9.0E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	2	002-IN-A	5.5E-03	5.000	0.110%			0.0019%
9	2-Hexanone	4	002-IN-B	5.3E-03	5.000	0.106%			0.0019%
9	2-Hexanone	6	002-IN-C	5.6E-03	5.000	0.112%			0.0019%
9	2-Hexanone	8	002-IN-D	6.5E-03	5.000	0.131%			0.0019%
9	2-Hexanone	10	002-IN-E	6.4E-03	5.000	0.127%			0.0019%
9	2-Hexanone	12	002-IN-F	7.1E-03	5.000	0.142%			0.0019%
9	2-Hexanone	14	002-IN-G	6.3E-03	5.000	0.126%			0.0019%
9	2-Hexanone	16	002-IN-H	7.4E-03	5.000	0.148%			0.0019%
9	2-Hexanone	2	002-EF-A	8.5E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	4	002-EF-B	9.2E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	6	002-EF-C	8.7E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	8	002-EF-D	8.7E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	10	002-EF-E	9.3E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	12	002-EF-F	8.7E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	14	002-EF-G	8.5E-05	5.000	0.002%	YES	U	0.0019%
9	2-Hexanone	16	002-EF-H	8.9E-05	5.000	0.002%	YES	U	0.0019%
11	4-Methyl-2-hexanone	2	001-IN-A	3.5E-04	0.500	0.070%		J	0.018%
11	4-Methyl-2-hexanone	4	001-IN-B	4.0E-04	0.500	0.079%		J	0.018%
11	4-Methyl-2-hexanone	6	001-IN-C	2.6E-04	0.500	0.052%		JQ	0.018%
11	4-Methyl-2-hexanone	8	001-IN-D	2.9E-04	0.500	0.059%		JQ	0.018%
11	4-Methyl-2-hexanone	10	001-IN-E	4.3E-04	0.500	0.086%		J	0.018%
11	4-Methyl-2-hexanone	12	001-IN-F	4.6E-04	0.500	0.092%		J	0.018%
11	4-Methyl-2-hexanone	14	001-IN-G	4.1E-04	0.500	0.082%		J	0.018%
11	4-Methyl-2-hexanone	16	001-IN-H	2.8E-04	0.500	0.056%		JQ	0.018%
11	4-Methyl-2-hexanone	2	001-EF-A	8.2E-05	0.500	0.016%	YES	U	0.018%
11	4-Methyl-2-hexanone	4	001-EF-B	8.4E-05	0.500	0.017%	YES	U	0.018%
11	4-Methyl-2-hexanone	6	001-EF-C	8.9E-05	0.500	0.018%	YES	U	0.018%
11	4-Methyl-2-hexanone	8	001-EF-D	9.0E-05	0.500	0.018%	YES	U	0.018%
11	4-Methyl-2-hexanone	10	001-EF-E	9.0E-05	0.500	0.018%	YES	U	0.018%
11	4-Methyl-2-hexanone	12	001-EF-F	8.6E-05	0.500	0.017%	YES	U	0.018%
11	4-Methyl-2-hexanone	14	001-EF-G	8.8E-05	0.500	0.018%	YES	QU	0.018%
11	4-Methyl-2-hexanone	16	001-EF-H	8.5E-05	0.500	0.017%	YES	U	0.018%
11	4-Methyl-2-hexanone	2	002-IN-A	4.6E-04	0.500	0.092%		J	0.018%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
11	4-Methyl-2-hexanone	4	001-EF-B	8.4E-05	0.500	0.017%	YES	U	0.018%
11	4-Methyl-2-hexanone	6	001-EF-C	8.9E-05	0.500	0.018%	YES	U	0.018%
11	4-Methyl-2-hexanone	8	001-EF-D	9.0E-05	0.500	0.018%	YES	U	0.018%
11	4-Methyl-2-hexanone	10	001-EF-E	9.0E-05	0.500	0.018%	YES	U	0.018%
11	4-Methyl-2-hexanone	12	001-EF-F	8.6E-05	0.500	0.017%	YES	U	0.018%
11	4-Methyl-2-hexanone	14	001-EF-G	8.8E-05	0.500	0.018%	YES	QU	0.018%
11	4-Methyl-2-hexanone	16	001-EF-H	8.5E-05	0.500	0.017%	YES	U	0.018%
11	4-Methyl-2-hexanone	2	002-IN-A	4.6E-04	0.500	0.092%		J	0.018%
11	4-Methyl-2-hexanone	4	002-IN-B	4.5E-04	0.500	0.090%		J	0.018%
11	4-Methyl-2-hexanone	6	002-IN-C	5.0E-04	0.500	0.099%		J	0.018%
11	4-Methyl-2-hexanone	8	002-IN-D	5.7E-04	0.500	0.115%		J	0.018%
11	4-Methyl-2-hexanone	10	002-IN-E	4.9E-04	0.500	0.098%		J	0.018%
11	4-Methyl-2-hexanone	12	002-IN-F	5.2E-04	0.500	0.104%		J	0.018%
11	4-Methyl-2-hexanone	14	002-IN-G	4.8E-04	0.500	0.095%		J	0.018%
11	4-Methyl-2-hexanone	16	002-IN-H	6.5E-04	0.500	0.129%			0.018%
11	4-Methyl-2-hexanone	2	002-EF-A	7.9E-05	0.500	0.016%	YES	U	0.018%
11	4-Methyl-2-hexanone	4	002-EF-B	8.6E-05	0.500	0.017%	YES	U	0.018%
11	4-Methyl-2-hexanone	6	002-EF-C	8.1E-05	0.500	0.016%	YES	U	0.018%
11	4-Methyl-2-hexanone	8	002-EF-D	8.1E-05	0.500	0.016%	YES	U	0.018%
11	4-Methyl-2-hexanone	10	002-EF-E	8.7E-05	0.500	0.017%	YES	U	0.018%
11	4-Methyl-2-hexanone	12	002-EF-F	8.1E-05	0.500	0.016%	YES	U	0.018%
11	4-Methyl-2-hexanone	14	002-EF-G	8.0E-05	0.500	0.016%	YES	U	0.018%
11	4-Methyl-2-hexanone	16	002-EF-H	8.3E-05	0.500	0.017%	YES	U	0.018%
13	3-Buten-2-one	2	001-IN-A	1.0E-03	0.200	0.504%		J	0.115%
13	3-Buten-2-one	4	001-IN-B	9.2E-04	0.200	0.461%		J	0.115%
13	3-Buten-2-one	6	001-IN-C	9.1E-04	0.200	0.455%		J	0.115%
13	3-Buten-2-one	8	001-IN-D	9.6E-04	0.200	0.478%		J	0.115%
13	3-Buten-2-one	10	001-IN-E	9.9E-04	0.200	0.496%		J	0.115%
13	3-Buten-2-one	12	001-IN-F	1.0E-03	0.200	0.501%		J	0.115%
13	3-Buten-2-one	14	001-IN-G	9.8E-04	0.200	0.490%		J	0.115%
13	3-Buten-2-one	16	001-IN-H	8.0E-04	0.200	0.402%		J	0.115%
13	3-Buten-2-one	2	001-EF-A	2.1E-04	0.200	0.104%	YES	U	0.115%
13	3-Buten-2-one	4	001-EF-B	2.1E-04	0.200	0.107%	YES	U	0.115%
13	3-Buten-2-one	6	001-EF-C	2.3E-04	0.200	0.114%	YES	U	0.115%
13	3-Buten-2-one	8	001-EF-D	2.3E-04	0.200	0.115%	YES	U	0.115%
13	3-Buten-2-one	10	001-EF-E	2.3E-04	0.200	0.115%	YES	U	0.115%
13	3-Buten-2-one	12	001-EF-F	2.2E-04	0.200	0.109%	YES	U	0.115%
13	3-Buten-2-one	14	001-EF-G	2.2E-04	0.200	0.112%	YES	U	0.115%
13	3-Buten-2-one	16	001-EF-H	2.2E-04	0.200	0.108%	YES	U	0.115%
13	3-Buten-2-one	2	002-IN-A	6.1E-04	0.200	0.306%		J	0.115%
13	3-Buten-2-one	4	002-IN-B	1.0E-03	0.200	0.517%		J	0.115%
13	3-Buten-2-one	6	002-IN-C	1.2E-03	0.200	0.623%			0.115%
13	3-Buten-2-one	8	002-IN-D	1.0E-03	0.200	0.510%		J	0.115%
13	3-Buten-2-one	10	002-IN-E	8.3E-04	0.200	0.413%		J	0.115%
13	3-Buten-2-one	12	002-IN-F	9.3E-04	0.200	0.465%		J	0.115%
13	3-Buten-2-one	14	002-IN-G	8.0E-04	0.200	0.401%		J	0.115%
13	3-Buten-2-one	16	002-IN-H	1.1E-03	0.200	0.527%		J	0.115%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
13	3-Buten-2-one	2	002-EF-A	2.0E-04	0.200	0.101%	YES	U	0.115%
13	3-Buten-2-one	4	002-EF-B	2.2E-04	0.200	0.109%	YES	U	0.115%
13	3-Buten-2-one	6	002-EF-C	2.1E-04	0.200	0.103%	YES	U	0.115%
13	3-Buten-2-one	8	002-EF-D	2.1E-04	0.200	0.104%	YES	U	0.115%
13	3-Buten-2-one	10	002-EF-E	2.2E-04	0.200	0.111%	YES	U	0.115%
13	3-Buten-2-one	12	002-EF-F	2.1E-04	0.200	0.103%	YES	U	0.115%
13	3-Buten-2-one	14	002-EF-G	2.0E-04	0.200	0.101%	YES	U	0.115%
13	3-Buten-2-one	16	002-EF-H	2.1E-04	0.200	0.106%	YES	U	0.115%
14	Formaldehyde	2	001-IN-A	5.3E-03	0.300	1.78%			0.57%
14	Formaldehyde	4	001-IN-B	5.7E-03	0.300	1.89%			0.57%
14	Formaldehyde	6	001-IN-C	5.3E-03	0.300	1.75%			0.57%
14	Formaldehyde	8	001-IN-D	5.0E-03	0.300	1.66%			0.57%
14	Formaldehyde	10	001-IN-E	3.3E-03	0.300	1.09%			0.57%
14	Formaldehyde	12	001-IN-F	2.8E-03	0.300	0.945%			0.57%
14	Formaldehyde	14	001-IN-G	2.5E-03	0.300	0.833%			0.57%
14	Formaldehyde	16	001-IN-H	2.2E-03	0.300	0.746%			0.57%
14	Formaldehyde	2	001-EF-A	2.4E-03	0.300	0.805%			0.57%
14	Formaldehyde	4	001-EF-B	2.4E-03	0.300	0.790%			0.57%
14	Formaldehyde	6	001-EF-C	1.7E-03	0.300	0.556%	YES		0.57%
14	Formaldehyde	8	001-EF-D	1.7E-03	0.300	0.562%	YES		0.57%
14	Formaldehyde	10	001-EF-E	1.7E-03	0.300	0.558%	YES		0.57%
14	Formaldehyde	12	001-EF-F	1.7E-03	0.300	0.560%	YES		0.57%
14	Formaldehyde	14	001-EF-G	1.7E-03	0.300	0.553%	YES		0.57%
14	Formaldehyde	16	001-EF-H	1.7E-03	0.300	0.566%	YES		0.57%
14	Formaldehyde	2	002-IN-A	1.1E-02	0.300	**3.76%**			0.57%
14	Formaldehyde	4	002-IN-B	1.0E-02	0.300	**3.37%**			0.57%
14	Formaldehyde	6	002-IN-C	8.0E-03	0.300	**2.65%**			0.57%
14	Formaldehyde	8	002-IN-D	6.6E-03	0.300	**2.21%**			0.57%
14	Formaldehyde	10	002-IN-E	6.0E-03	0.300	2.00%			0.57%
14	Formaldehyde	12	002-IN-F	5.6E-03	0.300	1.86%			0.57%
14	Formaldehyde	14	002-IN-G	5.0E-03	0.300	1.68%			0.57%
14	Formaldehyde	16	002-IN-H	3.7E-03	0.300	1.23%			0.57%
14	Formaldehyde	2	002-EF-A	1.8E-03	0.300	0.610%			0.57%
14	Formaldehyde	4	002-EF-B	1.7E-03	0.300	0.554%			0.57%
14	Formaldehyde	6	002-EF-C	1.7E-03	0.300	0.557%	YES		0.57%
14	Formaldehyde	8	002-EF-D	1.6E-03	0.300	0.550%	YES		0.57%
14	Formaldehyde	10	002-EF-E	1.6E-03	0.300	0.544%	YES		0.57%
14	Formaldehyde	12	002-EF-F	1.6E-03	0.300	0.544%	YES		0.57%
14	Formaldehyde	14	002-EF-G	1.7E-03	0.300	0.553%	YES		0.57%
14	Formaldehyde	16	002-EF-H	1.7E-03	0.300	0.557%	YES		0.57%
15	Acetaldehyde	2	001-IN-A	5.7E-02	25.000	0.228%			0.0046%
15	Acetaldehyde	4	001-IN-B	6.1E-02	25.000	0.245%			0.0046%
15	Acetaldehyde	6	001-IN-C	5.6E-02	25.000	0.224%			0.0046%
15	Acetaldehyde	8	001-IN-D	5.9E-02	25.000	0.235%			0.0046%
15	Acetaldehyde	10	001-IN-E	6.0E-02	25.000	0.241%			0.0046%
15	Acetaldehyde	12	001-IN-F	6.2E-02	25.000	0.248%			0.0046%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
15	Acetaldehyde	14	001-IN-G	6.6E-02	25.000	0.264%			0.0046%
15	Acetaldehyde	16	001-IN-H	6.6E-02	25.000	0.264%			0.0046%
15	Acetaldehyde	2	001-EF-A	2.7E-02	25.000	0.110%			0.0046%
15	Acetaldehyde	4	001-EF-B	9.3E-03	25.000	0.037%			0.0046%
15	Acetaldehyde	6	001-EF-C	3.6E-02	25.000	0.145%			0.0046%
15	Acetaldehyde	8	001-EF-D	3.4E-02	25.000	0.138%			0.0046%
15	Acetaldehyde	10	001-EF-E	3.2E-02	25.000	0.128%			0.0046%
15	Acetaldehyde	12	001-EF-F	3.2E-02	25.000	0.128%			0.0046%
15	Acetaldehyde	14	001-EF-G	2.9E-02	25.000	0.118%			0.0046%
15	Acetaldehyde	16	001-EF-H	3.0E-02	25.000	0.120%			0.0046%
15	Acetaldehyde	2	002-IN-A	6.6E-02	25.000	0.264%			0.0046%
15	Acetaldehyde	4	002-IN-B	7.8E-02	25.000	0.313%			0.0046%
15	Acetaldehyde	6	002-IN-C	7.0E-02	25.000	0.280%			0.0046%
15	Acetaldehyde	8	002-IN-D	7.2E-02	25.000	0.289%			0.0046%
15	Acetaldehyde	10	002-IN-E	7.3E-02	25.000	0.290%			0.0046%
15	Acetaldehyde	12	002-IN-F	7.2E-02	25.000	0.287%			0.0046%
15	Acetaldehyde	14	002-IN-G	6.6E-02	25.000	0.266%			0.0046%
15	Acetaldehyde	16	002-IN-H	7.1E-02	25.000	0.282%			0.0046%
15	Acetaldehyde	2	002-EF-A	2.2E-02	25.000	0.089%			0.0046%
15	Acetaldehyde	4	002-EF-B	1.0E-02	25.000	0.041%			0.0046%
15	Acetaldehyde	6	002-EF-C	2.7E-02	25.000	0.109%			0.0046%
15	Acetaldehyde	8	002-EF-D	3.6E-02	25.000	0.144%			0.0046%
15	Acetaldehyde	10	002-EF-E	3.6E-02	25.000	0.142%			0.0046%
15	Acetaldehyde	12	002-EF-F	2.9E-02	25.000	0.116%			0.0046%
15	Acetaldehyde	14	002-EF-G	2.7E-02	25.000	0.108%			0.0046%
15	Acetaldehyde	16	002-EF-H	2.5E-02	25.000	0.100%			0.0046%
16	Butanal/Butyraldehyde	2	001-IN-A	1.1E-03	25.000	0.005%			0.0013%
16	Butanal/Butyraldehyde	4	001-IN-B	8.1E-04	25.000	0.003%		J	0.0013%
16	Butanal/Butyraldehyde	6	001-IN-C	1.6E-03	25.000	0.006%			0.0013%
16	Butanal/Butyraldehyde	8	001-IN-D	1.9E-03	25.000	0.007%			0.0013%
16	Butanal/Butyraldehyde	10	001-IN-E	2.5E-03	25.000	0.010%			0.0013%
16	Butanal/Butyraldehyde	12	001-IN-F	1.9E-03	25.000	0.008%			0.0013%
16	Butanal/Butyraldehyde	14	001-IN-G	1.3E-03	25.000	0.005%			0.0013%
16	Butanal/Butyraldehyde	16	001-IN-H	1.4E-03	25.000	0.005%			0.0013%
16	Butanal/Butyraldehyde	2	001-EF-A	2.9E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	4	001-EF-B	3.0E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	6	001-EF-C	3.2E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	8	001-EF-D	3.2E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	10	001-EF-E	3.2E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	12	001-EF-F	3.1E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	14	001-EF-G	3.1E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	16	001-EF-H	3.0E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	2	002-IN-A	1.2E-03	25.000	0.005%			0.0013%
16	Butanal/Butyraldehyde	4	002-IN-B	1.1E-03	25.000	0.004%			0.0013%
16	Butanal/Butyraldehyde	6	002-IN-C	1.3E-03	25.000	0.005%			0.0013%
16	Butanal/Butyraldehyde	8	002-IN-D	1.4E-03	25.000	0.006%			0.0013%
16	Butanal/Butyraldehyde	10	002-IN-E	1.5E-03	25.000	0.006%			0.0013%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
16	Butanal/Butyraldehyde	12	002-IN-F	1.6E-03	25.000	0.006%			0.0013%
16	Butanal/Butyraldehyde	14	002-IN-G	1.4E-03	25.000	0.006%			0.0013%
16	Butanal/Butyraldehyde	16	002-IN-H	2.0E-03	25.000	0.008%			0.0013%
16	Butanal/Butyraldehyde	2	002-EF-A	2.8E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	4	002-EF-B	3.1E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	6	002-EF-C	2.9E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	8	002-EF-D	2.9E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	10	002-EF-E	3.1E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	12	002-EF-F	2.9E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	14	002-EF-G	2.8E-04	25.000	0.001%	YES	U	0.0013%
16	Butanal/Butyraldehyde	16	002-EF-H	3.0E-04	25.000	0.001%	YES	U	0.0013%
19	2-Propenal/Acrolein	2	001-IN-A	8.9E-04	0.100	0.894%	YES		0.91%
19	2-Propenal/Acrolein	4	001-IN-B	8.9E-04	0.100	0.893%	YES		0.91%
19	2-Propenal/Acrolein	6	001-IN-C	8.8E-04	0.100	0.881%	YES		0.91%
19	2-Propenal/Acrolein	8	001-IN-D	8.9E-04	0.100	0.888%	YES		0.91%
19	2-Propenal/Acrolein	10	001-IN-E	8.8E-04	0.100	0.878%	YES		0.91%
19	2-Propenal/Acrolein	12	001-IN-F	9.0E-04	0.100	0.903%	YES		0.91%
19	2-Propenal/Acrolein	14	001-IN-G	8.9E-04	0.100	0.893%	YES		0.91%
19	2-Propenal/Acrolein	16	001-IN-H	8.9E-04	0.100	0.894%	YES		0.91%
19	2-Propenal/Acrolein	2	001-EF-A	9.0E-04	0.100	0.899%	YES		0.91%
19	2-Propenal/Acrolein	4	001-EF-B	8.9E-04	0.100	0.893%	YES		0.91%
19	2-Propenal/Acrolein	6	001-EF-C	8.9E-04	0.100	0.893%	YES		0.91%
19	2-Propenal/Acrolein	8	001-EF-D	9.0E-04	0.100	0.903%	YES		0.91%
19	2-Propenal/Acrolein	10	001-EF-E	9.0E-04	0.100	0.896%	YES		0.91%
19	2-Propenal/Acrolein	12	001-EF-F	9.0E-04	0.100	0.899%	YES		0.91%
19	2-Propenal/Acrolein	14	001-EF-G	8.9E-04	0.100	0.888%	YES		0.91%
19	2-Propenal/Acrolein	16	001-EF-H	9.1E-04	0.100	0.909%	YES		0.91%
19	2-Propenal/Acrolein	2	002-IN-A	8.6E-04	0.100	0.863%	YES		0.91%
19	2-Propenal/Acrolein	4	002-IN-B	9.0E-04	0.100	0.904%	YES		0.91%
19	2-Propenal/Acrolein	6	002-IN-C	8.9E-04	0.100	0.887%	YES		0.91%
19	2-Propenal/Acrolein	8	002-IN-D	8.9E-04	0.100	0.888%	YES		0.91%
19	2-Propenal/Acrolein	10	002-IN-E	8.9E-04	0.100	0.891%	YES		0.91%
19	2-Propenal/Acrolein	12	002-IN-F	8.8E-04	0.100	0.880%	YES		0.91%
19	2-Propenal/Acrolein	14	002-IN-G	9.0E-04	0.100	0.901%	YES		0.91%
19	2-Propenal/Acrolein	16	002-IN-H	8.9E-04	0.100	0.895%	YES		0.91%
19	2-Propenal/Acrolein	2	002-EF-A	8.9E-04	0.100	0.892%	YES		0.91%
19	2-Propenal/Acrolein	4	002-EF-B	8.9E-04	0.100	0.890%	YES		0.91%
19	2-Propenal/Acrolein	6	002-EF-C	9.0E-04	0.100	0.896%	YES		0.91%
19	2-Propenal/Acrolein	8	002-EF-D	8.8E-04	0.100	0.884%	YES		0.91%
19	2-Propenal/Acrolein	10	002-EF-E	8.7E-04	0.100	0.874%	YES		0.91%
19	2-Propenal/Acrolein	12	002-EF-F	8.7E-04	0.100	0.874%	YES		0.91%
19	2-Propenal/Acrolein	14	002-EF-G	8.9E-04	0.100	0.888%	YES		0.91%
19	2-Propenal/Acrolein	16	002-EF-H	9.0E-04	0.100	0.895%	YES		0.91%
20	Furan	2	001-IN-A	2.2E-05	0.001	2.24%	YES	U	2.56%
20	Furan	4	001-IN-B	2.3E-05	0.001	2.31%	YES	U	2.56%
20	Furan	6	001-IN-C	2.4E-05	0.001	2.36%	YES	U	2.56%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
20	Furan	8	001-IN-D	2.4E-05	0.001	2.43%	YES	U	2.56%
20	Furan	10	001-IN-E	2.5E-05	0.001	2.47%	YES	U	2.56%
20	Furan	12	001-IN-F	2.5E-05	0.001	2.51%	YES	U	2.56%
20	Furan	14	001-IN-G	2.5E-05	0.001	2.50%	YES	U	2.56%
20	Furan	16	001-IN-H	2.4E-05	0.001	2.37%	YES		2.56%
20	Furan	2	001-EF-A	2.3E-05	0.001	2.33%	YES	U	2.56%
20	Furan	4	001-EF-B	2.4E-05	0.001	2.35%	YES	U	2.56%
20	Furan	6	001-EF-C	2.4E-05	0.001	2.38%	YES	U	2.56%
20	Furan	8	001-EF-D	2.6E-05	0.001	2.56%	YES	U	2.56%
20	Furan	10	001-EF-E	2.3E-05	0.001	2.31%	YES	U	2.56%
20	Furan	12	001-EF-F	2.4E-05	0.001	2.40%	YES	U	2.56%
20	Furan	14	001-EF-G	2.5E-05	0.001	2.47%	YES	U	2.56%
20	Furan	16	001-EF-H	2.3E-05	0.001	2.32%	YES	U	2.56%
20	Furan	2	002-IN-A	2.3E-05	0.001	2.28%	YES	UY	2.56%
20	Furan	4	002-IN-B	2.4E-05	0.001	2.36%	YES	UY	2.56%
20	Furan	6	002-IN-C	2.5E-05	0.001	2.47%	YES	UY	2.56%
20	Furan	8	002-IN-D	2.4E-05	0.001	2.44%	YES	UY	2.56%
20	Furan	10	002-IN-E	2.5E-05	0.001	2.46%	YES	U	2.56%
20	Furan	12	002-IN-F	2.5E-05	0.001	2.49%	YES	UY	2.56%
20	Furan	14	002-IN-G	2.4E-05	0.001	2.36%	YES	UY	2.56%
20	Furan	16	002-IN-H	2.4E-05	0.001	2.37%	YES	U	2.56%
20	Furan	2	002-EF-A	2.2E-05	0.001	2.21%	YES	UY	2.56%
20	Furan	4	002-EF-B	2.3E-05	0.001	2.27%	YES	UY	2.56%
20	Furan	6	002-EF-C	2.4E-05	0.001	2.37%	YES	UY	2.56%
20	Furan	8	002-EF-D	2.4E-05	0.001	2.38%	YES	UY	2.56%
20	Furan	10	002-EF-E	2.4E-05	0.001	2.39%	YES	UY	2.56%
20	Furan	12	002-EF-F	2.4E-05	0.001	2.42%	YES	UY	2.56%
20	Furan	14	002-EF-G	2.4E-05	0.001	2.42%	YES	UY	2.56%
20	Furan	16	002-EF-H	2.4E-05	0.001	2.43%	YES	UY	2.56%
21	2,3-Dihydrofuran	2	001-IN-A	1.9E-05	0.001	1.91%	YES	U	2.18%
21	2,3-Dihydrofuran	4	001-IN-B	2.0E-05	0.001	1.97%	YES	U	2.18%
21	2,3-Dihydrofuran	6	001-IN-C	2.0E-05	0.001	2.01%	YES	U	2.18%
21	2,3-Dihydrofuran	8	001-IN-D	2.1E-05	0.001	2.07%	YES	U	2.18%
21	2,3-Dihydrofuran	10	001-IN-E	2.1E-05	0.001	2.11%	YES	U	2.18%
21	2,3-Dihydrofuran	12	001-IN-F	2.1E-05	0.001	2.14%	YES	U	2.18%
21	2,3-Dihydrofuran	14	001-IN-G	2.1E-05	0.001	2.13%	YES	U	2.18%
21	2,3-Dihydrofuran	16	001-IN-H	2.0E-05	0.001	2.02%	YES	U	2.18%
21	2,3-Dihydrofuran	2	001-EF-A	2.0E-05	0.001	1.99%	YES	U	2.18%
21	2,3-Dihydrofuran	4	001-EF-B	2.0E-05	0.001	2.00%	YES	U	2.18%
21	2,3-Dihydrofuran	6	001-EF-C	2.0E-05	0.001	2.03%	YES	U	2.18%
21	2,3-Dihydrofuran	8	001-EF-D	2.2E-05	0.001	2.18%	YES	U	2.18%
21	2,3-Dihydrofuran	10	001-EF-E	2.0E-05	0.001	1.97%	YES	U	2.18%
21	2,3-Dihydrofuran	12	001-EF-F	2.0E-05	0.001	2.04%	YES	U	2.18%
21	2,3-Dihydrofuran	14	001-EF-G	2.1E-05	0.001	2.10%	YES	U	2.18%
21	2,3-Dihydrofuran	16	001-EF-H	2.0E-05	0.001	1.98%	YES	U	2.18%
21	2,3-Dihydrofuran	2	002-IN-A	1.9E-05	0.001	1.95%	YES	UY	2.18%
21	2,3-Dihydrofuran	4	002-IN-B	2.0E-05	0.001	2.02%	YES	UY	2.18%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
21	2,3-Dihydrofuran	6	002-IN-C	2.1E-05	0.001	2.11%	YES	UY	2.18%
21	2,3-Dihydrofuran	8	002-IN-D	2.1E-05	0.001	2.08%	YES	UY	2.18%
21	2,3-Dihydrofuran	10	002-IN-E	2.1E-05	0.001	2.10%	YES	U	2.18%
21	2,3-Dihydrofuran	12	002-IN-F	2.1E-05	0.001	2.12%	YES	UY	2.18%
21	2,3-Dihydrofuran	14	002-IN-G	2.0E-05	0.001	2.01%	YES	UY	2.18%
21	2,3-Dihydrofuran	16	002-IN-H	2.0E-05	0.001	2.02%	YES	U	2.18%
21	2,3-Dihydrofuran	2	002-EF-A	1.9E-05	0.001	1.88%	YES	UY	2.18%
21	2,3-Dihydrofuran	4	002-EF-B	4.3E-05	0.001	4.25%		JY	2.18%
21	2,3-Dihydrofuran	6	002-EF-C	2.0E-05	0.001	2.02%	YES	UY	2.18%
21	2,3-Dihydrofuran	8	002-EF-D	2.0E-05	0.001	2.03%	YES	UY	2.18%
21	2,3-Dihydrofuran	10	002-EF-E	2.0E-05	0.001	2.04%	YES	UY	2.18%
21	2,3-Dihydrofuran	12	002-EF-F	2.1E-05	0.001	2.06%	YES	UY	2.18%
21	2,3-Dihydrofuran	14	002-EF-G	2.1E-05	0.001	2.07%	YES	UY	2.18%
21	2,3-Dihydrofuran	16	002-EF-H	2.1E-05	0.001	2.08%	YES	UY	2.18%
22	2,5-Dihydrofuran	2	001-IN-A	2.2E-05	0.001	2.23%	YES	U	2.55%
22	2,5-Dihydrofuran	4	001-IN-B	2.3E-05	0.001	2.30%	YES	U	2.55%
22	2,5-Dihydrofuran	6	001-IN-C	2.3E-05	0.001	2.35%	YES	U	2.55%
22	2,5-Dihydrofuran	8	001-IN-D	2.4E-05	0.001	2.42%	YES	U	2.55%
22	2,5-Dihydrofuran	10	001-IN-E	2.5E-05	0.001	2.46%	YES	U	2.55%
22	2,5-Dihydrofuran	12	001-IN-F	2.5E-05	0.001	2.50%	YES	U	2.55%
22	2,5-Dihydrofuran	14	001-IN-G	2.5E-05	0.001	2.48%	YES	U	2.55%
22	2,5-Dihydrofuran	16	001-IN-H	2.4E-05	0.001	2.36%	YES		2.55%
22	2,5-Dihydrofuran	2	001-EF-A	2.3E-05	0.001	2.32%	YES	U	2.55%
22	2,5-Dihydrofuran	4	001-EF-B	2.3E-05	0.001	2.34%	YES	U	2.55%
22	2,5-Dihydrofuran	6	001-EF-C	2.4E-05	0.001	2.37%	YES	U	2.55%
22	2,5-Dihydrofuran	8	001-EF-D	2.5E-05	0.001	2.55%	YES	U	2.55%
22	2,5-Dihydrofuran	10	001-EF-E	2.3E-05	0.001	2.30%	YES	U	2.55%
22	2,5-Dihydrofuran	12	001-EF-F	2.4E-05	0.001	2.38%	YES	U	2.55%
22	2,5-Dihydrofuran	14	001-EF-G	2.5E-05	0.001	2.45%	YES	U	2.55%
22	2,5-Dihydrofuran	16	001-EF-H	2.3E-05	0.001	2.31%	YES	U	2.55%
22	2,5-Dihydrofuran	2	002-IN-A	2.3E-05	0.001	2.27%	YES	UY	2.55%
22	2,5-Dihydrofuran	4	002-IN-B	2.4E-05	0.001	2.35%	YES	UY	2.55%
22	2,5-Dihydrofuran	6	002-IN-C	2.5E-05	0.001	2.46%	YES	UY	2.55%
22	2,5-Dihydrofuran	8	002-IN-D	2.4E-05	0.001	2.43%	YES	UY	2.55%
22	2,5-Dihydrofuran	10	002-IN-E	2.4E-05	0.001	2.45%	YES	U	2.55%
22	2,5-Dihydrofuran	12	002-IN-F	2.5E-05	0.001	2.48%	YES	UY	2.55%
22	2,5-Dihydrofuran	14	002-IN-G	2.3E-05	0.001	2.35%	YES	UY	2.55%
22	2,5-Dihydrofuran	16	002-IN-H	2.4E-05	0.001	2.35%	YES	U	2.55%
22	2,5-Dihydrofuran	2	002-EF-A	2.2E-05	0.001	2.19%	YES	UY	2.55%
22	2,5-Dihydrofuran	4	002-EF-B	2.3E-05	0.001	2.26%	YES	UY	2.55%
22	2,5-Dihydrofuran	6	002-EF-C	2.4E-05	0.001	2.36%	YES	UY	2.55%
22	2,5-Dihydrofuran	8	002-EF-D	2.4E-05	0.001	2.37%	YES	UY	2.55%
22	2,5-Dihydrofuran	10	002-EF-E	2.4E-05	0.001	2.38%	YES	UY	2.55%
22	2,5-Dihydrofuran	12	002-EF-F	2.4E-05	0.001	2.41%	YES	UY	2.55%
22	2,5-Dihydrofuran	14	002-EF-G	2.4E-05	0.001	2.41%	YES	UY	2.55%
22	2,5-Dihydrofuran	16	002-EF-H	2.4E-05	0.001	2.42%	YES	UY	2.55%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
23	2-Methylfuran	2	001-IN-A	2.9E-05	0.001	2.94%	YES	U	3.36%
23	2-Methylfuran	4	001-IN-B	3.0E-05	0.001	3.04%	YES	U	3.36%
23	2-Methylfuran	6	001-IN-C	3.1E-05	0.001	3.10%	YES	U	3.36%
23	2-Methylfuran	8	001-IN-D	3.2E-05	0.001	3.20%	YES	U	3.36%
23	2-Methylfuran	10	001-IN-E	3.2E-05	0.001	3.25%	YES	U	3.36%
23	2-Methylfuran	12	001-IN-F	3.3E-05	0.001	3.30%	YES	U	3.36%
23	2-Methylfuran	14	001-IN-G	3.3E-05	0.001	3.28%	YES	U	3.36%
23	2-Methylfuran	16	001-IN-H	3.1E-05	0.001	3.12%	YES		3.36%
23	2-Methylfuran	2	001-EF-A	3.1E-05	0.001	3.06%	YES	U	3.36%
23	2-Methylfuran	4	001-EF-B	3.1E-05	0.001	3.09%	YES	U	3.36%
23	2-Methylfuran	6	001-EF-C	3.1E-05	0.001	3.14%	YES	U	3.36%
23	2-Methylfuran	8	001-EF-D	3.4E-05	0.001	3.36%	YES	U	3.36%
23	2-Methylfuran	10	001-EF-E	3.0E-05	0.001	3.04%	YES	U	3.36%
23	2-Methylfuran	12	001-EF-F	3.2E-05	0.001	3.15%	YES	U	3.36%
23	2-Methylfuran	14	001-EF-G	3.2E-05	0.001	3.24%	YES	U	3.36%
23	2-Methylfuran	16	001-EF-H	3.0E-05	0.001	3.05%	YES	U	3.36%
23	2-Methylfuran	2	002-IN-A	3.0E-05	0.001	3.00%	YES	UY	3.36%
23	2-Methylfuran	4	002-IN-B	3.1E-05	0.001	3.11%	YES	UY	3.36%
23	2-Methylfuran	6	002-IN-C	3.2E-05	0.001	3.25%	YES	UY	3.36%
23	2-Methylfuran	8	002-IN-D	3.2E-05	0.001	3.21%	YES	UY	3.36%
23	2-Methylfuran	10	002-IN-E	3.2E-05	0.001	3.23%	YES	U	3.36%
23	2-Methylfuran	12	002-IN-F	3.3E-05	0.001	3.27%	YES	UY	3.36%
23	2-Methylfuran	14	002-IN-G	3.1E-05	0.001	3.10%	YES	UY	3.36%
23	2-Methylfuran	16	002-IN-H	3.1E-05	0.001	3.11%	YES	U	3.36%
23	2-Methylfuran	2	002-EF-A	2.9E-05	0.001	2.90%	YES	UY	3.36%
23	2-Methylfuran	4	002-EF-B	3.0E-05	0.001	2.99%	YES	UY	3.36%
23	2-Methylfuran	6	002-EF-C	3.1E-05	0.001	3.11%	YES	UY	3.36%
23	2-Methylfuran	8	002-EF-D	3.1E-05	0.001	3.13%	YES	UY	3.36%
23	2-Methylfuran	10	002-EF-E	3.1E-05	0.001	3.14%	YES	UY	3.36%
23	2-Methylfuran	12	002-EF-F	3.2E-05	0.001	3.18%	YES	UY	3.36%
23	2-Methylfuran	14	002-EF-G	3.2E-05	0.001	3.19%	YES	UY	3.36%
23	2-Methylfuran	16	002-EF-H	3.2E-05	0.001	3.20%	YES	UY	3.36%
24	2,5-Dimethylfuran	2	001-IN-A	3.6E-05	0.001	3.59%	YES	U	4.11%
24	2,5-Dimethylfuran	4	001-IN-B	3.7E-05	0.001	3.71%	YES	U	4.11%
24	2,5-Dimethylfuran	6	001-IN-C	3.8E-05	0.001	3.79%	YES	U	4.11%
24	2,5-Dimethylfuran	8	001-IN-D	3.9E-05	0.001	3.91%	YES	U	4.11%
24	2,5-Dimethylfuran	10	001-IN-E	4.0E-05	0.001	3.97%	YES	U	4.11%
24	2,5-Dimethylfuran	12	001-IN-F	4.0E-05	0.001	4.03%	YES	U	4.11%
24	2,5-Dimethylfuran	14	001-IN-G	4.0E-05	0.001	4.01%	YES	U	4.11%
24	2,5-Dimethylfuran	16	001-IN-H	3.8E-05	0.001	3.81%	YES		4.11%
24	2,5-Dimethylfuran	2	001-EF-A	3.7E-05	0.001	3.74%	YES	U	4.11%
24	2,5-Dimethylfuran	4	001-EF-B	3.8E-05	0.001	3.78%	YES	U	4.11%
24	2,5-Dimethylfuran	6	001-EF-C	3.8E-05	0.001	3.83%	YES	U	4.11%
24	2,5-Dimethylfuran	8	001-EF-D	4.1E-05	0.001	4.11%	YES	U	4.11%
24	2,5-Dimethylfuran	10	001-EF-E	3.7E-05	0.001	3.71%	YES	U	4.11%
24	2,5-Dimethylfuran	12	001-EF-F	3.9E-05	0.001	3.85%	YES	U	4.11%
24	2,5-Dimethylfuran	14	001-EF-G	4.0E-05	0.001	3.96%	YES	U	4.11%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
24	2,5-Dimethylfuran	16	001-EF-H	3.7E-05	0.001	3.72%	YES	U	4.11%
24	2,5-Dimethylfuran	2	002-IN-A	3.7E-05	0.001	3.66%	YES	UY	4.11%
24	2,5-Dimethylfuran	4	002-IN-B	3.8E-05	0.001	3.80%	YES	UY	4.11%
24	2,5-Dimethylfuran	6	002-IN-C	4.0E-05	0.001	3.97%	YES	UY	4.11%
24	2,5-Dimethylfuran	8	002-IN-D	3.9E-05	0.001	3.92%	YES	UY	4.11%
24	2,5-Dimethylfuran	10	002-IN-E	4.0E-05	0.001	3.95%	YES	U	4.11%
24	2,5-Dimethylfuran	12	002-IN-F	4.0E-05	0.001	4.00%	YES	UY	4.11%
24	2,5-Dimethylfuran	14	002-IN-G	3.8E-05	0.001	3.79%	YES	UY	4.11%
24	2,5-Dimethylfuran	16	002-IN-H	3.8E-05	0.001	3.80%	YES	U	4.11%
24	2,5-Dimethylfuran	2	002-EF-A	3.5E-05	0.001	3.54%	YES	UY	4.11%
24	2,5-Dimethylfuran	4	002-EF-B	3.7E-05	0.001	3.65%	YES	UY	4.11%
24	2,5-Dimethylfuran	6	002-EF-C	3.8E-05	0.001	3.80%	YES	UY	4.11%
24	2,5-Dimethylfuran	8	002-EF-D	3.8E-05	0.001	3.83%	YES	UY	4.11%
24	2,5-Dimethylfuran	10	002-EF-E	3.8E-05	0.001	3.84%	YES	UY	4.11%
24	2,5-Dimethylfuran	12	002-EF-F	3.9E-05	0.001	3.88%	YES	UY	4.11%
24	2,5-Dimethylfuran	14	002-EF-G	3.9E-05	0.001	3.89%	YES	UY	4.11%
24	2,5-Dimethylfuran	16	002-EF-H	3.9E-05	0.001	3.91%	YES	UY	4.11%
28	2-Pentylfuran	2	001-IN-A	5.1E-05	0.001	5.11%		J	3.38%
28	2-Pentylfuran	4	001-IN-B	3.1E-05	0.001	3.06%	YES	U	3.38%
28	2-Pentylfuran	6	001-IN-C	3.1E-05	0.001	3.12%	YES	U	3.38%
28	2-Pentylfuran	8	001-IN-D	3.2E-05	0.001	3.21%	YES	U	3.38%
28	2-Pentylfuran	10	001-IN-E	3.3E-05	0.001	3.27%	YES	U	3.38%
28	2-Pentylfuran	12	001-IN-F	3.3E-05	0.001	3.32%	YES	U	3.38%
28	2-Pentylfuran	14	001-IN-G	3.3E-05	0.001	3.30%	YES	U	3.38%
28	2-Pentylfuran	16	001-IN-H	3.1E-05	0.001	3.13%	YES		3.38%
28	2-Pentylfuran	2	001-EF-A	3.1E-05	0.001	3.08%	YES	U	3.38%
28	2-Pentylfuran	4	001-EF-B	3.1E-05	0.001	3.11%	YES	U	3.38%
28	2-Pentylfuran	6	001-EF-C	3.2E-05	0.001	3.15%	YES	U	3.38%
28	2-Pentylfuran	8	001-EF-D	3.4E-05	0.001	3.38%	YES	U	3.38%
28	2-Pentylfuran	10	001-EF-E	3.1E-05	0.001	3.05%	YES	U	3.38%
28	2-Pentylfuran	12	001-EF-F	3.2E-05	0.001	3.17%	YES	U	3.38%
28	2-Pentylfuran	14	001-EF-G	3.3E-05	0.001	3.26%	YES	U	3.38%
28	2-Pentylfuran	16	001-EF-H	3.1E-05	0.001	3.06%	YES	U	3.38%
28	2-Pentylfuran	2	002-IN-A	6.9E-05	0.001	6.85%		JY	3.38%
28	2-Pentylfuran	4	002-IN-B	4.5E-05	0.001	4.55%		JY	3.38%
28	2-Pentylfuran	6	002-IN-C	3.3E-05	0.001	3.26%	YES	UY	3.38%
28	2-Pentylfuran	8	002-IN-D	3.2E-05	0.001	3.23%	YES	UY	3.38%
28	2-Pentylfuran	10	002-IN-E	3.3E-05	0.001	3.25%	YES	U	3.38%
28	2-Pentylfuran	12	002-IN-F	3.3E-05	0.001	3.29%	YES	UY	3.38%
28	2-Pentylfuran	14	002-IN-G	3.1E-05	0.001	3.12%	YES	UY	3.38%
28	2-Pentylfuran	16	002-IN-H	3.1E-05	0.001	3.13%	YES	U	3.38%
28	2-Pentylfuran	2	002-EF-A	5.0E-05	0.001	5.03%		JY	3.38%
28	2-Pentylfuran	4	002-EF-B	3.0E-05	0.001	3.00%	YES	UY	3.38%
28	2-Pentylfuran	6	002-EF-C	3.1E-05	0.001	3.13%	YES	UY	3.38%
28	2-Pentylfuran	8	002-EF-D	3.1E-05	0.001	3.15%	YES	UY	3.38%
28	2-Pentylfuran	10	002-EF-E	3.2E-05	0.001	3.16%	YES	UY	3.38%
28	2-Pentylfuran	12	002-EF-F	3.2E-05	0.001	3.20%	YES	UY	3.38%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
28	2-Pentylfuran	14	002-EF-G	3.2E-05	0.001	3.20%	YES	UY	3.38%
28	2-Pentylfuran	16	002-EF-H	3.2E-05	0.001	3.22%	YES	UY	3.38%
29	2-Heptylfuran	2	001-IN-A	2.2E-05	0.001	2.23%	YES	U	2.56%
29	2-Heptylfuran	4	001-IN-B	2.3E-05	0.001	2.31%	YES	U	2.56%
29	2-Heptylfuran	6	001-IN-C	2.4E-05	0.001	2.36%	YES	U	2.56%
29	2-Heptylfuran	8	001-IN-D	2.4E-05	0.001	2.43%	YES	U	2.56%
29	2-Heptylfuran	10	001-IN-E	2.5E-05	0.001	2.47%	YES	U	2.56%
29	2-Heptylfuran	12	001-IN-F	2.5E-05	0.001	2.51%	YES	U	2.56%
29	2-Heptylfuran	14	001-IN-G	2.5E-05	0.001	2.49%	YES	U	2.56%
29	2-Heptylfuran	16	001-IN-H	2.4E-05	0.001	2.37%	YES		2.56%
29	2-Heptylfuran	2	001-EF-A	2.3E-05	0.001	2.33%	YES	U	2.56%
29	2-Heptylfuran	4	001-EF-B	2.3E-05	0.001	2.35%	YES	U	2.56%
29	2-Heptylfuran	6	001-EF-C	2.4E-05	0.001	2.38%	YES	U	2.56%
29	2-Heptylfuran	8	001-EF-D	2.6E-05	0.001	2.56%	YES	U	2.56%
29	2-Heptylfuran	10	001-EF-E	2.3E-05	0.001	2.31%	YES	U	2.56%
29	2-Heptylfuran	12	001-EF-F	2.4E-05	0.001	2.39%	YES	U	2.56%
29	2-Heptylfuran	14	001-EF-G	2.5E-05	0.001	2.46%	YES	U	2.56%
29	2-Heptylfuran	16	001-EF-H	2.3E-05	0.001	2.32%	YES	U	2.56%
29	2-Heptylfuran	2	002-IN-A	2.3E-05	0.001	2.28%	YES	UY	2.56%
29	2-Heptylfuran	4	002-IN-B	2.4E-05	0.001	2.36%	YES	UY	2.56%
29	2-Heptylfuran	6	002-IN-C	2.5E-05	0.001	2.47%	YES	UY	2.56%
29	2-Heptylfuran	8	002-IN-D	2.4E-05	0.001	2.44%	YES	UY	2.56%
29	2-Heptylfuran	10	002-IN-E	2.5E-05	0.001	2.46%	YES	U	2.56%
29	2-Heptylfuran	12	002-IN-F	2.5E-05	0.001	2.48%	YES	UY	2.56%
29	2-Heptylfuran	14	002-IN-G	2.4E-05	0.001	2.36%	YES	UY	2.56%
29	2-Heptylfuran	16	002-IN-H	2.4E-05	0.001	2.36%	YES	U	2.56%
29	2-Heptylfuran	2	002-EF-A	2.2E-05	0.001	2.20%	YES	UY	2.56%
29	2-Heptylfuran	4	002-EF-B	2.3E-05	0.001	2.27%	YES	UY	2.56%
29	2-Heptylfuran	6	002-EF-C	2.4E-05	0.001	2.36%	YES	UY	2.56%
29	2-Heptylfuran	8	002-EF-D	2.4E-05	0.001	2.38%	YES	UY	2.56%
29	2-Heptylfuran	10	002-EF-E	2.4E-05	0.001	2.39%	YES	UY	2.56%
29	2-Heptylfuran	12	002-EF-F	2.4E-05	0.001	2.41%	YES	UY	2.56%
29	2-Heptylfuran	14	002-EF-G	2.4E-05	0.001	2.42%	YES	UY	2.56%
29	2-Heptylfuran	16	002-EF-H	2.4E-05	0.001	2.43%	YES	UY	2.56%
30	2-Propylfuran	2	001-IN-A	2.2E-05	0.001	2.23%	YES	U	2.55%
30	2-Propylfuran	4	001-IN-B	2.3E-05	0.001	2.30%	YES	U	2.55%
30	2-Propylfuran	6	001-IN-C	2.3E-05	0.001	2.35%	YES	U	2.55%
30	2-Propylfuran	8	001-IN-D	2.4E-05	0.001	2.42%	YES	U	2.55%
30	2-Propylfuran	10	001-IN-E	2.5E-05	0.001	2.46%	YES	U	2.55%
30	2-Propylfuran	12	001-IN-F	2.5E-05	0.001	2.50%	YES	U	2.55%
30	2-Propylfuran	14	001-IN-G	2.5E-05	0.001	2.48%	YES	U	2.55%
30	2-Propylfuran	16	001-IN-H	2.4E-05	0.001	2.36%	YES		2.55%
30	2-Propylfuran	2	001-EF-A	2.3E-05	0.001	2.32%	YES	U	2.55%
30	2-Propylfuran	4	001-EF-B	2.3E-05	0.001	2.34%	YES	U	2.55%
30	2-Propylfuran	6	001-EF-C	2.4E-05	0.001	2.37%	YES	U	2.55%
30	2-Propylfuran	8	001-EF-D	2.5E-05	0.001	2.55%	YES	U	2.55%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
30	2-Propylfuran	10	001-EF-E	2.3E-05	0.001	2.30%	YES	U	2.55%
30	2-Propylfuran	12	001-EF-F	2.4E-05	0.001	2.38%	YES	U	2.55%
30	2-Propylfuran	14	001-EF-G	2.5E-05	0.001	2.45%	YES	U	2.55%
30	2-Propylfuran	16	001-EF-H	2.3E-05	0.001	2.31%	YES	U	2.55%
30	2-Propylfuran	2	002-IN-A	2.3E-05	0.001	2.27%	YES	UY	2.55%
30	2-Propylfuran	4	002-IN-B	2.4E-05	0.001	2.35%	YES	UY	2.55%
30	2-Propylfuran	6	002-IN-C	2.5E-05	0.001	2.46%	YES	UY	2.55%
30	2-Propylfuran	8	002-IN-D	2.4E-05	0.001	2.43%	YES	UY	2.55%
30	2-Propylfuran	10	002-IN-E	2.4E-05	0.001	2.45%	YES	U	2.55%
30	2-Propylfuran	12	002-IN-F	2.5E-05	0.001	2.47%	YES	UY	2.55%
30	2-Propylfuran	14	002-IN-G	2.3E-05	0.001	2.35%	YES	UY	2.55%
30	2-Propylfuran	16	002-IN-H	2.4E-05	0.001	2.35%	YES	U	2.55%
30	2-Propylfuran	2	002-EF-A	2.2E-05	0.001	2.19%	YES	UY	2.55%
30	2-Propylfuran	4	002-EF-B	2.3E-05	0.001	2.26%	YES	UY	2.55%
30	2-Propylfuran	6	002-EF-C	2.4E-05	0.001	2.36%	YES	UY	2.55%
30	2-Propylfuran	8	002-EF-D	2.4E-05	0.001	2.37%	YES	UY	2.55%
30	2-Propylfuran	10	002-EF-E	2.4E-05	0.001	2.38%	YES	UY	2.55%
30	2-Propylfuran	12	002-EF-F	2.4E-05	0.001	2.41%	YES	UY	2.55%
30	2-Propylfuran	14	002-EF-G	2.4E-05	0.001	2.41%	YES	UY	2.55%
30	2-Propylfuran	16	002-EF-H	2.4E-05	0.001	2.42%	YES	UY	2.55%
34	Diethylphthalate	2	001-IN-A	1.9E-04	0.543	0.035%	YES	U	0.04%
34	Diethylphthalate	4	001-IN-B	1.9E-04	0.543	0.036%	YES	U	0.04%
34	Diethylphthalate	6	001-IN-C	1.8E-04	0.543	0.034%	YES	U	0.04%
34	Diethylphthalate	8	001-IN-D	1.9E-04	0.543	0.035%	YES	U	0.04%
34	Diethylphthalate	10	001-IN-E	2.0E-04	0.543	0.037%	YES	U	0.04%
34	Diethylphthalate	12	001-IN-F	1.9E-04	0.543	0.034%	YES	U	0.04%
34	Diethylphthalate	14	001-IN-G	1.9E-04	0.543	0.034%	YES	U	0.04%
34	Diethylphthalate	16	001-IN-H	1.9E-04	0.543	0.035%	YES	U	0.04%
34	Diethylphthalate	2	001-EF-A	1.8E-04	0.543	0.033%	YES	U	0.04%
34	Diethylphthalate	4	001-EF-B	1.9E-04	0.543	0.035%	YES	U	0.04%
34	Diethylphthalate	6	001-EF-C	1.9E-04	0.543	0.035%	YES	U	0.04%
34	Diethylphthalate	8	001-EF-D	2.0E-04	0.543	0.037%	YES	U	0.04%
34	Diethylphthalate	10	001-EF-E	2.0E-04	0.543	0.037%	YES	U	0.04%
34	Diethylphthalate	12	001-EF-F	2.0E-04	0.543	0.036%	YES	U	0.04%
34	Diethylphthalate	14	001-EF-G	1.9E-04	0.543	0.035%	YES	U	0.04%
34	Diethylphthalate	16	001-EF-H	1.9E-04	0.543	0.034%	YES	U	0.04%
34	Diethylphthalate	2	002-IN-A	1.8E-04	0.543	0.034%	YES	U	0.04%
34	Diethylphthalate	4	002-IN-B	1.8E-04	0.543	0.033%	YES	U	0.04%
34	Diethylphthalate	6	002-IN-C	1.9E-04	0.543	0.035%	YES	U	0.04%
34	Diethylphthalate	8	002-IN-D	1.9E-04	0.543	0.036%	YES	U	0.04%
34	Diethylphthalate	10	002-IN-E	2.0E-04	0.543	0.038%	YES	U	0.04%
34	Diethylphthalate	12	002-IN-F	1.9E-04	0.543	0.035%	YES	U	0.04%
34	Diethylphthalate	14	002-IN-G	1.9E-04	0.543	0.036%	YES	U	0.04%
34	Diethylphthalate	16	002-IN-H	1.9E-04	0.543	0.034%	YES	U	0.04%
34	Diethylphthalate	2	002-EF-A	1.8E-04	0.543	0.033%	YES	U	0.04%
34	Diethylphthalate	4	002-EF-B	1.8E-04	0.543	0.033%	YES	U	0.04%
34	Diethylphthalate	6	002-EF-C	1.8E-04	0.543	0.033%	YES	U	0.04%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
34	Diethylphthalate	8	002-EF-D	1.9E-04	0.543	0.036%	YES	U	0.04%
34	Diethylphthalate	10	002-EF-E	1.9E-04	0.543	0.035%	YES	U	0.04%
34	Diethylphthalate	12	002-EF-F	1.8E-04	0.543	0.034%	YES	U	0.04%
34	Diethylphthalate	14	002-EF-G	1.8E-04	0.543	0.034%	YES	U	0.04%
34	Diethylphthalate	16	002-EF-H	1.9E-04	0.543	0.035%	YES	U	0.04%
35	Acetonitrile	2	001-IN-A	3.3E-01	20.000	1.65%		E	0.0023%
35	Acetonitrile	4	001-IN-B	1.9E-01	20.000	0.930%		E	0.0023%
35	Acetonitrile	6	001-IN-C	1.4E-01	20.000	0.699%		E	0.0023%
35	Acetonitrile	8	001-IN-D	2.2E-01	20.000	1.11%		E	0.0023%
35	Acetonitrile	10	001-IN-E	1.4E-01	20.000	0.701%		E	0.0023%
35	Acetonitrile	12	001-IN-F	2.0E-01	20.000	1.01%		E	0.0023%
35	Acetonitrile	14	001-IN-G	2.7E-01	20.000	1.37%		E	0.0023%
35	Acetonitrile	16	001-IN-H	4.0E-01	20.000	2.01%		E	0.0023%
35	Acetonitrile	2	001-EF-A	5.7E-02	20.000	0.284%		E	0.0023%
35	Acetonitrile	4	001-EF-B	1.2E-01	20.000	0.590%		E	0.0023%
35	Acetonitrile	6	001-EF-C	1.1E-01	20.000	0.550%		E	0.0023%
35	Acetonitrile	8	001-EF-D	3.1E-01	20.000	1.57%		E	0.0023%
35	Acetonitrile	10	001-EF-E	1.7E-01	20.000	0.865%		E	0.0023%
35	Acetonitrile	12	001-EF-F	1.9E-01	20.000	0.968%		E	0.0023%
35	Acetonitrile	14	001-EF-G	3.1E-01	20.000	1.53%		E	0.0023%
35	Acetonitrile	16	001-EF-H	3.1E-01	20.000	1.55%		E	0.0023%
35	Acetonitrile	2	002-IN-A	1.3E-01	20.000	0.670%		E	0.0023%
35	Acetonitrile	4	002-IN-B	4.3E-01	20.000	2.13%		E	0.0023%
35	Acetonitrile	6	002-IN-C	1.8E-01	20.000	0.911%		E	0.0023%
35	Acetonitrile	8	002-IN-D	2.9E-01	20.000	1.45%		E	0.0023%
35	Acetonitrile	10	002-IN-E	1.4E-01	20.000	0.705%		E	0.0023%
35	Acetonitrile	12	002-IN-F	1.6E-01	20.000	0.795%		E	0.0023%
35	Acetonitrile	14	002-IN-G	1.7E-01	20.000	0.845%		E	0.0023%
35	Acetonitrile	16	002-IN-H	2.6E-01	20.000	1.28%		E	0.0023%
35	Acetonitrile	2	002-EF-A	6.2E-01	20.000	3.09%		E	0.0023%
35	Acetonitrile	4	002-EF-B	1.6E-01	20.000	0.822%		E	0.0023%
35	Acetonitrile	6	002-EF-C	3.0E-01	20.000	1.48%		E	0.0023%
35	Acetonitrile	8	002-EF-D	4.7E-01	20.000	2.34%		EY	0.0023%
35	Acetonitrile	10	002-EF-E	1.8E-01	20.000	0.911%		E	0.0023%
35	Acetonitrile	12	002-EF-F	1.4E-01	20.000	0.706%		E	0.0023%
35	Acetonitrile	14	002-EF-G	1.5E-01	20.000	0.762%		E	0.0023%
35	Acetonitrile	16	002-EF-H	1.6E-01	20.000	0.795%		E	0.0023%
36	Propanenitrile	2	001-IN-A	1.9E-03	6.000	0.032%			0.0063%
36	Propanenitrile	4	001-IN-B	1.6E-03	6.000	0.027%			0.0063%
36	Propanenitrile	6	001-IN-C	2.2E-03	6.000	0.037%			0.0063%
36	Propanenitrile	8	001-IN-D	2.8E-03	6.000	0.046%			0.0063%
36	Propanenitrile	10	001-IN-E	2.5E-03	6.000	0.042%			0.0063%
36	Propanenitrile	12	001-IN-F	2.4E-03	6.000	0.041%			0.0063%
36	Propanenitrile	14	001-IN-G	2.6E-03	6.000	0.043%			0.0063%
36	Propanenitrile	16	001-IN-H	2.4E-03	6.000	0.041%			0.0063%
36	Propanenitrile	2	001-EF-A	3.4E-04	6.000	0.006%	YES	U	0.0063%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
36	Propanenitrile	4	001-EF-B	3.5E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	6	001-EF-C	3.7E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	8	001-EF-D	3.7E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	10	001-EF-E	3.8E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	12	001-EF-F	3.6E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	14	001-EF-G	3.7E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	16	001-EF-H	3.5E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	2	002-IN-A	1.1E-03	6.000	0.018%		J	0.0063%
36	Propanenitrile	4	002-IN-B	1.8E-03	6.000	0.029%			0.0063%
36	Propanenitrile	6	002-IN-C	2.2E-03	6.000	0.036%			0.0063%
36	Propanenitrile	8	002-IN-D	1.9E-03	6.000	0.032%			0.0063%
36	Propanenitrile	10	002-IN-E	2.0E-03	6.000	0.033%			0.0063%
36	Propanenitrile	12	002-IN-F	2.2E-03	6.000	0.036%			0.0063%
36	Propanenitrile	14	002-IN-G	2.1E-03	6.000	0.034%			0.0063%
36	Propanenitrile	16	002-IN-H	2.6E-03	6.000	0.043%			0.0063%
36	Propanenitrile	2	002-EF-A	3.3E-04	6.000	0.005%	YES	U	0.0063%
36	Propanenitrile	4	002-EF-B	3.6E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	6	002-EF-C	3.4E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	8	002-EF-D	3.4E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	10	002-EF-E	3.6E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	12	002-EF-F	3.4E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	14	002-EF-G	3.3E-04	6.000	0.006%	YES	U	0.0063%
36	Propanenitrile	16	002-EF-H	3.4E-04	6.000	0.006%	YES	U	0.0063%
37	Butanenitrile	2	001-IN-A	2.3E-03	8.000	0.029%			0.0021%
37	Butanenitrile	4	001-IN-B	2.1E-03	8.000	0.027%			0.0021%
37	Butanenitrile	6	001-IN-C	3.6E-03	8.000	0.045%			0.0021%
37	Butanenitrile	8	001-IN-D	4.1E-03	8.000	0.052%			0.0021%
37	Butanenitrile	10	001-IN-E	2.6E-03	8.000	0.032%			0.0021%
37	Butanenitrile	12	001-IN-F	2.3E-03	8.000	0.029%			0.0021%
37	Butanenitrile	14	001-IN-G	2.2E-03	8.000	0.027%			0.0021%
37	Butanenitrile	16	001-IN-H	3.7E-03	8.000	0.047%			0.0021%
37	Butanenitrile	2	001-EF-A	1.5E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	4	001-EF-B	1.6E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	6	001-EF-C	1.7E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	8	001-EF-D	1.7E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	10	001-EF-E	1.7E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	12	001-EF-F	1.6E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	14	001-EF-G	1.6E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	16	001-EF-H	1.6E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	2	002-IN-A	2.0E-03	8.000	0.025%			0.0021%
37	Butanenitrile	4	002-IN-B	1.8E-03	8.000	0.023%			0.0021%
37	Butanenitrile	6	002-IN-C	2.5E-03	8.000	0.032%			0.0021%
37	Butanenitrile	8	002-IN-D	2.6E-03	8.000	0.032%			0.0021%
37	Butanenitrile	10	002-IN-E	2.5E-03	8.000	0.031%			0.0021%
37	Butanenitrile	12	002-IN-F	2.6E-03	8.000	0.032%			0.0021%
37	Butanenitrile	14	002-IN-G	2.2E-03	8.000	0.027%			0.0021%
37	Butanenitrile	16	002-IN-H	2.9E-03	8.000	0.036%			0.0021%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
37	Butanenitrile	2	002-EF-A	1.5E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	4	002-EF-B	1.6E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	6	002-EF-C	1.5E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	8	002-EF-D	1.5E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	10	002-EF-E	1.6E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	12	002-EF-F	1.5E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	14	002-EF-G	1.5E-04	8.000	0.002%	YES	U	0.0021%
37	Butanenitrile	16	002-EF-H	1.5E-04	8.000	0.002%	YES	U	0.0021%
38	Pentanenitrile	2	001-IN-A	1.2E-03	6.000	0.020%			0.0018%
38	Pentanenitrile	4	001-IN-B	1.1E-03	6.000	0.019%			0.0018%
38	Pentanenitrile	6	001-IN-C	2.5E-03	6.000	0.042%		Q	0.0018%
38	Pentanenitrile	8	001-IN-D	3.0E-03	6.000	0.050%		Q	0.0018%
38	Pentanenitrile	10	001-IN-E	1.5E-03	6.000	0.025%			0.0018%
38	Pentanenitrile	12	001-IN-F	1.3E-03	6.000	0.022%			0.0018%
38	Pentanenitrile	14	001-IN-G	1.1E-03	6.000	0.019%			0.0018%
38	Pentanenitrile	16	001-IN-H	2.2E-03	6.000	0.037%		Q	0.0018%
38	Pentanenitrile	2	001-EF-A	9.8E-05	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	4	001-EF-B	1.0E-04	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	6	001-EF-C	1.1E-04	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	8	001-EF-D	1.1E-04	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	10	001-EF-E	1.1E-04	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	12	001-EF-F	1.0E-04	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	14	001-EF-G	1.7E-04	6.000	0.003%		JQ	0.0018%
38	Pentanenitrile	16	001-EF-H	1.0E-04	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	2	002-IN-A	1.2E-03	6.000	0.019%			0.0018%
38	Pentanenitrile	4	002-IN-B	1.3E-03	6.000	0.022%			0.0018%
38	Pentanenitrile	6	002-IN-C	1.3E-03	6.000	0.022%			0.0018%
38	Pentanenitrile	8	002-IN-D	1.6E-03	6.000	0.027%			0.0018%
38	Pentanenitrile	10	002-IN-E	1.5E-03	6.000	0.026%			0.0018%
38	Pentanenitrile	12	002-IN-F	1.8E-03	6.000	0.030%			0.0018%
38	Pentanenitrile	14	002-IN-G	1.7E-03	6.000	0.029%			0.0018%
38	Pentanenitrile	16	002-IN-H	1.9E-03	6.000	0.031%			0.0018%
38	Pentanenitrile	2	002-EF-A	9.5E-05	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	4	002-EF-B	1.0E-04	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	6	002-EF-C	9.8E-05	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	8	002-EF-D	9.8E-05	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	10	002-EF-E	1.0E-04	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	12	002-EF-F	9.8E-05	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	14	002-EF-G	9.6E-05	6.000	0.002%	YES	U	0.0018%
38	Pentanenitrile	16	002-EF-H	1.0E-04	6.000	0.002%	YES	U	0.0018%
39	Hexanenitrile	2	001-IN-A	6.1E-04	6.000	0.010%		J	0.0025%
39	Hexanenitrile	4	001-IN-B	8.5E-04	6.000	0.014%			0.0025%
39	Hexanenitrile	6	001-IN-C	6.6E-04	6.000	0.011%		JQ	0.0025%
39	Hexanenitrile	8	001-IN-D	5.8E-04	6.000	0.010%		JQ	0.0025%
39	Hexanenitrile	10	001-IN-E	9.1E-04	6.000	0.015%			0.0025%
39	Hexanenitrile	12	001-IN-F	8.5E-04	6.000	0.014%			0.0025%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
39	Hexanenitrile	14	001-IN-G	7.7E-04	6.000	0.013%		J	0.0025%
39	Hexanenitrile	16	001-IN-H	6.2E-04	6.000	0.010%		JQ	0.0025%
39	Hexanenitrile	2	001-EF-A	1.4E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	4	001-EF-B	1.4E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	6	001-EF-C	1.5E-04	6.000	0.003%	YES	U	0.0025%
39	Hexanenitrile	8	001-EF-D	1.5E-04	6.000	0.003%	YES	U	0.0025%
39	Hexanenitrile	10	001-EF-E	1.5E-04	6.000	0.003%	YES	U	0.0025%
39	Hexanenitrile	12	001-EF-F	1.4E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	14	001-EF-G	1.5E-04	6.000	0.002%	YES	QU	0.0025%
39	Hexanenitrile	16	001-EF-H	1.4E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	2	002-IN-A	8.1E-04	6.000	0.013%			0.0025%
39	Hexanenitrile	4	002-IN-B	9.3E-04	6.000	0.016%			0.0025%
39	Hexanenitrile	6	002-IN-C	1.1E-03	6.000	0.018%			0.0025%
39	Hexanenitrile	8	002-IN-D	1.2E-03	6.000	0.020%			0.0025%
39	Hexanenitrile	10	002-IN-E	1.1E-03	6.000	0.019%			0.0025%
39	Hexanenitrile	12	002-IN-F	1.2E-03	6.000	0.019%			0.0025%
39	Hexanenitrile	14	002-IN-G	1.0E-03	6.000	0.017%			0.0025%
39	Hexanenitrile	16	002-IN-H	1.2E-03	6.000	0.020%			0.0025%
39	Hexanenitrile	2	002-EF-A	1.3E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	4	002-EF-B	1.5E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	6	002-EF-C	1.4E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	8	002-EF-D	1.4E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	10	002-EF-E	1.5E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	12	002-EF-F	1.4E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	14	002-EF-G	1.3E-04	6.000	0.002%	YES	U	0.0025%
39	Hexanenitrile	16	002-EF-H	1.4E-04	6.000	0.002%	YES	U	0.0025%
43	Ethylamine	2	001-IN-A	4.3E-03	5.000	0.086%	YES		0.09%
43	Ethylamine	4	001-IN-B	4.4E-03	5.000	0.088%	YES		0.09%
43	Ethylamine	6	001-IN-C	4.4E-03	5.000	0.087%	YES		0.09%
43	Ethylamine	8	001-IN-D	4.5E-03	5.000	0.091%	YES		0.09%
43	Ethylamine	10	001-IN-E	4.5E-03	5.000	0.090%	YES		0.09%
43	Ethylamine	12	001-IN-F	4.5E-03	5.000	0.091%	YES		0.09%
43	Ethylamine	14	001-IN-G	4.6E-03	5.000	0.091%	YES		0.09%
43	Ethylamine	16	001-IN-H	4.5E-03	5.000	0.090%	YES		0.09%
43	Ethylamine	2	001-EF-A	4.2E-03	5.000	0.085%	YES		0.09%
43	Ethylamine	4	001-EF-B	4.3E-03	5.000	0.086%	YES		0.09%
43	Ethylamine	6	001-EF-C	4.4E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	8	001-EF-D	4.4E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	10	001-EF-E	4.5E-03	5.000	0.090%	YES		0.09%
43	Ethylamine	12	001-EF-F	4.5E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	14	001-EF-G	4.4E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	16	001-EF-H	4.5E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	2	002-IN-A	4.3E-03	5.000	0.086%	YES		0.09%
43	Ethylamine	4	002-IN-B	4.4E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	6	002-IN-C	4.3E-03	5.000	0.086%	YES		0.09%
43	Ethylamine	8	002-IN-D	4.3E-03	5.000	0.087%	YES		0.09%
43	Ethylamine	10	002-IN-E	4.3E-03	5.000	0.085%	YES		0.09%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
43	Ethylamine	12	002-IN-F	4.2E-03	5.000	0.085%	YES		0.09%
43	Ethylamine	14	002-IN-G	4.3E-03	5.000	0.087%	YES		0.09%
43	Ethylamine	16	002-IN-H	4.3E-03	5.000	0.086%	YES		0.09%
43	Ethylamine	2	002-EF-A	4.2E-03	5.000	0.083%	YES		0.09%
43	Ethylamine	4	002-EF-B	4.4E-03	5.000	0.088%	YES		0.09%
43	Ethylamine	6	002-EF-C	4.5E-03	5.000	0.091%	YES		0.09%
43	Ethylamine	8	002-EF-D	4.3E-03	5.000	0.086%	YES		0.09%
43	Ethylamine	10	002-EF-E	4.3E-03	5.000	0.086%	YES		0.09%
43	Ethylamine	12	002-EF-F	4.2E-03	5.000	0.085%	YES		0.09%
43	Ethylamine	14	002-EF-G	4.3E-03	5.000	0.085%	YES		0.09%
43	Ethylamine	16	002-EF-H	4.2E-03	5.000	0.085%	YES		0.09%
44	N-Nitrosodimethylamine	2	001-IN-A	1.0E-02	0.0003	3358%		BDa	5.12%
44	N-Nitrosodimethylamine	4	001-IN-B	9.2E-03	0.0003	3080%		BDa	5.12%
44	N-Nitrosodimethylamine	6	001-IN-C	9.3E-03	0.0003	3108%		BDa	5.12%
44	N-Nitrosodimethylamine	8	001-IN-D	7.9E-03	0.0003	2633%		BDa	5.12%
44	N-Nitrosodimethylamine	10	001-IN-E	8.7E-03	0.0003	2885%		BDa	5.12%
44	N-Nitrosodimethylamine	12	001-IN-F	6.6E-03	0.0003	2205%		BDa	5.12%
44	N-Nitrosodimethylamine	14	001-IN-G	6.5E-03	0.0003	2165%		BDa	5.12%
44	N-Nitrosodimethylamine	16	001-IN-H	5.8E-03	0.0003	1941%		BDa	5.12%
44	N-Nitrosodimethylamine	2	001-EF-A	1.4E-05	0.0003	4.64%	YES		5.12%
44	N-Nitrosodimethylamine	4	001-EF-B	1.3E-05	0.0003	4.48%	YES		5.12%
44	N-Nitrosodimethylamine	6	001-EF-C	1.3E-05	0.0003	4.48%	YES		5.12%
44	N-Nitrosodimethylamine	8	001-EF-D	1.3E-05	0.0003	4.43%	YES		5.12%
44	N-Nitrosodimethylamine	10	001-EF-E	1.3E-05	0.0003	4.42%	YES		5.12%
44	N-Nitrosodimethylamine	12	001-EF-F	1.3E-05	0.0003	4.45%	YES		5.12%
44	N-Nitrosodimethylamine	14	001-EF-G	1.3E-05	0.0003	4.44%	YES		5.12%
44	N-Nitrosodimethylamine	16	001-EF-H	1.3E-05	0.0003	4.48%	YES		5.12%
44	N-Nitrosodimethylamine	2	002-IN-A	4.5E-03	0.0003	1498%		D	5.12%
44	N-Nitrosodimethylamine	4	002-IN-B	8.3E-03	0.0003	2755%		D	5.12%
44	N-Nitrosodimethylamine	6	002-IN-C	9.8E-03	0.0003	3261%		D	5.12%
44	N-Nitrosodimethylamine	8	002-IN-D	9.4E-03	0.0003	3124%		D	5.12%
44	N-Nitrosodimethylamine	10	002-IN-E	7.9E-03	0.0003	2631%		D	5.12%
44	N-Nitrosodimethylamine	12	002-IN-F	8.2E-03	0.0003	2718%		D	5.12%
44	N-Nitrosodimethylamine	14	002-IN-G	8.1E-03	0.0003	2713%		D	5.12%
44	N-Nitrosodimethylamine	16	002-IN-H	7.5E-03	0.0003	2485%		D	5.12%
44	N-Nitrosodimethylamine	2	002-EF-A	1.5E-05	0.0003	5.01%	YES		5.12%
44	N-Nitrosodimethylamine	4	002-EF-B	1.5E-05	0.0003	4.83%	YES		5.12%
44	N-Nitrosodimethylamine	6	002-EF-C	1.5E-05	0.0003	5.12%	YES		5.12%
44	N-Nitrosodimethylamine	8	002-EF-D	1.5E-05	0.0003	5.05%	YES		5.12%
44	N-Nitrosodimethylamine	10	002-EF-E	1.4E-05	0.0003	4.75%	YES		5.12%
44	N-Nitrosodimethylamine	12	002-EF-F	1.5E-05	0.0003	4.98%	YES		5.12%
44	N-Nitrosodimethylamine	14	002-EF-G	1.5E-05	0.0003	4.87%	YES		5.12%
44	N-Nitrosodimethylamine	16	002-EF-H	1.4E-05	0.0003	4.73%	YES		5.12%
45	N-Nitrosodiethylamine	2	001-IN-A	3.1E-05	0.0001	30.5%			11.1%
45	N-Nitrosodiethylamine	4	001-IN-B	3.1E-05	0.0001	30.9%			11.1%
45	N-Nitrosodiethylamine	6	001-IN-C	3.6E-05	0.0001	36.2%			11.1%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
45	N-Nitrosodiethylamine	8	001-IN-D	1.7E-05	0.0001	17.4%			11.1%
45	N-Nitrosodiethylamine	10	001-IN-E	3.5E-05	0.0001	35.4%			11.1%
45	N-Nitrosodiethylamine	12	001-IN-F	2.7E-05	0.0001	27.3%			11.1%
45	N-Nitrosodiethylamine	14	001-IN-G	2.1E-05	0.0001	21.2%			11.1%
45	N-Nitrosodiethylamine	16	001-IN-H	2.9E-05	0.0001	29.3%			11.1%
45	N-Nitrosodiethylamine	2	001-EF-A	1.0E-05	0.0001	10.1%	YES		11.1%
45	N-Nitrosodiethylamine	4	001-EF-B	9.8E-06	0.0001	9.75%	YES		11.1%
45	N-Nitrosodiethylamine	6	001-EF-C	9.8E-06	0.0001	9.75%	YES		11.1%
45	N-Nitrosodiethylamine	8	001-EF-D	9.6E-06	0.0001	9.63%	YES		11.1%
45	N-Nitrosodiethylamine	10	001-EF-E	9.6E-06	0.0001	9.61%	YES		11.1%
45	N-Nitrosodiethylamine	12	001-EF-F	9.7E-06	0.0001	9.68%	YES		11.1%
45	N-Nitrosodiethylamine	14	001-EF-G	9.7E-06	0.0001	9.65%	YES		11.1%
45	N-Nitrosodiethylamine	16	001-EF-H	9.8E-06	0.0001	9.75%	YES		11.1%
45	N-Nitrosodiethylamine	2	002-IN-A	1.1E-05	0.0001	10.7%	YES		11.1%
45	N-Nitrosodiethylamine	4	002-IN-B	3.3E-05	0.0001	33.1%			11.1%
45	N-Nitrosodiethylamine	6	002-IN-C	4.4E-05	0.0001	43.8%			11.1%
45	N-Nitrosodiethylamine	8	002-IN-D	3.4E-05	0.0001	34.5%			11.1%
45	N-Nitrosodiethylamine	10	002-IN-E	9.9E-06	0.0001	9.95%	YES		11.1%
45	N-Nitrosodiethylamine	12	002-IN-F	1.2E-05	0.0001	11.9%			11.1%
45	N-Nitrosodiethylamine	14	002-IN-G	9.9E-06	0.0001	9.92%	YES		11.1%
45	N-Nitrosodiethylamine	16	002-IN-H	9.8E-06	0.0001	9.85%	YES		11.1%
45	N-Nitrosodiethylamine	2	002-EF-A	1.1E-05	0.0001	10.9%	YES		11.1%
45	N-Nitrosodiethylamine	4	002-EF-B	1.1E-05	0.0001	10.5%	YES		11.1%
45	N-Nitrosodiethylamine	6	002-EF-C	1.1E-05	0.0001	11.1%	YES		11.1%
45	N-Nitrosodiethylamine	8	002-EF-D	1.1E-05	0.0001	11.0%	YES		11.1%
45	N-Nitrosodiethylamine	10	002-EF-E	1.0E-05	0.0001	10.3%	YES		11.1%
45	N-Nitrosodiethylamine	12	002-EF-F	1.1E-05	0.0001	10.8%	YES		11.1%
45	N-Nitrosodiethylamine	14	002-EF-G	1.1E-05	0.0001	10.6%	YES		11.1%
45	N-Nitrosodiethylamine	16	002-EF-H	1.0E-05	0.0001	10.3%	YES		11.1%
46	N-Nitrosomethylethylamine	2	001-IN-A	5.8E-05	0.0003	19.4%			4.30%
46	N-Nitrosomethylethylamine	4	001-IN-B	6.6E-05	0.0003	22.0%			4.30%
46	N-Nitrosomethylethylamine	6	001-IN-C	6.8E-05	0.0003	22.5%			4.30%
46	N-Nitrosomethylethylamine	8	001-IN-D	4.4E-05	0.0003	14.6%			4.30%
46	N-Nitrosomethylethylamine	10	001-IN-E	6.5E-05	0.0003	21.6%			4.30%
46	N-Nitrosomethylethylamine	12	001-IN-F	5.0E-05	0.0003	16.6%			4.30%
46	N-Nitrosomethylethylamine	14	001-IN-G	6.2E-05	0.0003	20.5%			4.30%
46	N-Nitrosomethylethylamine	16	001-IN-H	6.2E-05	0.0003	20.8%			4.30%
46	N-Nitrosomethylethylamine	2	001-EF-A	1.2E-05	0.0003	3.90%	YES		4.30%
46	N-Nitrosomethylethylamine	4	001-EF-B	1.1E-05	0.0003	3.77%	YES		4.30%
46	N-Nitrosomethylethylamine	6	001-EF-C	1.1E-05	0.0003	3.77%	YES		4.30%
46	N-Nitrosomethylethylamine	8	001-EF-D	1.1E-05	0.0003	3.72%	YES		4.30%
46	N-Nitrosomethylethylamine	10	001-EF-E	1.1E-05	0.0003	3.71%	YES		4.30%
46	N-Nitrosomethylethylamine	12	001-EF-F	1.1E-05	0.0003	3.74%	YES		4.30%
46	N-Nitrosomethylethylamine	14	001-EF-G	1.1E-05	0.0003	3.73%	YES		4.30%
46	N-Nitrosomethylethylamine	16	001-EF-H	1.1E-05	0.0003	3.77%	YES		4.30%
46	N-Nitrosomethylethylamine	2	002-IN-A	3.3E-05	0.0003	10.9%			4.30%
46	N-Nitrosomethylethylamine	4	002-IN-B	8.3E-05	0.0003	27.8%			4.30%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
46	N-Nitrosomethylethylamine	6	002-IN-C	9.3E-05	0.0003	30.9%			4.30%
46	N-Nitrosomethylethylamine	8	002-IN-D	7.0E-05	0.0003	23.4%			4.30%
46	N-Nitrosomethylethylamine	10	002-IN-E	5.6E-05	0.0003	18.5%			4.30%
46	N-Nitrosomethylethylamine	12	002-IN-F	5.6E-05	0.0003	18.7%			4.30%
46	N-Nitrosomethylethylamine	14	002-IN-G	5.2E-05	0.0003	17.4%			4.30%
46	N-Nitrosomethylethylamine	16	002-IN-H	4.0E-05	0.0003	13.5%			4.30%
46	N-Nitrosomethylethylamine	2	002-EF-A	1.3E-05	0.0003	4.21%	YES		4.30%
46	N-Nitrosomethylethylamine	4	002-EF-B	1.2E-05	0.0003	4.06%	YES		4.30%
46	N-Nitrosomethylethylamine	6	002-EF-C	1.3E-05	0.0003	4.30%	YES		4.30%
46	N-Nitrosomethylethylamine	8	002-EF-D	1.3E-05	0.0003	4.25%	YES		4.30%
46	N-Nitrosomethylethylamine	10	002-EF-E	1.2E-05	0.0003	3.99%	YES		4.30%
46	N-Nitrosomethylethylamine	12	002-EF-F	1.3E-05	0.0003	4.19%	YES		4.30%
46	N-Nitrosomethylethylamine	14	002-EF-G	1.2E-05	0.0003	4.09%	YES		4.30%
46	N-Nitrosomethylethylamine	16	002-EF-H	1.2E-05	0.0003	3.98%	YES		4.30%
47	N-Nitrosomorpholine	2	001-IN-A	3.1E-05	0.001	5.20%		L	1.48%
47	N-Nitrosomorpholine	4	001-IN-B	3.5E-05	0.001	5.85%		L	1.48%
47	N-Nitrosomorpholine	6	001-IN-C	3.5E-05	0.001	5.89%		L	1.48%
47	N-Nitrosomorpholine	8	001-IN-D	2.5E-05	0.001	4.11%		L	1.48%
47	N-Nitrosomorpholine	10	001-IN-E	1.1E-05	0.001	1.87%		L	1.48%
47	N-Nitrosomorpholine	12	001-IN-F	8.6E-06	0.001	1.43%	YES	L	1.48%
47	N-Nitrosomorpholine	14	001-IN-G	8.5E-06	0.001	1.42%		L	1.48%
47	N-Nitrosomorpholine	16	001-IN-H	8.6E-06	0.001	1.43%	YES	L	1.48%
47	N-Nitrosomorpholine	2	001-EF-A	8.9E-06	0.001	1.48%	YES	L	1.48%
47	N-Nitrosomorpholine	4	001-EF-B	8.6E-06	0.001	1.43%	YES	L	1.48%
47	N-Nitrosomorpholine	6	001-EF-C	8.6E-06	0.001	1.43%	YES	L	1.48%
47	N-Nitrosomorpholine	8	001-EF-D	8.5E-06	0.001	1.41%	YES	L	1.48%
47	N-Nitrosomorpholine	10	001-EF-E	8.5E-06	0.001	1.41%	YES	L	1.48%
47	N-Nitrosomorpholine	12	001-EF-F	8.5E-06	0.001	1.42%	YES	L	1.48%
47	N-Nitrosomorpholine	14	001-EF-G	8.5E-06	0.001	1.42%	YES	L	1.48%
47	N-Nitrosomorpholine	16	001-EF-H	8.6E-06	0.001	1.43%	YES	L	1.48%
47	N-Nitrosomorpholine	2	002-IN-A	4.5E-05	0.001	7.54%			1.48%
47	N-Nitrosomorpholine	4	002-IN-B	4.9E-05	0.001	8.19%			1.48%
47	N-Nitrosomorpholine	6	002-IN-C	5.7E-05	0.001	9.42%			1.48%
47	N-Nitrosomorpholine	8	002-IN-D	6.4E-05	0.001	10.6%			1.48%
47	N-Nitrosomorpholine	10	002-IN-E	5.8E-05	0.001	9.68%			1.48%
47	N-Nitrosomorpholine	12	002-IN-F	2.4E-05	0.001	4.02%			1.48%
47	N-Nitrosomorpholine	14	002-IN-G	2.1E-05	0.001	3.44%			1.48%
47	N-Nitrosomorpholine	16	002-IN-H	1.1E-05	0.001	1.84%			1.48%
47	N-Nitrosomorpholine	2	002-EF-A	8.7E-06	0.001	1.45%	YES		1.48%
47	N-Nitrosomorpholine	4	002-EF-B	8.4E-06	0.001	1.40%	YES		1.48%
47	N-Nitrosomorpholine	6	002-EF-C	8.9E-06	0.001	1.48%	YES		1.48%
47	N-Nitrosomorpholine	8	002-EF-D	8.8E-06	0.001	1.47%	YES		1.48%
47	N-Nitrosomorpholine	10	002-EF-E	8.3E-06	0.001	1.38%	YES		1.48%
47	N-Nitrosomorpholine	12	002-EF-F	8.7E-06	0.001	1.44%	YES		1.48%
47	N-Nitrosomorpholine	14	002-EF-G	8.5E-06	0.001	1.41%	YES		1.48%
47	N-Nitrosomorpholine	16	002-EF-H	8.2E-06	0.001	1.37%	YES		1.48%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
48	Tributyl phosphate	2	001-IN-A	1.3E-04	0.200	0.064%	YES	U	0.07%
48	Tributyl phosphate	4	001-IN-B	1.3E-04	0.200	0.065%	YES	U	0.07%
48	Tributyl phosphate	6	001-IN-C	1.2E-04	0.200	0.061%	YES	U	0.07%
48	Tributyl phosphate	8	001-IN-D	1.3E-04	0.200	0.064%	YES	U	0.07%
48	Tributyl phosphate	10	001-IN-E	1.3E-04	0.200	0.066%	YES	U	0.07%
48	Tributyl phosphate	12	001-IN-F	1.2E-04	0.200	0.062%	YES	U	0.07%
48	Tributyl phosphate	14	001-IN-G	1.2E-04	0.200	0.062%	YES	U	0.07%
48	Tributyl phosphate	16	001-IN-H	1.3E-04	0.200	0.064%	YES	U	0.07%
48	Tributyl phosphate	2	001-EF-A	1.2E-04	0.200	0.059%	YES	U	0.07%
48	Tributyl phosphate	4	001-EF-B	1.3E-04	0.200	0.064%	YES	U	0.07%
48	Tributyl phosphate	6	001-EF-C	1.3E-04	0.200	0.064%	YES	U	0.07%
48	Tributyl phosphate	8	001-EF-D	1.3E-04	0.200	0.067%	YES	U	0.07%
48	Tributyl phosphate	10	001-EF-E	1.3E-04	0.200	0.067%	YES	U	0.07%
48	Tributyl phosphate	12	001-EF-F	1.3E-04	0.200	0.066%	YES	U	0.07%
48	Tributyl phosphate	14	001-EF-G	1.3E-04	0.200	0.064%	YES	U	0.07%
48	Tributyl phosphate	16	001-EF-H	1.2E-04	0.200	0.062%	YES	U	0.07%
48	Tributyl phosphate	2	002-IN-A	1.2E-04	0.200	0.061%	YES	U	0.07%
48	Tributyl phosphate	4	002-IN-B	1.2E-04	0.200	0.059%	YES	U	0.07%
48	Tributyl phosphate	6	002-IN-C	1.3E-04	0.200	0.063%	YES	U	0.07%
48	Tributyl phosphate	8	002-IN-D	1.3E-04	0.200	0.065%	YES	U	0.07%
48	Tributyl phosphate	10	002-IN-E	1.4E-04	0.200	0.068%	YES	U	0.07%
48	Tributyl phosphate	12	002-IN-F	1.3E-04	0.200	0.064%	YES	U	0.07%
48	Tributyl phosphate	14	002-IN-G	1.3E-04	0.200	0.065%	YES	U	0.07%
48	Tributyl phosphate	16	002-IN-H	1.2E-04	0.200	0.062%	YES	U	0.07%
48	Tributyl phosphate	2	002-EF-A	1.2E-04	0.200	0.059%	YES	U	0.07%
48	Tributyl phosphate	4	002-EF-B	1.2E-04	0.200	0.059%	YES	U	0.07%
48	Tributyl phosphate	6	002-EF-C	1.2E-04	0.200	0.061%	YES	U	0.07%
48	Tributyl phosphate	8	002-EF-D	1.3E-04	0.200	0.065%	YES	U	0.07%
48	Tributyl phosphate	10	002-EF-E	1.3E-04	0.200	0.063%	YES	U	0.07%
48	Tributyl phosphate	12	002-EF-F	1.2E-04	0.200	0.061%	YES	U	0.07%
48	Tributyl phosphate	14	002-EF-G	1.2E-04	0.200	0.062%	YES	U	0.07%
48	Tributyl phosphate	16	002-EF-H	1.3E-04	0.200	0.063%	YES	U	0.07%
49	Dibutyl butylphosphonate	2	001-IN-A	8.8E-05	0.007	1.25%	YES	U	1.33%
49	Dibutyl butylphosphonate	4	001-IN-B	8.9E-05	0.007	1.27%	YES	U	1.33%
49	Dibutyl butylphosphonate	6	001-IN-C	8.4E-05	0.007	1.20%	YES	U	1.33%
49	Dibutyl butylphosphonate	8	001-IN-D	8.8E-05	0.007	1.25%	YES	U	1.33%
49	Dibutyl butylphosphonate	10	001-IN-E	9.1E-05	0.007	1.29%	YES	U	1.33%
49	Dibutyl butylphosphonate	12	001-IN-F	8.5E-05	0.007	1.21%	YES	U	1.33%
49	Dibutyl butylphosphonate	14	001-IN-G	8.4E-05	0.007	1.21%	YES	U	1.33%
49	Dibutyl butylphosphonate	16	001-IN-H	8.8E-05	0.007	1.25%	YES	U	1.33%
49	Dibutyl butylphosphonate	2	001-EF-A	8.1E-05	0.007	1.15%	YES	U	1.33%
49	Dibutyl butylphosphonate	4	001-EF-B	8.8E-05	0.007	1.25%	YES	U	1.33%
49	Dibutyl butylphosphonate	6	001-EF-C	8.8E-05	0.007	1.26%	YES	U	1.33%
49	Dibutyl butylphosphonate	8	001-EF-D	9.1E-05	0.007	1.30%	YES	U	1.33%
49	Dibutyl butylphosphonate	10	001-EF-E	9.1E-05	0.007	1.31%	YES	U	1.33%
49	Dibutyl butylphosphonate	12	001-EF-F	9.0E-05	0.007	1.28%	YES	U	1.33%
49	Dibutyl butylphosphonate	14	001-EF-G	8.8E-05	0.007	1.25%	YES	U	1.33%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
49	Dibutyl butylphosphonate	16	001-EF-H	8.5E-05	0.007	1.21%	YES	U	1.33%
49	Dibutyl butylphosphonate	2	002-IN-A	8.4E-05	0.007	1.20%	YES	U	1.33%
49	Dibutyl butylphosphonate	4	002-IN-B	8.1E-05	0.007	1.15%	YES	U	1.33%
49	Dibutyl butylphosphonate	6	002-IN-C	8.6E-05	0.007	1.23%	YES	U	1.33%
49	Dibutyl butylphosphonate	8	002-IN-D	8.9E-05	0.007	1.27%	YES	U	1.33%
49	Dibutyl butylphosphonate	10	002-IN-E	9.3E-05	0.007	1.33%	YES	U	1.33%
49	Dibutyl butylphosphonate	12	002-IN-F	8.8E-05	0.007	1.25%	YES	U	1.33%
49	Dibutyl butylphosphonate	14	002-IN-G	8.9E-05	0.007	1.27%	YES	U	1.33%
49	Dibutyl butylphosphonate	16	002-IN-H	8.5E-05	0.007	1.21%	YES	U	1.33%
49	Dibutyl butylphosphonate	2	002-EF-A	8.1E-05	0.007	1.16%	YES	U	1.33%
49	Dibutyl butylphosphonate	4	002-EF-B	8.1E-05	0.007	1.16%	YES	U	1.33%
49	Dibutyl butylphosphonate	6	002-EF-C	8.3E-05	0.007	1.18%	YES	U	1.33%
49	Dibutyl butylphosphonate	8	002-EF-D	8.8E-05	0.007	1.26%	YES	U	1.33%
49	Dibutyl butylphosphonate	10	002-EF-E	8.7E-05	0.007	1.24%	YES	U	1.33%
49	Dibutyl butylphosphonate	12	002-EF-F	8.4E-05	0.007	1.20%	YES	U	1.33%
49	Dibutyl butylphosphonate	14	002-EF-G	8.4E-05	0.007	1.21%	YES	U	1.33%
49	Dibutyl butylphosphonate	16	002-EF-H	8.6E-05	0.007	1.23%	YES	U	1.33%
52	Pyridine	2	001-IN-A	3.3E-04	1.000	0.033%		J	0.016%
52	Pyridine	4	001-IN-B	2.7E-04	1.000	0.027%		J	0.016%
52	Pyridine	6	001-IN-C	3.2E-04	1.000	0.032%		J	0.016%
52	Pyridine	8	001-IN-D	2.9E-04	1.000	0.029%		J	0.016%
52	Pyridine	10	001-IN-E	3.3E-04	1.000	0.033%		J	0.016%
52	Pyridine	12	001-IN-F	2.7E-04	1.000	0.027%		J	0.016%
52	Pyridine	14	001-IN-G	2.4E-04	1.000	0.024%		J	0.016%
52	Pyridine	16	001-IN-H	3.6E-04	1.000	0.036%		J	0.016%
52	Pyridine	2	001-EF-A	1.4E-04	1.000	0.014%	YES	U	0.016%
52	Pyridine	4	001-EF-B	1.4E-04	1.000	0.014%	YES	U	0.016%
52	Pyridine	6	001-EF-C	1.5E-04	1.000	0.015%	YES	U	0.016%
52	Pyridine	8	001-EF-D	1.5E-04	1.000	0.015%	YES	U	0.016%
52	Pyridine	10	001-EF-E	1.6E-04	1.000	0.016%	YES	U	0.016%
52	Pyridine	12	001-EF-F	1.5E-04	1.000	0.015%	YES	U	0.016%
52	Pyridine	14	001-EF-G	1.5E-04	1.000	0.015%	YES	U	0.016%
52	Pyridine	16	001-EF-H	1.5E-04	1.000	0.015%	YES	U	0.016%
52	Pyridine	2	002-IN-A	2.4E-04	1.000	0.024%		J	0.016%
52	Pyridine	4	002-IN-B	3.8E-04	1.000	0.038%		J	0.016%
52	Pyridine	6	002-IN-C	3.6E-04	1.000	0.036%		J	0.016%
52	Pyridine	8	002-IN-D	4.0E-04	1.000	0.040%		J	0.016%
52	Pyridine	10	002-IN-E	3.7E-04	1.000	0.037%		J	0.016%
52	Pyridine	12	002-IN-F	3.7E-04	1.000	0.037%		J	0.016%
52	Pyridine	14	002-IN-G	3.7E-04	1.000	0.037%		J	0.016%
52	Pyridine	16	002-IN-H	3.7E-04	1.000	0.037%		J	0.016%
52	Pyridine	2	002-EF-A	1.4E-04	1.000	0.014%	YES	U	0.016%
52	Pyridine	4	002-EF-B	1.5E-04	1.000	0.015%	YES	U	0.016%
52	Pyridine	6	002-EF-C	1.4E-04	1.000	0.014%	YES	U	0.016%
52	Pyridine	8	002-EF-D	1.4E-04	1.000	0.014%	YES	U	0.016%
52	Pyridine	10	002-EF-E	1.5E-04	1.000	0.015%	YES	U	0.016%
52	Pyridine	12	002-EF-F	1.4E-04	1.000	0.014%	YES	U	0.016%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
52	Pyridine	14	002-EF-G	1.4E-04	1.000	0.014%	YES	U	0.016%
52	Pyridine	16	002-EF-H	1.4E-04	1.000	0.014%	YES	U	0.016%
53	2,4-Dimethylpyridine	2	001-IN-A	2.0E-04	0.500	0.040%	YES	U	0.043%
53	2,4-Dimethylpyridine	4	001-IN-B	2.0E-04	0.500	0.039%	YES	U	0.043%
53	2,4-Dimethylpyridine	6	001-IN-C	1.9E-04	0.500	0.039%	YES	QU	0.043%
53	2,4-Dimethylpyridine	8	001-IN-D	2.0E-04	0.500	0.041%	YES	QU	0.043%
53	2,4-Dimethylpyridine	10	001-IN-E	2.1E-04	0.500	0.042%	YES	U	0.043%
53	2,4-Dimethylpyridine	12	001-IN-F	2.1E-04	0.500	0.043%	YES	U	0.043%
53	2,4-Dimethylpyridine	14	001-IN-G	2.1E-04	0.500	0.042%	YES	U	0.043%
53	2,4-Dimethylpyridine	16	001-IN-H	2.1E-04	0.500	0.041%	YES	QU	0.043%
53	2,4-Dimethylpyridine	2	001-EF-A	2.0E-04	0.500	0.039%	YES	U	0.043%
53	2,4-Dimethylpyridine	4	001-EF-B	2.0E-04	0.500	0.040%	YES	U	0.043%
53	2,4-Dimethylpyridine	6	001-EF-C	2.1E-04	0.500	0.043%	YES	U	0.043%
53	2,4-Dimethylpyridine	8	001-EF-D	2.2E-04	0.500	0.043%	YES	U	0.043%
53	2,4-Dimethylpyridine	10	001-EF-E	2.2E-04	0.500	0.043%	YES	U	0.043%
53	2,4-Dimethylpyridine	12	001-EF-F	2.1E-04	0.500	0.041%	YES	U	0.043%
53	2,4-Dimethylpyridine	14	001-EF-G	2.1E-04	0.500	0.042%	YES	QU	0.043%
53	2,4-Dimethylpyridine	16	001-EF-H	2.0E-04	0.500	0.041%	YES	U	0.043%
53	2,4-Dimethylpyridine	2	002-IN-A	2.0E-04	0.500	0.041%	YES	U	0.043%
53	2,4-Dimethylpyridine	4	002-IN-B	2.0E-04	0.500	0.041%	YES	U	0.043%
53	2,4-Dimethylpyridine	6	002-IN-C	2.1E-04	0.500	0.042%	YES	U	0.043%
53	2,4-Dimethylpyridine	8	002-IN-D	2.0E-04	0.500	0.040%	YES	U	0.043%
53	2,4-Dimethylpyridine	10	002-IN-E	1.9E-04	0.500	0.039%	YES	U	0.043%
53	2,4-Dimethylpyridine	12	002-IN-F	2.0E-04	0.500	0.040%	YES	U	0.043%
53	2,4-Dimethylpyridine	14	002-IN-G	2.1E-04	0.500	0.042%	YES	U	0.043%
53	2,4-Dimethylpyridine	16	002-IN-H	2.1E-04	0.500	0.041%	YES	U	0.043%
53	2,4-Dimethylpyridine	2	002-EF-A	1.9E-04	0.500	0.038%	YES	U	0.043%
53	2,4-Dimethylpyridine	4	002-EF-B	2.1E-04	0.500	0.041%	YES	U	0.043%
53	2,4-Dimethylpyridine	6	002-EF-C	1.9E-04	0.500	0.039%	YES	U	0.043%
53	2,4-Dimethylpyridine	8	002-EF-D	2.0E-04	0.500	0.039%	YES	U	0.043%
53	2,4-Dimethylpyridine	10	002-EF-E	2.1E-04	0.500	0.042%	YES	U	0.043%
53	2,4-Dimethylpyridine	12	002-EF-F	1.9E-04	0.500	0.039%	YES	U	0.043%
53	2,4-Dimethylpyridine	14	002-EF-G	1.9E-04	0.500	0.038%	YES	U	0.043%
53	2,4-Dimethylpyridine	16	002-EF-H	2.0E-04	0.500	0.040%	YES	U	0.043%
Data below is obtained through secondary analysis methods									
16	Butanal/Butyraldehyde	2	001-IN-A	1.5E-02	25.000	0.061%			0.0028%
16	Butanal/Butyraldehyde	4	001-IN-B	1.7E-02	25.000	0.067%			0.0028%
16	Butanal/Butyraldehyde	6	001-IN-C	1.5E-02	25.000	0.060%			0.0028%
16	Butanal/Butyraldehyde	8	001-IN-D	1.5E-02	25.000	0.061%			0.0028%
16	Butanal/Butyraldehyde	10	001-IN-E	1.5E-02	25.000	0.060%			0.0028%
16	Butanal/Butyraldehyde	12	001-IN-F	1.7E-02	25.000	0.067%			0.0028%
16	Butanal/Butyraldehyde	14	001-IN-G	1.9E-02	25.000	0.078%			0.0028%
16	Butanal/Butyraldehyde	16	001-IN-H	1.9E-02	25.000	0.078%			0.0028%
16	Butanal/Butyraldehyde	2	001-EF-A	7.0E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	4	001-EF-B	6.9E-04	25.000	0.003%	YES		0.0028%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
16	Butanal/Butyraldehyde	6	001-EF-C	6.9E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	8	001-EF-D	7.0E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	10	001-EF-E	7.0E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	12	001-EF-F	7.0E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	14	001-EF-G	6.9E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	16	001-EF-H	7.1E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	2	002-IN-A	1.9E-02	25.000	0.075%			0.0028%
16	Butanal/Butyraldehyde	4	002-IN-B	1.8E-02	25.000	0.073%			0.0028%
16	Butanal/Butyraldehyde	6	002-IN-C	1.9E-02	25.000	0.077%			0.0028%
16	Butanal/Butyraldehyde	8	002-IN-D	1.9E-02	25.000	0.077%			0.0028%
16	Butanal/Butyraldehyde	10	002-IN-E	1.9E-02	25.000	0.078%			0.0028%
16	Butanal/Butyraldehyde	12	002-IN-F	1.9E-02	25.000	0.077%			0.0028%
16	Butanal/Butyraldehyde	14	002-IN-G	1.8E-02	25.000	0.073%			0.0028%
16	Butanal/Butyraldehyde	16	002-IN-H	1.8E-02	25.000	0.072%			0.0028%
16	Butanal/Butyraldehyde	2	002-EF-A	6.9E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	4	002-EF-B	6.9E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	6	002-EF-C	7.0E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	8	002-EF-D	6.9E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	10	002-EF-E	6.8E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	12	002-EF-F	6.8E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	14	002-EF-G	6.9E-04	25.000	0.003%	YES		0.0028%
16	Butanal/Butyraldehyde	16	002-EF-H	7.0E-04	25.00	0.003%	YES		0.0028%
20	Furan	2	001-IN-A	2.6E-04	0.001	25.9%	YES	U	28.5%
20	Furan	4	001-IN-B	2.6E-04	0.001	25.9%	YES	U	28.5%
20	Furan	6	001-IN-C	2.6E-04	0.001	25.5%	YES	U	28.5%
20	Furan	8	001-IN-D	2.7E-04	0.001	26.8%	YES	U	28.5%
20	Furan	10	001-IN-E	2.8E-04	0.001	27.9%	YES	U	28.5%
20	Furan	12	001-IN-F	2.8E-04	0.001	28.1%	YES	U	28.5%
20	Furan	14	001-IN-G	2.8E-04	0.001	27.5%	YES	U	28.5%
20	Furan	16	001-IN-H	2.7E-04	0.001	27.0%	YES	U	28.5%
20	Furan	2	001-EF-A	2.6E-04	0.001	25.7%	YES	U	28.5%
20	Furan	4	001-EF-B	2.6E-04	0.001	26.3%	YES	U	28.5%
20	Furan	6	001-EF-C	2.8E-04	0.001	28.0%	YES	U	28.5%
20	Furan	8	001-EF-D	2.8E-04	0.001	28.3%	YES	U	28.5%
20	Furan	10	001-EF-E	2.8E-04	0.001	28.5%	YES	U	28.5%
20	Furan	12	001-EF-F	2.7E-04	0.001	26.9%	YES	U	28.5%
20	Furan	14	001-EF-G	2.8E-04	0.001	27.7%	YES	U	28.5%
20	Furan	16	001-EF-H	2.7E-04	0.001	26.6%	YES	U	28.5%
20	Furan	2	002-IN-A	2.7E-04	0.001	26.6%	YES	U	28.5%
20	Furan	4	002-IN-B	2.7E-04	0.001	26.6%	YES	U	28.5%
20	Furan	6	002-IN-C	2.7E-04	0.001	27.5%	YES	U	28.5%
20	Furan	8	002-IN-D	2.6E-04	0.001	26.3%	YES	U	28.5%
20	Furan	10	002-IN-E	2.5E-04	0.001	25.5%	YES	U	28.5%
20	Furan	12	002-IN-F	2.6E-04	0.001	26.1%	YES	U	28.5%
20	Furan	14	002-IN-G	2.8E-04	0.001	27.8%	YES	U	28.5%
20	Furan	16	002-IN-H	2.7E-04	0.001	27.2%	YES	U	28.5%
20	Furan	2	002-EF-A	2.5E-04	0.001	24.9%	YES	U	28.5%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
20	Furan	4	002-EF-B	2.7E-04	0.001	27.0%	YES	U	28.5%
20	Furan	6	002-EF-C	2.6E-04	0.001	25.6%	YES	U	28.5%
20	Furan	8	002-EF-D	2.6E-04	0.001	25.6%	YES	U	28.5%
20	Furan	10	002-EF-E	2.7E-04	0.001	27.5%	YES	U	28.5%
20	Furan	12	002-EF-F	2.6E-04	0.001	25.5%	YES	U	28.5%
20	Furan	14	002-EF-G	2.5E-04	0.001	25.1%	YES	U	28.5%
20	Furan	16	002-EF-H	2.6E-04	0.00	26.2%	YES	U	28.5%
22	2,5-Dihydrofuran	2	001-IN-A	4.8E-04	0.001	47.8%	YES	U	52.5%
22	2,5-Dihydrofuran	4	001-IN-B	4.8E-04	0.001	47.8%	YES	U	52.5%
22	2,5-Dihydrofuran	6	001-IN-C	4.7E-04	0.001	47.1%	YES	U	52.5%
22	2,5-Dihydrofuran	8	001-IN-D	5.0E-04	0.001	49.5%	YES	U	52.5%
22	2,5-Dihydrofuran	10	001-IN-E	5.1E-04	0.001	51.4%	YES	U	52.5%
22	2,5-Dihydrofuran	12	001-IN-F	5.2E-04	0.001	51.9%	YES	U	52.5%
22	2,5-Dihydrofuran	14	001-IN-G	5.1E-04	0.001	50.8%	YES	U	52.5%
22	2,5-Dihydrofuran	16	001-IN-H	5.0E-04	0.001	49.8%	YES	U	52.5%
22	2,5-Dihydrofuran	2	001-EF-A	4.7E-04	0.001	47.3%	YES	U	52.5%
22	2,5-Dihydrofuran	4	001-EF-B	4.9E-04	0.001	48.6%	YES	U	52.5%
22	2,5-Dihydrofuran	6	001-EF-C	5.2E-04	0.001	51.8%	YES	U	52.5%
22	2,5-Dihydrofuran	8	001-EF-D	5.2E-04	0.001	52.3%	YES	U	52.5%
22	2,5-Dihydrofuran	10	001-EF-E	5.3E-04	0.001	52.5%	YES	U	52.5%
22	2,5-Dihydrofuran	12	001-EF-F	5.0E-04	0.001	49.7%	YES	U	52.5%
22	2,5-Dihydrofuran	14	001-EF-G	5.1E-04	0.001	51.1%	YES	U	52.5%
22	2,5-Dihydrofuran	16	001-EF-H	4.9E-04	0.001	49.1%	YES	U	52.5%
22	2,5-Dihydrofuran	2	002-IN-A	4.9E-04	0.001	49.1%	YES	U	52.5%
22	2,5-Dihydrofuran	4	002-IN-B	4.9E-04	0.001	49.1%	YES	U	52.5%
22	2,5-Dihydrofuran	6	002-IN-C	5.1E-04	0.001	50.7%	YES	U	52.5%
22	2,5-Dihydrofuran	8	002-IN-D	4.8E-04	0.001	48.5%	YES	U	52.5%
22	2,5-Dihydrofuran	10	002-IN-E	4.7E-04	0.001	47.0%	YES	U	52.5%
22	2,5-Dihydrofuran	12	002-IN-F	4.8E-04	0.001	48.2%	YES	U	52.5%
22	2,5-Dihydrofuran	14	002-IN-G	5.1E-04	0.001	51.3%	YES	U	52.5%
22	2,5-Dihydrofuran	16	002-IN-H	5.0E-04	0.001	50.1%	YES	U	52.5%
22	2,5-Dihydrofuran	2	002-EF-A	4.6E-04	0.001	45.9%	YES	U	52.5%
22	2,5-Dihydrofuran	4	002-EF-B	5.0E-04	0.001	49.9%	YES	U	52.5%
22	2,5-Dihydrofuran	6	002-EF-C	4.7E-04	0.001	47.2%	YES	U	52.5%
22	2,5-Dihydrofuran	8	002-EF-D	4.7E-04	0.001	47.3%	YES	U	52.5%
22	2,5-Dihydrofuran	10	002-EF-E	5.1E-04	0.001	50.7%	YES	U	52.5%
22	2,5-Dihydrofuran	12	002-EF-F	4.7E-04	0.001	47.1%	YES	U	52.5%
22	2,5-Dihydrofuran	14	002-EF-G	4.6E-04	0.001	46.3%	YES	U	52.5%
22	2,5-Dihydrofuran	16	002-EF-H	4.8E-04	0.00	48.3%	YES	U	52.5%
23	2-Methylfuran	2	001-IN-A	1.1E-04	0.001	11.5%	YES	U	12.6%
23	2-Methylfuran	4	001-IN-B	1.1E-04	0.001	11.4%	YES	U	12.6%
23	2-Methylfuran	6	001-IN-C	1.1E-04	0.001	11.3%	YES	U	12.6%
23	2-Methylfuran	8	001-IN-D	1.2E-04	0.001	11.9%	YES	U	12.6%
23	2-Methylfuran	10	001-IN-E	1.2E-04	0.001	12.3%	YES	U	12.6%
23	2-Methylfuran	12	001-IN-F	1.2E-04	0.001	12.4%	YES	U	12.6%
23	2-Methylfuran	14	001-IN-G	1.2E-04	0.001	12.2%	YES	U	12.6%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
23	2-Methylfuran	16	001-IN-H	1.2E-04	0.001	11.9%	YES	U	12.6%
23	2-Methylfuran	2	001-EF-A	1.1E-04	0.001	11.3%	YES	U	12.6%
23	2-Methylfuran	4	001-EF-B	1.2E-04	0.001	11.7%	YES	U	12.6%
23	2-Methylfuran	6	001-EF-C	1.2E-04	0.001	12.4%	YES	U	12.6%
23	2-Methylfuran	8	001-EF-D	1.3E-04	0.001	12.5%	YES	U	12.6%
23	2-Methylfuran	10	001-EF-E	1.3E-04	0.001	12.6%	YES	U	12.6%
23	2-Methylfuran	12	001-EF-F	1.2E-04	0.001	11.9%	YES	U	12.6%
23	2-Methylfuran	14	001-EF-G	1.2E-04	0.001	12.2%	YES	U	12.6%
23	2-Methylfuran	16	001-EF-H	1.2E-04	0.001	11.8%	YES	U	12.6%
23	2-Methylfuran	2	002-IN-A	1.2E-04	0.001	11.8%	YES	U	12.6%
23	2-Methylfuran	4	002-IN-B	1.2E-04	0.001	11.8%	YES	U	12.6%
23	2-Methylfuran	6	002-IN-C	1.2E-04	0.001	12.2%	YES	U	12.6%
23	2-Methylfuran	8	002-IN-D	1.2E-04	0.001	11.6%	YES	U	12.6%
23	2-Methylfuran	10	002-IN-E	1.1E-04	0.001	11.3%	YES	U	12.6%
23	2-Methylfuran	12	002-IN-F	1.2E-04	0.001	11.6%	YES	U	12.6%
23	2-Methylfuran	14	002-IN-G	1.2E-04	0.001	12.3%	YES	U	12.6%
23	2-Methylfuran	16	002-IN-H	1.2E-04	0.001	12.0%	YES	U	12.6%
23	2-Methylfuran	2	002-EF-A	1.1E-04	0.001	11.0%	YES	U	12.6%
23	2-Methylfuran	4	002-EF-B	1.2E-04	0.001	12.0%	YES	U	12.6%
23	2-Methylfuran	6	002-EF-C	1.1E-04	0.001	11.3%	YES	U	12.6%
23	2-Methylfuran	8	002-EF-D	1.1E-04	0.001	11.3%	YES	U	12.6%
23	2-Methylfuran	10	002-EF-E	1.2E-04	0.001	12.1%	YES	U	12.6%
23	2-Methylfuran	12	002-EF-F	1.1E-04	0.001	11.3%	YES	U	12.6%
23	2-Methylfuran	14	002-EF-G	1.1E-04	0.001	11.1%	YES	U	12.6%
23	2-Methylfuran	16	002-EF-H	1.2E-04	0.00	11.6%	YES	U	12.6%
35	Acetonitrile	2	001-IN-A	4.7E-01	20.000	2.35%	YES		2.55%
35	Acetonitrile	4	001-IN-B	4.8E-01	20.000	2.39%	YES		2.55%
35	Acetonitrile	6	001-IN-C	4.9E-01	20.000	2.45%	YES		2.55%
35	Acetonitrile	8	001-IN-D	4.9E-01	20.000	2.43%	YES		2.55%
35	Acetonitrile	10	001-IN-E	5.0E-01	20.000	2.49%	YES		2.55%
35	Acetonitrile	12	001-IN-F	4.8E-01	20.000	2.40%	YES		2.55%
35	Acetonitrile	14	001-IN-G	4.9E-01	20.000	2.44%	YES		2.55%
35	Acetonitrile	16	001-IN-H	5.0E-01	20.000	2.51%	YES		2.55%
35	Acetonitrile	2	001-EF-A	4.7E-01	20.000	2.37%	YES		2.55%
35	Acetonitrile	4	001-EF-B	4.8E-01	20.000	2.42%	YES		2.55%
35	Acetonitrile	6	001-EF-C	4.8E-01	20.000	2.41%	YES		2.55%
35	Acetonitrile	8	001-EF-D	4.9E-01	20.000	2.43%	YES		2.55%
35	Acetonitrile	10	001-EF-E	9.2E-02	20.000	0.461%	YES		2.55%
35	Acetonitrile	12	001-EF-F	4.8E-01	20.000	2.42%	YES		2.55%
35	Acetonitrile	14	001-EF-G	5.0E-01	20.000	2.50%	YES		2.55%
35	Acetonitrile	16	001-EF-H	5.0E-01	20.000	2.49%	YES		2.55%
35	Acetonitrile	2	002-IN-A	4.7E-01	20.000	2.37%	YES		2.55%
35	Acetonitrile	4	002-IN-B	7.4E-01	20.000	3.71%			2.55%
35	Acetonitrile	6	002-IN-C	5.0E-01	20.000	2.48%	YES		2.55%
35	Acetonitrile	8	002-IN-D	4.8E-01	20.000	2.39%	YES		2.55%
35	Acetonitrile	10	002-IN-E	4.9E-01	20.000	2.47%	YES		2.55%
35	Acetonitrile	12	002-IN-F	5.0E-01	20.000	2.48%	YES		2.55%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
35	Acetonitrile	14	002-IN-G	4.8E-01	20.000	2.38%	YES		2.55%
35	Acetonitrile	16	002-IN-H	4.8E-01	20.000	2.39%	YES		2.55%
35	Acetonitrile	2	002-EF-A	7.1E-01	20.000	3.54%			2.55%
35	Acetonitrile	4	002-EF-B	4.9E-01	20.000	2.46%	YES		2.55%
35	Acetonitrile	6	002-EF-C	4.9E-01	20.000	2.44%	YES		2.55%
35	Acetonitrile	8	002-EF-D	4.8E-01	20.000	2.41%	YES		2.55%
35	Acetonitrile	10	002-EF-E	5.0E-01	20.000	2.49%	YES		2.55%
35	Acetonitrile	12	002-EF-F	4.8E-01	20.000	2.39%	YES		2.55%
35	Acetonitrile	14	002-EF-G	4.6E-01	20.000	2.29%	YES		2.55%
35	Acetonitrile	16	002-EF-H	5.1E-01	20.00	2.55%	YES		2.55%
52	Pyridine	2	001-IN-A	1.3E-03	1.000	0.127%	YES		0.25%
52	Pyridine	4	001-IN-B	1.2E-03	1.000	0.123%	YES		0.25%
52	Pyridine	6	001-IN-C	1.3E-03	1.000	0.125%	YES		0.25%
52	Pyridine	8	001-IN-D	1.2E-03	1.000	0.122%	YES		0.25%
52	Pyridine	10	001-IN-E	1.2E-03	1.000	0.123%	YES		0.25%
52	Pyridine	12	001-IN-F	1.2E-03	1.000	0.124%	YES		0.25%
52	Pyridine	14	001-IN-G	1.2E-03	1.000	0.125%	YES		0.25%
52	Pyridine	16	001-IN-H	1.2E-03	1.000	0.122%	YES		0.25%
52	Pyridine	2	001-EF-A	1.3E-03	1.000	0.127%	YES		0.25%
52	Pyridine	4	001-EF-B	1.3E-03	1.000	0.127%	YES		0.25%
52	Pyridine	6	001-EF-C	1.3E-03	1.000	0.126%	YES		0.25%
52	Pyridine	8	001-EF-D	1.2E-03	1.000	0.121%	YES		0.25%
52	Pyridine	10	001-EF-E	1.2E-03	1.000	0.120%	YES		0.25%
52	Pyridine	12	001-EF-F	1.2E-03	1.000	0.123%	YES		0.25%
52	Pyridine	14	001-EF-G	1.2E-03	1.000	0.124%	YES		0.25%
52	Pyridine	16	001-EF-H	1.2E-03	1.000	0.123%	YES		0.25%
52	Pyridine	2	002-IN-A	2.5E-03	1.000	0.254%	YES		0.25%
52	Pyridine	4	002-IN-B	1.2E-03	1.000	0.121%	YES		0.25%
52	Pyridine	6	002-IN-C	1.3E-03	1.000	0.127%	YES		0.25%
52	Pyridine	8	002-IN-D	1.3E-03	1.000	0.126%	YES		0.25%
52	Pyridine	10	002-IN-E	1.2E-03	1.000	0.125%	YES		0.25%
52	Pyridine	12	002-IN-F	1.2E-03	1.000	0.119%	YES		0.25%
52	Pyridine	14	002-IN-G	1.2E-03	1.000	0.124%	YES		0.25%
52	Pyridine	16	002-IN-H	1.2E-03	1.000	0.120%	YES		0.25%
52	Pyridine	2	002-EF-A	1.3E-03	1.000	0.129%	YES		0.25%
52	Pyridine	4	002-EF-B	1.2E-03	1.000	0.120%	YES		0.25%
52	Pyridine	6	002-EF-C	1.3E-03	1.000	0.127%	YES		0.25%
52	Pyridine	8	002-EF-D	1.3E-03	1.000	0.127%	YES		0.25%
52	Pyridine	10	002-EF-E	1.2E-03	1.000	0.124%	YES		0.25%
52	Pyridine	12	002-EF-F	1.3E-03	1.000	0.126%	YES		0.25%
52	Pyridine	14	002-EF-G	1.2E-03	1.000	0.119%	YES		0.25%
52	Pyridine	16	002-EF-H	1.2E-03	1.00	0.122%	YES		0.25%
53	2,4-Dimethylpyridine	2	001-IN-A	9.4E-04	0.500	0.188%	YES	a	0.38%
53	2,4-Dimethylpyridine	4	001-IN-B	9.1E-04	0.500	0.182%	YES	a	0.38%
53	2,4-Dimethylpyridine	6	001-IN-C	9.2E-04	0.500	0.185%	YES	a	0.38%
53	2,4-Dimethylpyridine	8	001-IN-D	9.0E-04	0.500	0.181%	YES	a	0.38%

Table D.1. SX-101 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
53	2,4-Dimethylpyridine	10	001-IN-E	9.1E-04	0.500	0.182%	YES	a	0.38%
53	2,4-Dimethylpyridine	12	001-IN-F	9.2E-04	0.500	0.183%	YES	a	0.38%
53	2,4-Dimethylpyridine	14	001-IN-G	9.2E-04	0.500	0.184%	YES	a	0.38%
53	2,4-Dimethylpyridine	16	001-IN-H	9.0E-04	0.500	0.181%	YES	a	0.38%
53	2,4-Dimethylpyridine	2	001-EF-A	9.4E-04	0.500	0.188%	YES	a	0.38%
53	2,4-Dimethylpyridine	4	001-EF-B	9.4E-04	0.500	0.188%	YES	a	0.38%
53	2,4-Dimethylpyridine	6	001-EF-C	9.3E-04	0.500	0.186%	YES	a	0.38%
53	2,4-Dimethylpyridine	8	001-EF-D	8.9E-04	0.500	0.179%	YES	a	0.38%
53	2,4-Dimethylpyridine	10	001-EF-E	8.9E-04	0.500	0.177%	YES	a	0.38%
53	2,4-Dimethylpyridine	12	001-EF-F	9.1E-04	0.500	0.182%	YES	a	0.38%
53	2,4-Dimethylpyridine	14	001-EF-G	9.2E-04	0.500	0.183%	YES	a	0.38%
53	2,4-Dimethylpyridine	16	001-EF-H	9.1E-04	0.500	0.181%	YES	a	0.38%
53	2,4-Dimethylpyridine	2	002-IN-A	1.9E-03	0.500	0.375%	YES	a	0.38%
53	2,4-Dimethylpyridine	4	002-IN-B	8.9E-04	0.500	0.178%	YES	a	0.38%
53	2,4-Dimethylpyridine	6	002-IN-C	9.4E-04	0.500	0.188%	YES	a	0.38%
53	2,4-Dimethylpyridine	8	002-IN-D	9.3E-04	0.500	0.186%	YES	a	0.38%
53	2,4-Dimethylpyridine	10	002-IN-E	9.2E-04	0.500	0.184%	YES	a	0.38%
53	2,4-Dimethylpyridine	12	002-IN-F	8.8E-04	0.500	0.176%	YES	a	0.38%
53	2,4-Dimethylpyridine	14	002-IN-G	9.2E-04	0.500	0.183%	YES	a	0.38%
53	2,4-Dimethylpyridine	16	002-IN-H	8.9E-04	0.500	0.177%	YES	a	0.38%
53	2,4-Dimethylpyridine	2	002-EF-A	9.5E-04	0.500	0.191%	YES	a	0.38%
53	2,4-Dimethylpyridine	4	002-EF-B	8.9E-04	0.500	0.177%	YES	a	0.38%
53	2,4-Dimethylpyridine	6	002-EF-C	9.4E-04	0.500	0.188%	YES	a	0.38%
53	2,4-Dimethylpyridine	8	002-EF-D	9.3E-04	0.500	0.187%	YES	a	0.38%
53	2,4-Dimethylpyridine	10	002-EF-E	9.2E-04	0.500	0.183%	YES	a	0.38%
53	2,4-Dimethylpyridine	12	002-EF-F	9.3E-04	0.500	0.186%	YES	a	0.38%
53	2,4-Dimethylpyridine	14	002-EF-G	8.8E-04	0.500	0.176%	YES	a	0.38%
53	2,4-Dimethylpyridine	16	002-EF-H	9.0E-04	0.50	0.180%	YES	a	0.38%

Table D.2. SX-104 Calculated Data

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
1	Ammonia	2	001-IN-A	2.6E+02	25.000	1048%			2.41%
1	Ammonia	4	001-IN-B	2.8E+02	25.000	1126%			2.41%
1	Ammonia	6	001-IN-C	2.8E+02	25.000	1106%			2.41%
1	Ammonia	8	001-IN-D	2.8E+02	25.000	1103%			2.41%
1	Ammonia	10	001-IN-E	2.7E+02	25.000	1065%			2.41%
1	Ammonia	12	001-IN-F	2.6E+02	25.000	1041%			2.41%
1	Ammonia	14	001-IN-G	2.1E+02	25.000	856%			2.41%
1	Ammonia	16	001-IN-H	2.5E+02	25.000	1000%			2.41%
1	Ammonia	2	001-EF-A	2.5E+00	25.000	9.90%			2.41%
1	Ammonia	4	001-EF-B	1.8E+02	25.000	709%			2.41%
1	Ammonia	6	001-EF-C	2.9E+02	25.000	1163%			2.41%
1	Ammonia	8	001-EF-D	2.9E+02	25.000	1163%			2.41%
1	Ammonia	10	001-EF-E	2.5E+02	25.000	1015%			2.41%
1	Ammonia	12	001-EF-F	2.1E+02	25.000	843%			2.41%
1	Ammonia	14	001-EF-G	2.6E+02	25.000	1040%			2.41%
1	Ammonia	16	001-EF-H	2.2E+02	25.000	899%			2.41%
1	Ammonia	2	002-IN-A	2.5E+02	25.000	1015%			2.41%
1	Ammonia	4	002-IN-B	3.0E+02	25.000	1181%			2.41%
1	Ammonia	6	002-IN-C	2.8E+02	25.000	1103%			2.41%
1	Ammonia	8	002-IN-D	1.1E+02	25.000	450%			2.41%
1	Ammonia	10	002-IN-E	2.8E+02	25.000	1129%			2.41%
1	Ammonia	12	002-IN-F	2.7E+02	25.000	1066%			2.41%
1	Ammonia	14	002-IN-G	3.0E+02	25.000	1213%			2.41%
1	Ammonia	16	002-IN-H	2.7E+02	25.000	1067%			2.41%
1	Ammonia	2	002-EF-A	1.1E+02	25.000	434%			2.41%
1	Ammonia	4	002-EF-B	1.7E+02	25.000	667%			2.41%
1	Ammonia	6	002-EF-C	2.5E+02	25.000	1020%			2.41%
1	Ammonia	8	002-EF-D	2.6E+02	25.000	1057%			2.41%
1	Ammonia	10	002-EF-E	2.6E+02	25.000	1031%			2.41%
1	Ammonia	12	002-EF-F	9.0E+01	25.000	359%			2.41%
1	Ammonia	14	002-EF-G	2.5E+02	25.000	986%			2.41%
1	Ammonia	16	002-EF-H	2.9E+02	25.000	1157%			2.41%
3	Mercury	2	001-IN-A	4.2E-04	0.003	14.1%			7.59%
3	Mercury	4	001-IN-B	4.7E-04	0.003	15.5%			7.59%
3	Mercury	6	001-IN-C	4.5E-04	0.003	14.8%			7.59%
3	Mercury	8	001-IN-D	4.5E-04	0.003	15.0%			7.59%
3	Mercury	10	001-IN-E	4.3E-04	0.003	14.3%			7.59%
3	Mercury	12	001-IN-F	3.7E-04	0.003	12.4%			7.59%
3	Mercury	14	001-IN-G	4.1E-04	0.003	13.5%			7.59%
3	Mercury	16	001-IN-H	3.6E-04	0.003	12.1%			7.59%
3	Mercury	2	001-EF-A	2.0E-04	0.003	6.59%	YES		7.59%
3	Mercury	4	001-EF-B	2.0E-04	0.003	6.75%	YES		7.59%
3	Mercury	6	001-EF-C	2.2E-04	0.003	7.24%	YES		7.59%
3	Mercury	8	001-EF-D	1.9E-04	0.003	6.47%	YES		7.59%
3	Mercury	10	001-EF-E	2.0E-04	0.003	6.59%	YES		7.59%
3	Mercury	12	001-EF-F	2.0E-04	0.003	6.53%	YES		7.59%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
3	Mercury	14	001-EF-G	2.0E-04	0.003	6.50%	YES		7.59%
3	Mercury	16	001-EF-H	2.0E-04	0.003	6.56%	YES		7.59%
3	Mercury	2	002-IN-A	3.9E-04	0.003	13.1%			7.59%
3	Mercury	4	002-IN-B	4.5E-04	0.003	15.0%			7.59%
3	Mercury	6	002-IN-C	2.0E-04	0.003	6.58%	YES		7.59%
3	Mercury	8	002-IN-D	3.9E-04	0.003	12.8%			7.59%
3	Mercury	10	002-IN-E	4.0E-04	0.003	13.4%			7.59%
3	Mercury	12	002-IN-F	3.4E-04	0.003	11.3%			7.59%
3	Mercury	14	002-IN-G	3.3E-04	0.003	11.1%			7.59%
3	Mercury	16	002-IN-H	3.2E-04	0.003	10.6%			7.59%
3	Mercury	2	002-EF-A	2.0E-04	0.003	6.67%	YES		7.59%
3	Mercury	4	002-EF-B	2.3E-04	0.003	7.59%	YES		7.59%
3	Mercury	6	002-EF-C	2.1E-04	0.003	6.82%	YES		7.59%
3	Mercury	8	002-EF-D	1.9E-04	0.003	6.41%	YES		7.59%
3	Mercury	10	002-EF-E	2.0E-04	0.003	6.59%	YES		7.59%
3	Mercury	12	002-EF-F	2.0E-04	0.003	6.54%	YES		7.59%
3	Mercury	14	002-EF-G	2.0E-04	0.003	6.70%	YES		7.59%
3	Mercury	16	002-EF-H	2.0E-04	0.003	6.74%	YES		7.59%
4	1,3-Butadiene	2	001-IN-A	1.8E-02	1.000	1.82%	YES		1.98%
4	1,3-Butadiene	4	001-IN-B	1.9E-02	1.000	1.86%	YES		1.98%
4	1,3-Butadiene	6	001-IN-C	1.8E-02	1.000	1.85%	YES		1.98%
4	1,3-Butadiene	8	001-IN-D	1.9E-02	1.000	1.85%	YES		1.98%
4	1,3-Butadiene	10	001-IN-E	1.8E-02	1.000	1.83%	YES		1.98%
4	1,3-Butadiene	12	001-IN-F	1.8E-02	1.000	1.80%	YES		1.98%
4	1,3-Butadiene	14	001-IN-G	1.9E-02	1.000	1.87%	YES		1.98%
4	1,3-Butadiene	16	001-IN-H	1.9E-02	1.000	1.86%	YES		1.98%
4	1,3-Butadiene	2	001-EF-A	1.9E-02	1.000	1.88%	YES		1.98%
4	1,3-Butadiene	4	001-EF-B	2.0E-02	1.000	1.98%	YES		1.98%
4	1,3-Butadiene	6	001-EF-C	1.8E-02	1.000	1.84%	YES		1.98%
4	1,3-Butadiene	8	001-EF-D	1.8E-02	1.000	1.83%	YES		1.98%
4	1,3-Butadiene	10	001-EF-E	1.8E-02	1.000	1.83%	YES		1.98%
4	1,3-Butadiene	12	001-EF-F	1.8E-02	1.000	1.82%	YES		1.98%
4	1,3-Butadiene	14	001-EF-G	1.8E-02	1.000	1.81%	YES		1.98%
4	1,3-Butadiene	16	001-EF-H	1.8E-02	1.000	1.82%	YES		1.98%
4	1,3-Butadiene	2	002-IN-A	1.8E-02	1.000	1.81%	YES		1.98%
4	1,3-Butadiene	4	002-IN-B	1.9E-02	1.000	1.88%	YES		1.98%
4	1,3-Butadiene	6	002-IN-C	1.8E-02	1.000	1.78%	YES		1.98%
4	1,3-Butadiene	8	002-IN-D	1.8E-02	1.000	1.78%	YES		1.98%
4	1,3-Butadiene	10	002-IN-E	1.9E-02	1.000	1.86%	YES		1.98%
4	1,3-Butadiene	12	002-IN-F	1.8E-02	1.000	1.83%	YES		1.98%
4	1,3-Butadiene	14	002-IN-G	1.8E-02	1.000	1.83%	YES		1.98%
4	1,3-Butadiene	16	002-IN-H	1.8E-02	1.000	1.84%	YES		1.98%
4	1,3-Butadiene	2	002-EF-A	1.9E-02	1.000	1.90%	YES		1.98%
4	1,3-Butadiene	4	002-EF-B	1.8E-02	1.000	1.83%	YES		1.98%
4	1,3-Butadiene	6	002-EF-C	1.9E-02	1.000	1.94%	YES		1.98%
4	1,3-Butadiene	8	002-EF-D	1.9E-02	1.000	1.94%	YES		1.98%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
4	1,3-Butadiene	10	002-EF-E	1.8E-02	1.000	1.83%	YES		1.98%
4	1,3-Butadiene	12	002-EF-F	1.8E-02	1.000	1.84%	YES		1.98%
4	1,3-Butadiene	14	002-EF-G	1.8E-02	1.000	1.84%	YES		1.98%
4	1,3-Butadiene	16	002-EF-H	1.8E-02	1.000	1.84%	YES		1.98%
5	Benzene	2	001-IN-A	2.0E-03	0.500	0.403%			0.044%
5	Benzene	4	001-IN-B	2.4E-03	0.500	0.482%			0.044%
5	Benzene	6	001-IN-C	2.5E-03	0.500	0.491%			0.044%
5	Benzene	8	001-IN-D	2.2E-03	0.500	0.444%			0.044%
5	Benzene	10	001-IN-E	2.2E-03	0.500	0.433%			0.044%
5	Benzene	12	001-IN-F	2.2E-03	0.500	0.446%			0.044%
5	Benzene	14	001-IN-G	2.3E-03	0.500	0.470%			0.044%
5	Benzene	16	001-IN-H	2.3E-03	0.500	0.454%			0.044%
5	Benzene	2	001-EF-A	2.1E-04	0.500	0.042%	YES	U	0.044%
5	Benzene	4	001-EF-B	2.1E-04	0.500	0.042%	YES	U	0.044%
5	Benzene	6	001-EF-C	2.1E-04	0.500	0.042%	YES	U	0.044%
5	Benzene	8	001-EF-D	2.2E-04	0.500	0.043%	YES	U	0.044%
5	Benzene	10	001-EF-E	2.1E-04	0.500	0.042%	YES	U	0.044%
5	Benzene	12	001-EF-F	2.1E-04	0.500	0.042%	YES	U	0.044%
5	Benzene	14	001-EF-G	2.2E-04	0.500	0.044%	YES	U	0.044%
5	Benzene	16	001-EF-H	2.2E-04	0.500	0.044%	YES	U	0.044%
5	Benzene	2	002-IN-A	2.4E-03	0.500	0.473%			0.044%
5	Benzene	4	002-IN-B	2.6E-03	0.500	0.516%			0.044%
5	Benzene	6	002-IN-C	2.4E-03	0.500	0.487%			0.044%
5	Benzene	8	002-IN-D	2.4E-03	0.500	0.485%			0.044%
5	Benzene	10	002-IN-E	2.5E-03	0.500	0.495%			0.044%
5	Benzene	12	002-IN-F	2.1E-03	0.500	0.412%			0.044%
5	Benzene	14	002-IN-G	2.3E-03	0.500	0.450%			0.044%
5	Benzene	16	002-IN-H	2.3E-03	0.500	0.469%			0.044%
5	Benzene	2	002-EF-A	1.1E-04	0.500	0.022%	YES	U	0.044%
5	Benzene	4	002-EF-B	3.7E-04	0.500	0.074%		J	0.044%
5	Benzene	6	002-EF-C	1.2E-04	0.500	0.023%	YES	U	0.044%
5	Benzene	8	002-EF-D	1.2E-04	0.500	0.024%	YES	U	0.044%
5	Benzene	10	002-EF-E	1.2E-04	0.500	0.024%	YES	U	0.044%
5	Benzene	12	002-EF-F	1.1E-04	0.500	0.023%	YES	U	0.044%
5	Benzene	14	002-EF-G	1.1E-04	0.500	0.023%	YES	U	0.044%
5	Benzene	16	002-EF-H	1.2E-04	0.500	0.024%	YES	U	0.044%
6	Biphenyl	2	001-IN-A	1.6E-04	0.200	0.079%	YES	U	0.33%
6	Biphenyl	4	001-IN-B	1.6E-04	0.200	0.079%	YES	U	0.33%
6	Biphenyl	6	001-IN-C	1.5E-04	0.200	0.077%	YES	U	0.33%
6	Biphenyl	8	001-IN-D	1.6E-04	0.200	0.078%	YES	U	0.33%
6	Biphenyl	10	001-IN-E	1.7E-04	0.200	0.083%	YES	U	0.33%
6	Biphenyl	12	001-IN-F	1.6E-04	0.200	0.080%	YES	U	0.33%
6	Biphenyl	14	001-IN-G	1.6E-04	0.200	0.082%	YES	U	0.33%
6	Biphenyl	16	001-IN-H	1.7E-04	0.200	0.084%	YES	U	0.33%
6	Biphenyl	2	001-EF-A	1.6E-04	0.200	0.079%	YES	U	0.33%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
6	Biphenyl	4	001-EF-B	1.6E-04	0.200	0.078%	YES	QU	0.33%
6	Biphenyl	6	001-EF-C	1.6E-04	0.200	0.078%	YES	U	0.33%
6	Biphenyl	8	001-EF-D	1.6E-04	0.200	0.081%	YES	U	0.33%
6	Biphenyl	10	001-EF-E	1.6E-04	0.200	0.078%	YES	U	0.33%
6	Biphenyl	12	001-EF-F	1.3E-04	0.200	0.066%	YES	U	0.33%
6	Biphenyl	14	001-EF-G	1.7E-04	0.200	0.084%	YES	U	0.33%
6	Biphenyl	16	001-EF-H	1.6E-04	0.200	0.082%	YES	U	0.33%
6	Biphenyl	2	002-IN-A	1.5E-04	0.200	0.077%	YES	U	0.33%
6	Biphenyl	4	002-IN-B	1.6E-04	0.200	0.080%	YES	U	0.33%
6	Biphenyl	6	002-IN-C	1.7E-04	0.200	0.083%	YES	U	0.33%
6	Biphenyl	8	002-IN-D	6.6E-04	0.200	0.330%	YES	U	0.33%
6	Biphenyl	10	002-IN-E	1.6E-04	0.200	0.078%	YES	U	0.33%
6	Biphenyl	12	002-IN-F		0.200				0.33%
6	Biphenyl	14	002-IN-G	1.6E-04	0.200	0.080%	YES	U	0.33%
6	Biphenyl	16	002-IN-H	1.6E-04	0.200	0.081%	YES	HU	0.33%
6	Biphenyl	2	002-EF-A	1.5E-04	0.200	0.073%	YES	U	0.33%
6	Biphenyl	4	002-EF-B	1.6E-04	0.200	0.080%	YES	QU	0.33%
6	Biphenyl	6	002-EF-C	1.5E-04	0.200	0.076%	YES	U	0.33%
6	Biphenyl	8	002-EF-D	1.8E-04	0.200	0.088%		J	0.33%
6	Biphenyl	10	002-EF-E	1.6E-04	0.200	0.081%	YES	U	0.33%
6	Biphenyl	12	002-EF-F	1.5E-04	0.200	0.075%	YES	U	0.33%
6	Biphenyl	14	002-EF-G	1.5E-04	0.200	0.075%	YES	U	0.33%
6	Biphenyl	16	002-EF-H	1.6E-04	0.200	0.080%	YES	U	0.33%
7	1-Butanol	2	001-IN-A	6.1E-02	20.000	0.306%			0.0023%
7	1-Butanol	4	001-IN-B	7.0E-02	20.000	0.349%		E	0.0023%
7	1-Butanol	6	001-IN-C	7.3E-02	20.000	0.363%		E	0.0023%
7	1-Butanol	8	001-IN-D	7.3E-02	20.000	0.367%		E	0.0023%
7	1-Butanol	10	001-IN-E	6.4E-02	20.000	0.321%			0.0023%
7	1-Butanol	12	001-IN-F	6.3E-02	20.000	0.314%			0.0023%
7	1-Butanol	14	001-IN-G	6.6E-02	20.000	0.330%			0.0023%
7	1-Butanol	16	001-IN-H	7.3E-02	20.000	0.363%		E	0.0023%
7	1-Butanol	2	001-EF-A	4.3E-04	20.000	0.002%	YES	U	0.0023%
7	1-Butanol	4	001-EF-B	4.3E-04	20.000	0.002%	YES	U	0.0023%
7	1-Butanol	6	001-EF-C	4.4E-04	20.000	0.002%	YES	U	0.0023%
7	1-Butanol	8	001-EF-D	4.5E-04	20.000	0.002%	YES	U	0.0023%
7	1-Butanol	10	001-EF-E	4.3E-04	20.000	0.002%	YES	U	0.0023%
7	1-Butanol	12	001-EF-F	4.4E-04	20.000	0.002%	YES	U	0.0023%
7	1-Butanol	14	001-EF-G	4.6E-04	20.000	0.002%	YES	U	0.0023%
7	1-Butanol	16	001-EF-H	7.8E-04	20.000	0.004%		J	0.0023%
7	1-Butanol	2	002-IN-A	5.1E-02	20.000	0.257%			0.0023%
7	1-Butanol	4	002-IN-B	7.8E-02	20.000	0.389%		E	0.0023%
7	1-Butanol	6	002-IN-C	6.9E-02	20.000	0.345%		E	0.0023%
7	1-Butanol	8	002-IN-D	7.1E-02	20.000	0.357%		E	0.0023%
7	1-Butanol	10	002-IN-E	7.6E-02	20.000	0.380%		E	0.0023%
7	1-Butanol	12	002-IN-F	6.7E-02	20.000	0.334%			0.0023%
7	1-Butanol	14	002-IN-G	6.7E-02	20.000	0.336%		E	0.0023%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
7	1-Butanol	16	002-IN-H	6.8E-02	20.000	0.341%			0.0023%
7	1-Butanol	2	002-EF-A	2.1E-04	20.000	0.001%	YES	U	0.0023%
7	1-Butanol	4	002-EF-B	7.3E-04	20.000	0.004%		J	0.0023%
7	1-Butanol	6	002-EF-C	3.2E-03	20.000	0.016%			0.0023%
7	1-Butanol	8	002-EF-D	4.9E-04	20.000	0.002%		J	0.0023%
7	1-Butanol	10	002-EF-E	4.1E-04	20.000	0.002%		J	0.0023%
7	1-Butanol	12	002-EF-F	2.2E-04	20.000	0.001%	YES	U	0.0023%
7	1-Butanol	14	002-EF-G	2.2E-04	20.000	0.001%	YES	U	0.0023%
7	1-Butanol	16	002-EF-H	2.9E-04	20.000	0.001%		J	0.0023%
8	Methanol	2	001-IN-A	1.8E+00	200.00	0.902%	YES		1.03%
8	Methanol	4	001-IN-B	1.9E+00	200.00	0.930%	YES		1.03%
8	Methanol	6	001-IN-C	1.9E+00	200.00	0.941%	YES		1.03%
8	Methanol	8	001-IN-D	1.9E+00	200.00	0.947%	YES		1.03%
8	Methanol	10	001-IN-E	1.9E+00	200.00	0.951%	YES		1.03%
8	Methanol	12	001-IN-F	2.0E+00	200.00	1.01%	YES		1.03%
8	Methanol	14	001-IN-G	1.9E+00	200.00	0.946%	YES		1.03%
8	Methanol	16	001-IN-H	2.0E+00	200.00	1.000%	YES		1.03%
8	Methanol	2	001-EF-A	1.9E+00	200.00	0.944%	YES		1.03%
8	Methanol	4	001-EF-B	2.0E+00	200.00	0.980%	YES		1.03%
8	Methanol	6	001-EF-C	2.0E+00	200.00	0.990%	YES		1.03%
8	Methanol	8	001-EF-D	2.0E+00	200.00	1.02%	YES		1.03%
8	Methanol	10	001-EF-E	2.0E+00	200.00	1.00%	YES		1.03%
8	Methanol	12	001-EF-F	2.1E+00	200.00	1.03%	YES		1.03%
8	Methanol	14	001-EF-G	2.0E+00	200.00	0.996%	YES		1.03%
8	Methanol	16	001-EF-H	1.9E+00	200.00	0.975%	YES		1.03%
8	Methanol	2	002-IN-A	1.8E+00	200.00	0.883%	YES		1.03%
8	Methanol	4	002-IN-B	1.9E+00	200.00	0.926%	YES		1.03%
8	Methanol	6	002-IN-C	2.0E+00	200.00	0.989%	YES		1.03%
8	Methanol	8	002-IN-D	1.9E+00	200.00	0.937%	YES		1.03%
8	Methanol	10	002-IN-E	1.9E+00	200.00	0.968%	YES		1.03%
8	Methanol	12	002-IN-F	2.0E+00	200.00	0.990%	YES		1.03%
8	Methanol	14	002-IN-G	1.8E+00	200.00	0.891%	YES		1.03%
8	Methanol	16	002-IN-H	1.8E+00	200.00	0.915%	YES		1.03%
8	Methanol	2	002-EF-A	1.8E+00	200.00	0.905%	YES		1.03%
8	Methanol	4	002-EF-B	1.8E+00	200.00	0.898%	YES		1.03%
8	Methanol	6	002-EF-C	1.9E+00	200.00	0.936%	YES		1.03%
8	Methanol	8	002-EF-D	2.0E+00	200.00	0.990%	YES		1.03%
8	Methanol	10	002-EF-E	2.0E+00	200.00	1.02%	YES		1.03%
8	Methanol	12	002-EF-F	2.0E+00	200.00	1.01%	YES		1.03%
8	Methanol	14	002-EF-G	1.9E+00	200.00	0.964%	YES		1.03%
8	Methanol	16	002-EF-H	1.9E+00	200.00	0.970%	YES		1.03%
9	2-Hexanone	2	001-IN-A	4.9E-03	5.000	0.098%			0.0028%
9	2-Hexanone	4	001-IN-B	1.9E-02	5.000	0.376%			0.0028%
9	2-Hexanone	6	001-IN-C	2.0E-02	5.000	0.395%			0.0028%
9	2-Hexanone	8	001-IN-D	1.7E-02	5.000	0.334%			0.0028%
9	2-Hexanone	10	001-IN-E	1.7E-02	5.000	0.350%			0.0028%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
9	2-Hexanone	12	001-IN-F	1.5E-02	5.000	0.309%			0.0028%
9	2-Hexanone	14	001-IN-G	1.6E-02	5.000	0.330%			0.0028%
9	2-Hexanone	16	001-IN-H	4.3E-03	5.000	0.085%			0.0028%
9	2-Hexanone	2	001-EF-A	1.3E-04	5.000	0.003%	YES	U	0.0028%
9	2-Hexanone	4	001-EF-B	1.3E-04	5.000	0.003%	YES	U	0.0028%
9	2-Hexanone	6	001-EF-C	1.3E-04	5.000	0.003%	YES	U	0.0028%
9	2-Hexanone	8	001-EF-D	1.4E-04	5.000	0.003%	YES	U	0.0028%
9	2-Hexanone	10	001-EF-E	1.3E-04	5.000	0.003%	YES	U	0.0028%
9	2-Hexanone	12	001-EF-F	1.3E-04	5.000	0.003%	YES	U	0.0028%
9	2-Hexanone	14	001-EF-G	1.4E-04	5.000	0.003%	YES	U	0.0028%
9	2-Hexanone	16	001-EF-H	1.4E-04	5.000	0.003%	YES	U	0.0028%
9	2-Hexanone	2	002-IN-A	5.7E-03	5.000	0.114%			0.0028%
9	2-Hexanone	4	002-IN-B	6.9E-03	5.000	0.138%			0.0028%
9	2-Hexanone	6	002-IN-C	5.6E-03	5.000	0.112%			0.0028%
9	2-Hexanone	8	002-IN-D	5.6E-03	5.000	0.111%			0.0028%
9	2-Hexanone	10	002-IN-E	7.0E-03	5.000	0.140%			0.0028%
9	2-Hexanone	12	002-IN-F	5.7E-03	5.000	0.114%			0.0028%
9	2-Hexanone	14	002-IN-G	5.7E-03	5.000	0.115%			0.0028%
9	2-Hexanone	16	002-IN-H	5.5E-03	5.000	0.111%			0.0028%
9	2-Hexanone	2	002-EF-A	8.6E-05	5.000	0.002%	YES	U	0.0028%
9	2-Hexanone	4	002-EF-B	8.8E-05	5.000	0.002%	YES	U	0.0028%
9	2-Hexanone	6	002-EF-C	9.0E-05	5.000	0.002%	YES	U	0.0028%
9	2-Hexanone	8	002-EF-D	9.2E-05	5.000	0.002%	YES	U	0.0028%
9	2-Hexanone	10	002-EF-E	9.3E-05	5.000	0.002%	YES	U	0.0028%
9	2-Hexanone	12	002-EF-F	8.9E-05	5.000	0.002%	YES	U	0.0028%
9	2-Hexanone	14	002-EF-G	9.0E-05	5.000	0.002%	YES	U	0.0028%
9	2-Hexanone	16	002-EF-H	9.3E-05	5.000	0.002%	YES	U	0.0028%
11	4-Methyl-2-hexanone	2	001-IN-A	2.1E-04	0.500	0.043%		J	0.026%
11	4-Methyl-2-hexanone	4	001-IN-B	2.6E-04	0.500	0.053%		J	0.026%
11	4-Methyl-2-hexanone	6	001-IN-C	2.8E-04	0.500	0.056%		J	0.026%
11	4-Methyl-2-hexanone	8	001-IN-D	2.5E-04	0.500	0.051%		J	0.026%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
11	4-Methyl-2-hexanone	10	001-IN-E	2.4E-04	0.500	0.048%		J	0.026%
11	4-Methyl-2-hexanone	12	001-IN-F	2.2E-04	0.500	0.044%		J	0.026%
11	4-Methyl-2-hexanone	14	001-IN-G	2.4E-04	0.500	0.048%		J	0.026%
11	4-Methyl-2-hexanone	16	001-IN-H	2.0E-04	0.500	0.040%		J	0.026%
11	4-Methyl-2-hexanone	2	001-EF-A	1.2E-04	0.500	0.024%	YES	U	0.026%
11	4-Methyl-2-hexanone	4	001-EF-B	1.2E-04	0.500	0.024%	YES	U	0.026%
11	4-Methyl-2-hexanone	6	001-EF-C	1.2E-04	0.500	0.025%	YES	U	0.026%
11	4-Methyl-2-hexanone	8	001-EF-D	1.3E-04	0.500	0.025%	YES	U	0.026%
11	4-Methyl-2-hexanone	10	001-EF-E	1.2E-04	0.500	0.024%	YES	U	0.026%
11	4-Methyl-2-hexanone	12	001-EF-F	1.2E-04	0.500	0.025%	YES	U	0.026%
11	4-Methyl-2-hexanone	14	001-EF-G	1.3E-04	0.500	0.026%	YES	U	0.026%
11	4-Methyl-2-hexanone	16	001-EF-H	1.3E-04	0.500	0.026%	YES	U	0.026%
11	4-Methyl-2-hexanone	2	002-IN-A	2.5E-04	0.500	0.051%		J	0.026%
11	4-Methyl-2-hexanone	4	002-IN-B	3.2E-04	0.500	0.064%		J	0.026%
11	4-Methyl-2-hexanone	6	002-IN-C	2.6E-04	0.500	0.052%		J	0.026%
11	4-Methyl-2-hexanone	8	002-IN-D	2.7E-04	0.500	0.054%		J	0.026%
11	4-Methyl-2-hexanone	10	002-IN-E	2.9E-04	0.500	0.057%		J	0.026%
11	4-Methyl-2-hexanone	12	002-IN-F	2.1E-04	0.500	0.042%		J	0.026%
11	4-Methyl-2-hexanone	14	002-IN-G	2.4E-04	0.500	0.048%		J	0.026%
11	4-Methyl-2-hexanone	16	002-IN-H	1.9E-04	0.500	0.038%		J	0.026%
11	4-Methyl-2-hexanone	2	002-EF-A	8.1E-05	0.500	0.016%	YES	U	0.026%
11	4-Methyl-2-hexanone	4	002-EF-B	8.3E-05	0.500	0.017%	YES	U	0.026%
11	4-Methyl-2-hexanone	6	002-EF-C	8.4E-05	0.500	0.017%	YES	U	0.026%
11	4-Methyl-2-hexanone	8	002-EF-D	8.6E-05	0.500	0.017%	YES	U	0.026%
11	4-Methyl-2-hexanone	10	002-EF-E	8.7E-05	0.500	0.017%	YES	U	0.026%
11	4-Methyl-2-hexanone	12	002-EF-F	8.3E-05	0.500	0.017%	YES	U	0.026%
11	4-Methyl-2-hexanone	14	002-EF-G	8.4E-05	0.500	0.017%	YES	U	0.026%
11	4-Methyl-2-hexanone	16	002-EF-H	8.7E-05	0.500	0.017%	YES	U	0.026%
13	3-Buten-2-one	2	001-IN-A	1.1E-03	0.200	0.540%			0.160%
13	3-Buten-2-one	4	001-IN-B	2.3E-03	0.200	1.17%			0.160%
13	3-Buten-2-one	6	001-IN-C	2.2E-03	0.200	1.10%			0.160%
13	3-Buten-2-one	8	001-IN-D	2.2E-03	0.200	1.10%			0.160%
13	3-Buten-2-one	10	001-IN-E	1.4E-03	0.200	0.714%			0.160%
13	3-Buten-2-one	12	001-IN-F	1.6E-03	0.200	0.783%			0.160%
13	3-Buten-2-one	14	001-IN-G	1.7E-03	0.200	0.829%			0.160%
13	3-Buten-2-one	16	001-IN-H	1.2E-03	0.200	0.611%			0.160%
13	3-Buten-2-one	2	001-EF-A	3.0E-04	0.200	0.151%	YES	U	0.160%
13	3-Buten-2-one	4	001-EF-B	3.0E-04	0.200	0.151%	YES	U	0.160%
13	3-Buten-2-one	6	001-EF-C	3.1E-04	0.200	0.153%	YES	U	0.160%
13	3-Buten-2-one	8	001-EF-D	3.1E-04	0.200	0.156%	YES	U	0.160%
13	3-Buten-2-one	10	001-EF-E	3.0E-04	0.200	0.151%	YES	U	0.160%
13	3-Buten-2-one	12	001-EF-F	3.0E-04	0.200	0.152%	YES	U	0.160%
13	3-Buten-2-one	14	001-EF-G	3.2E-04	0.200	0.160%	YES	U	0.160%
13	3-Buten-2-one	16	001-EF-H	3.2E-04	0.200	0.158%	YES	U	0.160%
13	3-Buten-2-one	2	002-IN-A	5.4E-04	0.200	0.268%		J	0.160%
13	3-Buten-2-one	4	002-IN-B	2.4E-03	0.200	1.19%			0.160%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
13	3-Buten-2-one	6	002-IN-C	2.5E-03	0.200	1.23%			0.160%
13	3-Buten-2-one	8	002-IN-D	2.2E-03	0.200	1.11%			0.160%
13	3-Buten-2-one	10	002-IN-E	1.9E-03	0.200	0.962%			0.160%
13	3-Buten-2-one	12	002-IN-F	1.1E-03	0.200	0.530%			0.160%
13	3-Buten-2-one	14	002-IN-G	1.3E-03	0.200	0.669%			0.160%
13	3-Buten-2-one	16	002-IN-H	9.9E-04	0.200	0.495%		J	0.160%
13	3-Buten-2-one	2	002-EF-A	2.1E-04	0.200	0.103%	YES	U	0.160%
13	3-Buten-2-one	4	002-EF-B	2.1E-04	0.200	0.105%	YES	U	0.160%
13	3-Buten-2-one	6	002-EF-C	2.1E-04	0.200	0.107%	YES	U	0.160%
13	3-Buten-2-one	8	002-EF-D	2.2E-04	0.200	0.110%	YES	U	0.160%
13	3-Buten-2-one	10	002-EF-E	2.2E-04	0.200	0.110%	YES	U	0.160%
13	3-Buten-2-one	12	002-EF-F	2.1E-04	0.200	0.106%	YES	U	0.160%
13	3-Buten-2-one	14	002-EF-G	2.1E-04	0.200	0.107%	YES	U	0.160%
13	3-Buten-2-one	16	002-EF-H	2.2E-04	0.200	0.111%	YES	U	0.160%
14	Formaldehyde	2	001-IN-A	9.2E-03	0.300	3.07%			0.58%
14	Formaldehyde	4	001-IN-B	1.0E-02	0.300	3.34%			0.58%
14	Formaldehyde	6	001-IN-C	8.0E-03	0.300	2.66%			0.58%
14	Formaldehyde	8	001-IN-D	5.7E-03	0.300	1.89%			0.58%
14	Formaldehyde	10	001-IN-E	3.6E-03	0.300	1.20%			0.58%
14	Formaldehyde	12	001-IN-F	2.2E-03	0.300	0.733%			0.58%
14	Formaldehyde	14	001-IN-G	1.2E-03	0.300	0.384%			0.58%
14	Formaldehyde	16	001-IN-H	1.8E-03	0.300	0.599%			0.58%
14	Formaldehyde	2	001-EF-A	5.2E-03	0.300	1.73%			0.58%
14	Formaldehyde	4	001-EF-B	4.1E-03	0.300	1.37%			0.58%
14	Formaldehyde	6	001-EF-C	2.8E-03	0.300	0.921%			0.58%
14	Formaldehyde	8	001-EF-D	1.7E-03	0.300	0.582%			0.58%
14	Formaldehyde	10	001-EF-E	1.7E-03	0.300	0.565%			0.58%
14	Formaldehyde	12	001-EF-F	1.7E-03	0.300	0.551%	YES		0.58%
14	Formaldehyde	14	001-EF-G	1.7E-03	0.300	0.554%	YES		0.58%
14	Formaldehyde	16	001-EF-H	1.7E-03	0.300	0.558%	YES		0.58%
14	Formaldehyde	2	002-IN-A	1.4E-02	0.300	4.75%			0.58%
14	Formaldehyde	4	002-IN-B	1.6E-02	0.300	5.49%			0.58%
14	Formaldehyde	6	002-IN-C	1.3E-02	0.300	4.46%			0.58%
14	Formaldehyde	8	002-IN-D	7.7E-03	0.300	2.57%			0.58%
14	Formaldehyde	10	002-IN-E	4.2E-03	0.300	1.41%			0.58%
14	Formaldehyde	12	002-IN-F	2.4E-03	0.300	0.799%			0.58%
14	Formaldehyde	14	002-IN-G	1.8E-03	0.300	0.601%			0.58%
14	Formaldehyde	16	002-IN-H	2.3E-03	0.300	0.760%			0.58%
14	Formaldehyde	2	002-EF-A	1.7E-03	0.300	0.571%	YES		0.58%
14	Formaldehyde	4	002-EF-B	2.5E-03	0.300	0.842%			0.58%
14	Formaldehyde	6	002-EF-C	1.7E-03	0.300	0.581%	YES		0.58%
14	Formaldehyde	8	002-EF-D	1.7E-03	0.300	0.570%	YES		0.58%
14	Formaldehyde	10	002-EF-E	1.6E-03	0.300	0.548%	YES		0.58%
14	Formaldehyde	12	002-EF-F	1.7E-03	0.300	0.556%	YES		0.58%
14	Formaldehyde	14	002-EF-G	1.6E-03	0.300	0.546%	YES		0.58%
14	Formaldehyde	16	002-EF-H	1.7E-03	0.300	0.555%	YES		0.58%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
15	Acetaldehyde	2	001-IN-A	1.2E-01	25.000	0.466%			0.0071%
15	Acetaldehyde	4	001-IN-B	1.4E-01	25.000	0.556%			0.0071%
15	Acetaldehyde	6	001-IN-C	1.3E-01	25.000	0.516%			0.0071%
15	Acetaldehyde	8	001-IN-D	1.2E-01	25.000	0.500%			0.0071%
15	Acetaldehyde	10	001-IN-E	1.2E-01	25.000	0.482%			0.0071%
15	Acetaldehyde	12	001-IN-F	1.2E-01	25.000	0.474%			0.0071%
15	Acetaldehyde	14	001-IN-G	6.7E-02	25.000	0.267%			0.0071%
15	Acetaldehyde	16	001-IN-H	1.2E-01	25.000	0.480%			0.0071%
15	Acetaldehyde	2	001-EF-A	1.6E-02	25.000	0.063%			0.0071%
15	Acetaldehyde	4	001-EF-B	6.3E-02	25.000	0.252%			0.0071%
15	Acetaldehyde	6	001-EF-C	7.0E-02	25.000	0.281%			0.0071%
15	Acetaldehyde	8	001-EF-D	6.9E-02	25.000	0.274%			0.0071%
15	Acetaldehyde	10	001-EF-E	8.4E-02	25.000	0.335%			0.0071%
15	Acetaldehyde	12	001-EF-F	7.0E-02	25.000	0.280%			0.0071%
15	Acetaldehyde	14	001-EF-G	6.8E-02	25.000	0.272%			0.0071%
15	Acetaldehyde	16	001-EF-H	6.9E-02	25.000	0.274%			0.0071%
15	Acetaldehyde	2	002-IN-A	9.0E-02	25.000	0.362%			0.0071%
15	Acetaldehyde	4	002-IN-B	1.4E-01	25.000	0.550%			0.0071%
15	Acetaldehyde	6	002-IN-C	1.3E-01	25.000	0.529%			0.0071%
15	Acetaldehyde	8	002-IN-D	1.2E-01	25.000	0.484%			0.0071%
15	Acetaldehyde	10	002-IN-E	1.3E-01	25.000	0.507%			0.0071%
15	Acetaldehyde	12	002-IN-F	1.1E-01	25.000	0.442%			0.0071%
15	Acetaldehyde	14	002-IN-G	1.2E-01	25.000	0.491%			0.0071%
15	Acetaldehyde	16	002-IN-H	1.3E-01	25.000	0.540%			0.0071%
15	Acetaldehyde	2	002-EF-A	4.4E-02	25.000	0.177%			0.0071%
15	Acetaldehyde	4	002-EF-B	2.7E-02	25.000	0.107%			0.0071%
15	Acetaldehyde	6	002-EF-C	7.1E-02	25.000	0.285%			0.0071%
15	Acetaldehyde	8	002-EF-D	8.6E-02	25.000	0.345%			0.0071%
15	Acetaldehyde	10	002-EF-E	9.0E-02	25.000	0.359%			0.0071%
15	Acetaldehyde	12	002-EF-F	4.5E-02	25.000	0.182%			0.0071%
15	Acetaldehyde	14	002-EF-G	8.9E-02	25.000	0.357%			0.0071%
15	Acetaldehyde	16	002-EF-H	7.3E-02	25.000	0.291%			0.0071%
16	Butanal/Butyraldehyde	2	001-IN-A	6.0E-03	25.000	0.024%			0.0014%
16	Butanal/Butyraldehyde	4	001-IN-B	1.1E-02	25.000	0.046%			0.0014%
16	Butanal/Butyraldehyde	6	001-IN-C	1.1E-02	25.000	0.045%			0.0014%
16	Butanal/Butyraldehyde	8	001-IN-D	1.4E-02	25.000	0.055%			0.0014%
16	Butanal/Butyraldehyde	10	001-IN-E	8.7E-03	25.000	0.035%			0.0014%
16	Butanal/Butyraldehyde	12	001-IN-F	7.7E-03	25.000	0.031%			0.0014%
16	Butanal/Butyraldehyde	14	001-IN-G	8.5E-03	25.000	0.034%			0.0014%
16	Butanal/Butyraldehyde	16	001-IN-H	6.6E-03	25.000	0.026%			0.0014%
16	Butanal/Butyraldehyde	2	001-EF-A	3.2E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	4	001-EF-B	3.2E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	6	001-EF-C	3.2E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	8	001-EF-D	3.3E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	10	001-EF-E	3.2E-04	25.000	0.001%	YES	U	0.0014%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
16	Butanal/Butyraldehyde	12	001-EF-F	3.2E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	14	001-EF-G	3.4E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	16	001-EF-H	3.3E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	2	002-IN-A	3.0E-03	25.000	0.012%			0.0014%
16	Butanal/Butyraldehyde	4	002-IN-B	6.7E-03	25.000	0.027%			0.0014%
16	Butanal/Butyraldehyde	6	002-IN-C	1.3E-02	25.000	0.053%			0.0014%
16	Butanal/Butyraldehyde	8	002-IN-D	1.4E-02	25.000	0.054%			0.0014%
16	Butanal/Butyraldehyde	10	002-IN-E	1.1E-02	25.000	0.046%			0.0014%
16	Butanal/Butyraldehyde	12	002-IN-F	7.1E-03	25.000	0.028%			0.0014%
16	Butanal/Butyraldehyde	14	002-IN-G	7.9E-03	25.000	0.032%			0.0014%
16	Butanal/Butyraldehyde	16	002-IN-H	6.7E-03	25.000	0.027%			0.0014%
16	Butanal/Butyraldehyde	2	002-EF-A	2.9E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	4	002-EF-B	2.9E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	6	002-EF-C	3.0E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	8	002-EF-D	3.1E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	10	002-EF-E	3.1E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	12	002-EF-F	3.0E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	14	002-EF-G	3.0E-04	25.000	0.001%	YES	U	0.0014%
16	Butanal/Butyraldehyde	16	002-EF-H	3.1E-04	25.000	0.001%	YES	U	0.0014%
19	2-Propenal/Acrolein	2	001-IN-A	8.8E-04	0.100	0.880%	YES		0.93%
19	2-Propenal/Acrolein	4	001-IN-B	9.0E-04	0.100	0.896%	YES		0.93%
19	2-Propenal/Acrolein	6	001-IN-C	8.9E-04	0.100	0.889%	YES		0.93%
19	2-Propenal/Acrolein	8	001-IN-D	8.9E-04	0.100	0.892%	YES		0.93%
19	2-Propenal/Acrolein	10	001-IN-E	8.8E-04	0.100	0.877%	YES		0.93%
19	2-Propenal/Acrolein	12	001-IN-F	8.8E-04	0.100	0.878%	YES		0.93%
19	2-Propenal/Acrolein	14	001-IN-G	5.1E-04	0.100	0.514%	YES		0.93%
19	2-Propenal/Acrolein	16	001-IN-H	9.1E-04	0.100	0.907%	YES		0.93%
19	2-Propenal/Acrolein	2	001-EF-A	2.6E-04	0.100	0.257%	YES		0.93%
19	2-Propenal/Acrolein	4	001-EF-B	9.2E-04	0.100	0.917%	YES		0.93%
19	2-Propenal/Acrolein	6	001-EF-C	8.9E-04	0.100	0.892%	YES		0.93%
19	2-Propenal/Acrolein	8	001-EF-D	9.0E-04	0.100	0.899%	YES		0.93%
19	2-Propenal/Acrolein	10	001-EF-E	8.9E-04	0.100	0.890%	YES		0.93%
19	2-Propenal/Acrolein	12	001-EF-F	8.9E-04	0.100	0.886%	YES		0.93%
19	2-Propenal/Acrolein	14	001-EF-G	8.9E-04	0.100	0.890%	YES		0.93%
19	2-Propenal/Acrolein	16	001-EF-H	9.0E-04	0.100	0.897%	YES		0.93%
19	2-Propenal/Acrolein	2	002-IN-A	8.7E-04	0.100	0.867%	YES		0.93%
19	2-Propenal/Acrolein	4	002-IN-B	9.0E-04	0.100	0.901%	YES		0.93%
19	2-Propenal/Acrolein	6	002-IN-C	9.0E-04	0.100	0.897%	YES		0.93%
19	2-Propenal/Acrolein	8	002-IN-D	9.0E-04	0.100	0.896%	YES		0.93%
19	2-Propenal/Acrolein	10	002-IN-E	8.7E-04	0.100	0.874%	YES		0.93%
19	2-Propenal/Acrolein	12	002-IN-F	9.0E-04	0.100	0.904%	YES		0.93%
19	2-Propenal/Acrolein	14	002-IN-G	8.9E-04	0.100	0.894%	YES		0.93%
19	2-Propenal/Acrolein	16	002-IN-H	9.0E-04	0.100	0.898%	YES		0.93%
19	2-Propenal/Acrolein	2	002-EF-A	9.2E-04	0.100	0.917%	YES		0.93%
19	2-Propenal/Acrolein	4	002-EF-B	8.8E-04	0.100	0.878%	YES		0.93%
19	2-Propenal/Acrolein	6	002-EF-C	9.3E-04	0.100	0.934%	YES		0.93%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
19	2-Propenal/Acrolein	8	002-EF-D	9.2E-04	0.100	0.916%	YES		0.93%
19	2-Propenal/Acrolein	10	002-EF-E	8.8E-04	0.100	0.881%	YES		0.93%
19	2-Propenal/Acrolein	12	002-EF-F	8.9E-04	0.100	0.893%	YES		0.93%
19	2-Propenal/Acrolein	14	002-EF-G	8.8E-04	0.100	0.877%	YES		0.93%
19	2-Propenal/Acrolein	16	002-EF-H	8.9E-04	0.100	0.892%	YES		0.93%
20	Furan	2	001-IN-A	2.3E-05	0.001	2.30%	YES	U	2.52%
20	Furan	4	001-IN-B	2.4E-05	0.001	2.37%	YES	U	2.52%
20	Furan	6	001-IN-C	2.3E-05	0.001	2.25%	YES	U	2.52%
20	Furan	8	001-IN-D	2.3E-05	0.001	2.32%	YES	U	2.52%
20	Furan	10	001-IN-E	2.4E-05	0.001	2.42%	YES	U	2.52%
20	Furan	12	001-IN-F	2.5E-05	0.001	2.52%	YES	U	2.52%
20	Furan	14	001-IN-G	2.4E-05	0.001	2.43%	YES	U	2.52%
20	Furan	16	001-IN-H	2.4E-05	0.001	2.41%	YES	U	2.52%
20	Furan	2	001-EF-A	2.3E-05	0.001	2.27%	YES	U	2.52%
20	Furan	4	001-EF-B	2.4E-05	0.001	2.36%	YES	U	2.52%
20	Furan	6	001-EF-C	2.3E-05	0.001	2.29%	YES	U	2.52%
20	Furan	8	001-EF-D	2.3E-05	0.001	2.28%	YES	U	2.52%
20	Furan	10	001-EF-E	2.3E-05	0.001	2.33%	YES	U	2.52%
20	Furan	12	001-EF-F	2.4E-05	0.001	2.37%	YES	U	2.52%
20	Furan	14	001-EF-G	2.4E-05	0.001	2.43%	YES	U	2.52%
20	Furan	16	001-EF-H		0.001				2.52%
20	Furan	2	002-IN-A	2.3E-05	0.001	2.29%	YES	U	2.52%
20	Furan	4	002-IN-B	2.3E-05	0.001	2.32%	YES	U	2.52%
20	Furan	6	002-IN-C	2.4E-05	0.001	2.39%	YES	U	2.52%
20	Furan	8	002-IN-D	2.3E-05	0.001	2.25%	YES	U	2.52%
20	Furan	10	002-IN-E	2.4E-05	0.001	2.38%	YES	U	2.52%
20	Furan	12	002-IN-F	2.3E-05	0.001	2.28%	YES	U	2.52%
20	Furan	14	002-IN-G	2.4E-05	0.001	2.42%	YES	U	2.52%
20	Furan	16	002-IN-H	2.4E-05	0.001	2.43%	YES	U	2.52%
20	Furan	2	002-EF-A	2.2E-05	0.001	2.25%	YES	U	2.52%
20	Furan	4	002-EF-B	2.4E-05	0.001	2.39%	YES	U	2.52%
20	Furan	6	002-EF-C	2.5E-05	0.001	2.45%	YES	U	2.52%
20	Furan	8	002-EF-D	2.4E-05	0.001	2.45%	YES	U	2.52%
20	Furan	10	002-EF-E	2.4E-05	0.001	2.38%	YES	U	2.52%
20	Furan	12	002-EF-F	2.4E-05	0.001	2.44%	YES	U	2.52%
20	Furan	14	002-EF-G	2.5E-05	0.001	2.51%	YES	U	2.52%
20	Furan	16	002-EF-H	2.4E-05	0.001	2.37%	YES	U	2.52%
21	2,3-Dihydrofuran	2	001-IN-A	6.5E-05	0.001	6.55%			2.15%
21	2,3-Dihydrofuran	4	001-IN-B	6.2E-05	0.001	6.17%			2.15%
21	2,3-Dihydrofuran	6	001-IN-C	5.3E-05	0.001	5.34%			2.15%
21	2,3-Dihydrofuran	8	001-IN-D	2.0E-05	0.001	1.98%	YES	U	2.15%
21	2,3-Dihydrofuran	10	001-IN-E	2.1E-05	0.001	2.07%	YES	U	2.15%
21	2,3-Dihydrofuran	12	001-IN-F	2.2E-05	0.001	2.15%	YES	U	2.15%
21	2,3-Dihydrofuran	14	001-IN-G	2.1E-05	0.001	2.07%	YES	U	2.15%
21	2,3-Dihydrofuran	16	001-IN-H	2.1E-05	0.001	2.06%	YES	U	2.15%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
21	2,3-Dihydrofuran	2	001-EF-A	1.9E-05	0.001	1.93%	YES	U	2.15%
21	2,3-Dihydrofuran	4	001-EF-B	2.0E-05	0.001	2.01%	YES	U	2.15%
21	2,3-Dihydrofuran	6	001-EF-C	2.0E-05	0.001	1.95%	YES	U	2.15%
21	2,3-Dihydrofuran	8	001-EF-D	1.9E-05	0.001	1.94%	YES	U	2.15%
21	2,3-Dihydrofuran	10	001-EF-E	2.0E-05	0.001	1.98%	YES	U	2.15%
21	2,3-Dihydrofuran	12	001-EF-F	2.0E-05	0.001	2.02%	YES	U	2.15%
21	2,3-Dihydrofuran	14	001-EF-G	2.1E-05	0.001	2.07%	YES	U	2.15%
21	2,3-Dihydrofuran	16	001-EF-H		0.001				2.15%
21	2,3-Dihydrofuran	2	002-IN-A	2.0E-05	0.001	1.95%	YES	U	2.15%
21	2,3-Dihydrofuran	4	002-IN-B	2.0E-05	0.001	1.98%	YES	U	2.15%
21	2,3-Dihydrofuran	6	002-IN-C	2.0E-05	0.001	2.04%	YES	U	2.15%
21	2,3-Dihydrofuran	8	002-IN-D	1.9E-05	0.001	1.92%	YES	U	2.15%
21	2,3-Dihydrofuran	10	002-IN-E	2.0E-05	0.001	2.03%	YES	U	2.15%
21	2,3-Dihydrofuran	12	002-IN-F	1.9E-05	0.001	1.95%	YES	U	2.15%
21	2,3-Dihydrofuran	14	002-IN-G	2.1E-05	0.001	2.06%	YES	U	2.15%
21	2,3-Dihydrofuran	16	002-IN-H	2.1E-05	0.001	2.07%	YES	U	2.15%
21	2,3-Dihydrofuran	2	002-EF-A	1.9E-05	0.001	1.92%	YES	U	2.15%
21	2,3-Dihydrofuran	4	002-EF-B	2.0E-05	0.001	2.03%	YES	U	2.15%
21	2,3-Dihydrofuran	6	002-EF-C	2.1E-05	0.001	2.09%	YES	U	2.15%
21	2,3-Dihydrofuran	8	002-EF-D	2.1E-05	0.001	2.09%	YES	U	2.15%
21	2,3-Dihydrofuran	10	002-EF-E	2.0E-05	0.001	2.03%	YES	U	2.15%
21	2,3-Dihydrofuran	12	002-EF-F	2.1E-05	0.001	2.08%	YES	U	2.15%
21	2,3-Dihydrofuran	14	002-EF-G	2.1E-05	0.001	2.14%	YES	U	2.15%
21	2,3-Dihydrofuran	16	002-EF-H	2.0E-05	0.001	2.02%	YES	U	2.15%
22	2,5-Dihydrofuran	2	001-IN-A	2.3E-05	0.001	2.29%	YES	U	2.51%
22	2,5-Dihydrofuran	4	001-IN-B	2.4E-05	0.001	2.36%	YES	U	2.51%
22	2,5-Dihydrofuran	6	001-IN-C	2.2E-05	0.001	2.24%	YES	U	2.51%
22	2,5-Dihydrofuran	8	001-IN-D	2.3E-05	0.001	2.31%	YES	U	2.51%
22	2,5-Dihydrofuran	10	001-IN-E	2.4E-05	0.001	2.41%	YES	U	2.51%
22	2,5-Dihydrofuran	12	001-IN-F	2.5E-05	0.001	2.51%	YES	U	2.51%
22	2,5-Dihydrofuran	14	001-IN-G	2.4E-05	0.001	2.41%	YES	U	2.51%
22	2,5-Dihydrofuran	16	001-IN-H	2.4E-05	0.001	2.40%	YES	U	2.51%
22	2,5-Dihydrofuran	2	001-EF-A	2.3E-05	0.001	2.26%	YES	U	2.51%
22	2,5-Dihydrofuran	4	001-EF-B	2.3E-05	0.001	2.34%	YES	U	2.51%
22	2,5-Dihydrofuran	6	001-EF-C	2.3E-05	0.001	2.28%	YES	U	2.51%
22	2,5-Dihydrofuran	8	001-EF-D	2.3E-05	0.001	2.27%	YES	U	2.51%
22	2,5-Dihydrofuran	10	001-EF-E	2.3E-05	0.001	2.31%	YES	U	2.51%
22	2,5-Dihydrofuran	12	001-EF-F	2.4E-05	0.001	2.36%	YES	U	2.51%
22	2,5-Dihydrofuran	14	001-EF-G	2.4E-05	0.001	2.42%	YES	U	2.51%
22	2,5-Dihydrofuran	16	001-EF-H		0.001				2.51%
22	2,5-Dihydrofuran	2	002-IN-A	2.3E-05	0.001	2.28%	YES	U	2.51%
22	2,5-Dihydrofuran	4	002-IN-B	2.3E-05	0.001	2.30%	YES	U	2.51%
22	2,5-Dihydrofuran	6	002-IN-C	2.4E-05	0.001	2.38%	YES	U	2.51%
22	2,5-Dihydrofuran	8	002-IN-D	2.2E-05	0.001	2.24%	YES	U	2.51%
22	2,5-Dihydrofuran	10	002-IN-E	2.4E-05	0.001	2.37%	YES	U	2.51%
22	2,5-Dihydrofuran	12	002-IN-F	2.3E-05	0.001	2.27%	YES	U	2.51%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
22	2,5-Dihydrofuran	14	002-IN-G	2.4E-05	0.001	2.41%	YES	U	2.51%
22	2,5-Dihydrofuran	16	002-IN-H	2.4E-05	0.001	2.42%	YES	U	2.51%
22	2,5-Dihydrofuran	2	002-EF-A	2.2E-05	0.001	2.23%	YES	U	2.51%
22	2,5-Dihydrofuran	4	002-EF-B	2.4E-05	0.001	2.37%	YES	U	2.51%
22	2,5-Dihydrofuran	6	002-EF-C	2.4E-05	0.001	2.44%	YES	U	2.51%
22	2,5-Dihydrofuran	8	002-EF-D	2.4E-05	0.001	2.43%	YES	U	2.51%
22	2,5-Dihydrofuran	10	002-EF-E	2.4E-05	0.001	2.37%	YES	U	2.51%
22	2,5-Dihydrofuran	12	002-EF-F	2.4E-05	0.001	2.42%	YES	U	2.51%
22	2,5-Dihydrofuran	14	002-EF-G	2.5E-05	0.001	2.50%	YES	U	2.51%
22	2,5-Dihydrofuran	16	002-EF-H	2.4E-05	0.001	2.36%	YES	U	2.51%
23	2-Methylfuran	2	001-IN-A	3.0E-05	0.001	3.03%	YES	U	3.31%
23	2-Methylfuran	4	001-IN-B	3.1E-05	0.001	3.11%	YES	U	3.31%
23	2-Methylfuran	6	001-IN-C	3.0E-05	0.001	2.96%	YES	U	3.31%
23	2-Methylfuran	8	001-IN-D	3.1E-05	0.001	3.05%	YES	U	3.31%
23	2-Methylfuran	10	001-IN-E	3.2E-05	0.001	3.18%	YES	U	3.31%
23	2-Methylfuran	12	001-IN-F	3.3E-05	0.001	3.31%	YES	U	3.31%
23	2-Methylfuran	14	001-IN-G	3.2E-05	0.001	3.19%	YES	U	3.31%
23	2-Methylfuran	16	001-IN-H	3.2E-05	0.001	3.17%	YES	U	3.31%
23	2-Methylfuran	2	001-EF-A	3.0E-05	0.001	2.98%	YES	U	3.31%
23	2-Methylfuran	4	001-EF-B	3.1E-05	0.001	3.10%	YES	U	3.31%
23	2-Methylfuran	6	001-EF-C	3.0E-05	0.001	3.01%	YES	U	3.31%
23	2-Methylfuran	8	001-EF-D	3.0E-05	0.001	3.00%	YES	U	3.31%
23	2-Methylfuran	10	001-EF-E	3.1E-05	0.001	3.06%	YES	U	3.31%
23	2-Methylfuran	12	001-EF-F	3.1E-05	0.001	3.11%	YES	U	3.31%
23	2-Methylfuran	14	001-EF-G	3.2E-05	0.001	3.20%	YES	U	3.31%
23	2-Methylfuran	16	001-EF-H		0.001				3.31%
23	2-Methylfuran	2	002-IN-A	3.0E-05	0.001	3.01%	YES	U	3.31%
23	2-Methylfuran	4	002-IN-B	3.0E-05	0.001	3.04%	YES	U	3.31%
23	2-Methylfuran	6	002-IN-C	3.1E-05	0.001	3.14%	YES	U	3.31%
23	2-Methylfuran	8	002-IN-D	3.0E-05	0.001	2.96%	YES	U	3.31%
23	2-Methylfuran	10	002-IN-E	3.1E-05	0.001	3.13%	YES	U	3.31%
23	2-Methylfuran	12	002-IN-F	3.0E-05	0.001	3.00%	YES	U	3.31%
23	2-Methylfuran	14	002-IN-G	3.2E-05	0.001	3.18%	YES	U	3.31%
23	2-Methylfuran	16	002-IN-H	3.2E-05	0.001	3.19%	YES	U	3.31%
23	2-Methylfuran	2	002-EF-A	3.0E-05	0.001	2.95%	YES	U	3.31%
23	2-Methylfuran	4	002-EF-B	3.1E-05	0.001	3.14%	YES	U	3.31%
23	2-Methylfuran	6	002-EF-C	3.2E-05	0.001	3.22%	YES	U	3.31%
23	2-Methylfuran	8	002-EF-D	3.2E-05	0.001	3.22%	YES	U	3.31%
23	2-Methylfuran	10	002-EF-E	3.1E-05	0.001	3.13%	YES	U	3.31%
23	2-Methylfuran	12	002-EF-F	3.2E-05	0.001	3.20%	YES	U	3.31%
23	2-Methylfuran	14	002-EF-G	3.3E-05	0.001	3.30%	YES	U	3.31%
23	2-Methylfuran	16	002-EF-H	3.1E-05	0.001	3.12%	YES	U	3.31%
24	2,5-Dimethylfuran	2	001-IN-A	3.7E-05	0.001	3.70%	YES	U	4.05%
24	2,5-Dimethylfuran	4	001-IN-B	3.8E-05	0.001	3.80%	YES	U	4.05%
24	2,5-Dimethylfuran	6	001-IN-C	3.6E-05	0.001	3.62%	YES	U	4.05%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
24	2,5-Dimethylfuran	8	001-IN-D	3.7E-05	0.001	3.73%	YES	U	4.05%
24	2,5-Dimethylfuran	10	001-IN-E	3.9E-05	0.001	3.89%	YES	U	4.05%
24	2,5-Dimethylfuran	12	001-IN-F	4.1E-05	0.001	4.05%	YES	U	4.05%
24	2,5-Dimethylfuran	14	001-IN-G	3.9E-05	0.001	3.90%	YES	U	4.05%
24	2,5-Dimethylfuran	16	001-IN-H	3.9E-05	0.001	3.88%	YES	U	4.05%
24	2,5-Dimethylfuran	2	001-EF-A	3.6E-05	0.001	3.64%	YES	U	4.05%
24	2,5-Dimethylfuran	4	001-EF-B	3.8E-05	0.001	3.78%	YES	U	4.05%
24	2,5-Dimethylfuran	6	001-EF-C	3.7E-05	0.001	3.68%	YES	U	4.05%
24	2,5-Dimethylfuran	8	001-EF-D	3.7E-05	0.001	3.66%	YES	U	4.05%
24	2,5-Dimethylfuran	10	001-EF-E	1.9E-04	0.001	19.3%			4.05%
24	2,5-Dimethylfuran	12	001-EF-F	1.7E-04	0.001	16.8%			4.05%
24	2,5-Dimethylfuran	14	001-EF-G	3.9E-05	0.001	3.91%	YES	U	4.05%
24	2,5-Dimethylfuran	16	001-EF-H		0.001				4.05%
24	2,5-Dimethylfuran	2	002-IN-A	3.7E-05	0.001	3.68%	YES	U	4.05%
24	2,5-Dimethylfuran	4	002-IN-B	2.5E-04	0.001	25.2%			4.05%
24	2,5-Dimethylfuran	6	002-IN-C	3.8E-05	0.001	3.83%	YES	U	4.05%
24	2,5-Dimethylfuran	8	002-IN-D	3.6E-05	0.001	3.61%	YES	U	4.05%
24	2,5-Dimethylfuran	10	002-IN-E	3.8E-05	0.001	3.82%	YES	U	4.05%
24	2,5-Dimethylfuran	12	002-IN-F	3.7E-05	0.001	3.67%	YES	U	4.05%
24	2,5-Dimethylfuran	14	002-IN-G	3.9E-05	0.001	3.89%	YES	U	4.05%
24	2,5-Dimethylfuran	16	002-IN-H	3.9E-05	0.001	3.90%	YES	U	4.05%
24	2,5-Dimethylfuran	2	002-EF-A	3.6E-05	0.001	3.61%	YES	U	4.05%
24	2,5-Dimethylfuran	4	002-EF-B	1.6E-04	0.001	16.1%			4.05%
24	2,5-Dimethylfuran	6	002-EF-C	3.9E-05	0.001	3.94%	YES	U	4.05%
24	2,5-Dimethylfuran	8	002-EF-D	3.9E-05	0.001	3.93%	YES	U	4.05%
24	2,5-Dimethylfuran	10	002-EF-E	3.8E-05	0.001	3.83%	YES	U	4.05%
24	2,5-Dimethylfuran	12	002-EF-F	3.9E-05	0.001	3.91%	YES	U	4.05%
24	2,5-Dimethylfuran	14	002-EF-G	4.0E-05	0.001	4.04%	YES	U	4.05%
24	2,5-Dimethylfuran	16	002-EF-H	3.4E-04	0.001	34.0%			4.05%
28	2-Pentylfuran	2	001-IN-A	5.5E-05	0.001	5.53%			3.33%
28	2-Pentylfuran	4	001-IN-B	5.7E-05	0.001	5.69%			3.33%
28	2-Pentylfuran	6	001-IN-C	3.0E-05	0.001	2.98%			3.33%
28	2-Pentylfuran	8	001-IN-D	3.1E-05	0.001	3.07%	YES	U	3.33%
28	2-Pentylfuran	10	001-IN-E	3.2E-05	0.001	3.20%	YES	U	3.33%
28	2-Pentylfuran	12	001-IN-F	3.3E-05	0.001	3.33%	YES	U	3.33%
28	2-Pentylfuran	14	001-IN-G	3.2E-05	0.001	3.21%	YES	U	3.33%
28	2-Pentylfuran	16	001-IN-H	3.2E-05	0.001	3.19%	YES	U	3.33%
28	2-Pentylfuran	2	001-EF-A	3.3E-05	0.001	3.27%			3.33%
28	2-Pentylfuran	4	001-EF-B	3.7E-05	0.001	3.68%			3.33%
28	2-Pentylfuran	6	001-EF-C	3.0E-05	0.001	3.03%	YES	U	3.33%
28	2-Pentylfuran	8	001-EF-D	3.0E-05	0.001	3.01%	YES	U	3.33%
28	2-Pentylfuran	10	001-EF-E	3.1E-05	0.001	3.07%	YES	U	3.33%
28	2-Pentylfuran	12	001-EF-F	3.1E-05	0.001	3.13%	YES	U	3.33%
28	2-Pentylfuran	14	001-EF-G	3.2E-05	0.001	3.21%	YES	U	3.33%
28	2-Pentylfuran	16	001-EF-H		0.001				3.33%
28	2-Pentylfuran	2	002-IN-A	3.8E-05	0.001	3.85%			3.33%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
28	2-Pentylfuran	4	002-IN-B	4.7E-05	0.001	4.73%		U	3.33%
28	2-Pentylfuran	6	002-IN-C	3.2E-05	0.001	3.15%	YES	U	3.33%
28	2-Pentylfuran	8	002-IN-D	3.0E-05	0.001	2.97%	YES	U	3.33%
28	2-Pentylfuran	10	002-IN-E	3.1E-05	0.001	3.15%	YES	U	3.33%
28	2-Pentylfuran	12	002-IN-F	3.0E-05	0.001	3.02%	YES	U	3.33%
28	2-Pentylfuran	14	002-IN-G	3.2E-05	0.001	3.20%	YES	U	3.33%
28	2-Pentylfuran	16	002-IN-H	3.2E-05	0.001	3.21%	YES	U	3.33%
28	2-Pentylfuran	2	002-EF-A	3.0E-05	0.001	2.97%	YES	U	3.33%
28	2-Pentylfuran	4	002-EF-B	3.2E-05	0.001	3.15%	YES	U	3.33%
28	2-Pentylfuran	6	002-EF-C	3.2E-05	0.001	3.24%	YES	U	3.33%
28	2-Pentylfuran	8	002-EF-D	3.2E-05	0.001	3.23%	YES	U	3.33%
28	2-Pentylfuran	10	002-EF-E	3.2E-05	0.001	3.15%	YES	U	3.33%
28	2-Pentylfuran	12	002-EF-F	3.2E-05	0.001	3.22%	YES	U	3.33%
28	2-Pentylfuran	14	002-EF-G	3.3E-05	0.001	3.32%	YES	U	3.33%
28	2-Pentylfuran	16	002-EF-H	3.1E-05	0.001	3.14%	YES	U	3.33%
29	2-Heptylfuran	2	001-IN-A	2.3E-05	0.001	2.30%	YES	U	2.52%
29	2-Heptylfuran	4	001-IN-B	2.4E-05	0.001	2.36%	YES	U	2.52%
29	2-Heptylfuran	6	001-IN-C	2.3E-05	0.001	2.25%	YES	U	2.52%
29	2-Heptylfuran	8	001-IN-D	2.3E-05	0.001	2.32%	YES	U	2.52%
29	2-Heptylfuran	10	001-IN-E	2.4E-05	0.001	2.42%	YES	U	2.52%
29	2-Heptylfuran	12	001-IN-F	2.5E-05	0.001	2.52%	YES	U	2.52%
29	2-Heptylfuran	14	001-IN-G	2.4E-05	0.001	2.42%	YES	U	2.52%
29	2-Heptylfuran	16	001-IN-H	2.4E-05	0.001	2.41%	YES	U	2.52%
29	2-Heptylfuran	2	001-EF-A	2.3E-05	0.001	2.26%	YES	U	2.52%
29	2-Heptylfuran	4	001-EF-B	2.4E-05	0.001	2.35%	YES	U	2.52%
29	2-Heptylfuran	6	001-EF-C	2.3E-05	0.001	2.29%	YES	U	2.52%
29	2-Heptylfuran	8	001-EF-D	2.3E-05	0.001	2.28%	YES	U	2.52%
29	2-Heptylfuran	10	001-EF-E	2.3E-05	0.001	2.32%	YES	U	2.52%
29	2-Heptylfuran	12	001-EF-F	2.4E-05	0.001	2.37%	YES	U	2.52%
29	2-Heptylfuran	14	001-EF-G	2.4E-05	0.001	2.43%	YES	U	2.52%
29	2-Heptylfuran	16	001-EF-H		0.001				2.52%
29	2-Heptylfuran	2	002-IN-A	2.3E-05	0.001	2.29%	YES	U	2.52%
29	2-Heptylfuran	4	002-IN-B	2.3E-05	0.001	2.31%	YES	U	2.52%
29	2-Heptylfuran	6	002-IN-C	2.4E-05	0.001	2.38%	YES	U	2.52%
29	2-Heptylfuran	8	002-IN-D	2.2E-05	0.001	2.25%	YES	U	2.52%
29	2-Heptylfuran	10	002-IN-E	2.4E-05	0.001	2.38%	YES	U	2.52%
29	2-Heptylfuran	12	002-IN-F	2.3E-05	0.001	2.28%	YES	U	2.52%
29	2-Heptylfuran	14	002-IN-G	2.4E-05	0.001	2.42%	YES	U	2.52%
29	2-Heptylfuran	16	002-IN-H	2.4E-05	0.001	2.43%	YES	U	2.52%
29	2-Heptylfuran	2	002-EF-A	2.2E-05	0.001	2.24%	YES	U	2.52%
29	2-Heptylfuran	4	002-EF-B	2.4E-05	0.001	2.38%	YES	U	2.52%
29	2-Heptylfuran	6	002-EF-C	2.4E-05	0.001	2.45%	YES	U	2.52%
29	2-Heptylfuran	8	002-EF-D	2.4E-05	0.001	2.44%	YES	U	2.52%
29	2-Heptylfuran	10	002-EF-E	2.4E-05	0.001	2.38%	YES	U	2.52%
29	2-Heptylfuran	12	002-EF-F	2.4E-05	0.001	2.43%	YES	U	2.52%
29	2-Heptylfuran	14	002-EF-G	2.5E-05	0.001	2.51%	YES	U	2.52%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
29	2-Heptylfuran	16	002-EF-H	2.4E-05	0.001	2.37%	YES	U	2.52%
30	2-Propylfuran	2	001-IN-A	2.3E-05	0.001	2.29%	YES	U	2.51%
30	2-Propylfuran	4	001-IN-B	2.4E-05	0.001	2.36%	YES	U	2.51%
30	2-Propylfuran	6	001-IN-C	2.2E-05	0.001	2.24%	YES	U	2.51%
30	2-Propylfuran	8	001-IN-D	2.3E-05	0.001	2.31%	YES	U	2.51%
30	2-Propylfuran	10	001-IN-E	2.4E-05	0.001	2.41%	YES	U	2.51%
30	2-Propylfuran	12	001-IN-F	2.5E-05	0.001	2.51%	YES	U	2.51%
30	2-Propylfuran	14	001-IN-G	2.4E-05	0.001	2.41%	YES	U	2.51%
30	2-Propylfuran	16	001-IN-H	2.4E-05	0.001	2.40%	YES	U	2.51%
30	2-Propylfuran	2	001-EF-A	2.3E-05	0.001	2.25%	YES	U	2.51%
30	2-Propylfuran	4	001-EF-B	2.3E-05	0.001	2.34%	YES	U	2.51%
30	2-Propylfuran	6	001-EF-C	2.3E-05	0.001	2.28%	YES	U	2.51%
30	2-Propylfuran	8	001-EF-D	2.3E-05	0.001	2.27%	YES	U	2.51%
30	2-Propylfuran	10	001-EF-E	2.3E-05	0.001	2.31%	YES	U	2.51%
30	2-Propylfuran	12	001-EF-F	2.4E-05	0.001	2.36%	YES	U	2.51%
30	2-Propylfuran	14	001-EF-G	2.4E-05	0.001	2.42%	YES	U	2.51%
30	2-Propylfuran	16	001-EF-H		0.001				2.51%
30	2-Propylfuran	2	002-IN-A	2.3E-05	0.001	2.28%	YES	U	2.51%
30	2-Propylfuran	4	002-IN-B	2.3E-05	0.001	2.30%	YES	U	2.51%
30	2-Propylfuran	6	002-IN-C	2.4E-05	0.001	2.37%	YES	U	2.51%
30	2-Propylfuran	8	002-IN-D	2.2E-05	0.001	2.24%	YES	U	2.51%
30	2-Propylfuran	10	002-IN-E	2.4E-05	0.001	2.37%	YES	U	2.51%
30	2-Propylfuran	12	002-IN-F	2.3E-05	0.001	2.27%	YES	U	2.51%
30	2-Propylfuran	14	002-IN-G	2.4E-05	0.001	2.41%	YES	U	2.51%
30	2-Propylfuran	16	002-IN-H	2.4E-05	0.001	2.42%	YES	U	2.51%
30	2-Propylfuran	2	002-EF-A	2.2E-05	0.001	2.23%	YES	U	2.51%
30	2-Propylfuran	4	002-EF-B	2.4E-05	0.001	2.37%	YES	U	2.51%
30	2-Propylfuran	6	002-EF-C	2.4E-05	0.001	2.44%	YES	U	2.51%
30	2-Propylfuran	8	002-EF-D	2.4E-05	0.001	2.43%	YES	U	2.51%
30	2-Propylfuran	10	002-EF-E	2.4E-05	0.001	2.37%	YES	U	2.51%
30	2-Propylfuran	12	002-EF-F	2.4E-05	0.001	2.42%	YES	U	2.51%
30	2-Propylfuran	14	002-EF-G	2.5E-05	0.001	2.50%	YES	U	2.51%
30	2-Propylfuran	16	002-EF-H	2.4E-05	0.001	2.36%	YES	U	2.51%
34	Diethylphthalate	2	001-IN-A	1.9E-04	0.543	0.036%	YES	U	0.15%
34	Diethylphthalate	4	001-IN-B	1.9E-04	0.543	0.035%	YES	LU	0.15%
34	Diethylphthalate	6	001-IN-C	1.9E-04	0.543	0.034%	YES	LU	0.15%
34	Diethylphthalate	8	001-IN-D	1.9E-04	0.543	0.035%	YES	LU	0.15%
34	Diethylphthalate	10	001-IN-E	2.0E-04	0.543	0.037%	YES	LU	0.15%
34	Diethylphthalate	12	001-IN-F	2.0E-04	0.543	0.036%	YES	LU	0.15%
34	Diethylphthalate	14	001-IN-G	2.0E-04	0.543	0.037%	YES	LU	0.15%
34	Diethylphthalate	16	001-IN-H	2.0E-04	0.543	0.038%	YES	U	0.15%
34	Diethylphthalate	2	001-EF-A	1.9E-04	0.543	0.035%	YES	U	0.15%
34	Diethylphthalate	4	001-EF-B	1.9E-04	0.543	0.035%	YES	QU	0.15%
34	Diethylphthalate	6	001-EF-C	1.9E-04	0.543	0.035%	YES	U	0.15%
34	Diethylphthalate	8	001-EF-D	2.0E-04	0.543	0.036%	YES	U	0.15%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
34	Diethylphthalate	10	001-EF-E	1.9E-04	0.543	0.035%	YES	U	0.15%
34	Diethylphthalate	12	001-EF-F	1.6E-04	0.543	0.029%	YES	U	0.15%
34	Diethylphthalate	14	001-EF-G	2.0E-04	0.543	0.038%	YES	U	0.15%
34	Diethylphthalate	16	001-EF-H	2.0E-04	0.543	0.037%	YES	U	0.15%
34	Diethylphthalate	2	002-IN-A	1.9E-04	0.543	0.035%	YES	U	0.15%
34	Diethylphthalate	4	002-IN-B	1.9E-04	0.543	0.036%	YES	LU	0.15%
34	Diethylphthalate	6	002-IN-C	2.0E-04	0.543	0.037%	YES	LU	0.15%
34	Diethylphthalate	8	002-IN-D	8.0E-04	0.543	0.148%	YES	LU	0.15%
34	Diethylphthalate	10	002-IN-E	1.9E-04	0.543	0.035%	YES	LU	0.15%
34	Diethylphthalate	12	002-IN-F		0.543				0.15%
34	Diethylphthalate	14	002-IN-G	1.9E-04	0.543	0.036%	YES	LU	0.15%
34	Diethylphthalate	16	002-IN-H	2.4E-04	0.543	0.044%		HJ	0.15%
34	Diethylphthalate	2	002-EF-A	1.8E-04	0.543	0.033%	YES	U	0.15%
34	Diethylphthalate	4	002-EF-B	1.9E-04	0.543	0.036%	YES	U	0.15%
34	Diethylphthalate	6	002-EF-C	1.8E-04	0.543	0.034%	YES	U	0.15%
34	Diethylphthalate	8	002-EF-D	1.8E-04	0.543	0.033%	YES	U	0.15%
34	Diethylphthalate	10	002-EF-E	2.0E-04	0.543	0.036%	YES	U	0.15%
34	Diethylphthalate	12	002-EF-F	1.8E-04	0.543	0.034%	YES	U	0.15%
34	Diethylphthalate	14	002-EF-G	1.8E-04	0.543	0.034%	YES	U	0.15%
34	Diethylphthalate	16	002-EF-H	1.9E-04	0.543	0.036%	YES	U	0.15%
35	Acetonitrile	2	001-IN-A	1.2E-01	20.000	0.603%		E	0.0023%
35	Acetonitrile	4	001-IN-B	1.6E-01	20.000	0.788%		E	0.0023%
35	Acetonitrile	6	001-IN-C	1.7E-01	20.000	0.828%		E	0.0023%
35	Acetonitrile	8	001-IN-D	1.8E-01	20.000	0.905%		E	0.0023%
35	Acetonitrile	10	001-IN-E	1.5E-01	20.000	0.762%		E	0.0023%
35	Acetonitrile	12	001-IN-F	1.6E-01	20.000	0.787%		E	0.0023%
35	Acetonitrile	14	001-IN-G	1.8E-01	20.000	0.894%		E	0.0023%
35	Acetonitrile	16	001-IN-H	1.6E-01	20.000	0.819%		E	0.0023%
35	Acetonitrile	2	001-EF-A	9.3E-03	20.000	0.047%			0.0023%
35	Acetonitrile	4	001-EF-B	1.1E-01	20.000	0.536%		E	0.0023%
35	Acetonitrile	6	001-EF-C	1.5E-01	20.000	0.747%		E	0.0023%
35	Acetonitrile	8	001-EF-D	1.7E-01	20.000	0.838%		E	0.0023%
35	Acetonitrile	10	001-EF-E	1.3E-01	20.000	0.648%		E	0.0023%
35	Acetonitrile	12	001-EF-F	1.0E-01	20.000	0.513%		E	0.0023%
35	Acetonitrile	14	001-EF-G	1.1E-01	20.000	0.563%		E	0.0023%
35	Acetonitrile	16	001-EF-H	1.0E-01	20.000	0.518%		E	0.0023%
35	Acetonitrile	2	002-IN-A	1.1E-01	20.000	0.539%		E	0.0023%
35	Acetonitrile	4	002-IN-B	2.9E-01	20.000	1.47%		E	0.0023%
35	Acetonitrile	6	002-IN-C	2.2E-01	20.000	1.09%		E	0.0023%
35	Acetonitrile	8	002-IN-D	2.2E-01	20.000	1.12%		E	0.0023%
35	Acetonitrile	10	002-IN-E	2.4E-01	20.000	1.21%		E	0.0023%
35	Acetonitrile	12	002-IN-F	3.0E-01	20.000	1.51%		E	0.0023%
35	Acetonitrile	14	002-IN-G	2.6E-01	20.000	1.29%		E	0.0023%
35	Acetonitrile	16	002-IN-H	5.2E-01	20.000	2.61%		EY	0.0023%
35	Acetonitrile	2	002-EF-A	3.9E-02	20.000	0.196%			0.0023%
35	Acetonitrile	4	002-EF-B	1.1E-01	20.000	0.531%		E	0.0023%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
35	Acetonitrile	6	002-EF-C	1.9E-01	20.000	0.954%		E	0.0023%
35	Acetonitrile	8	002-EF-D	2.5E-01	20.000	1.27%		E	0.0023%
35	Acetonitrile	10	002-EF-E	2.1E-01	20.000	1.05%		E	0.0023%
35	Acetonitrile	12	002-EF-F	1.4E-01	20.000	0.724%		E	0.0023%
35	Acetonitrile	14	002-EF-G	1.7E-01	20.000	0.875%		E	0.0023%
35	Acetonitrile	16	002-EF-H	2.0E-01	20.000	0.983%		E	0.0023%
36	Propanenitrile	2	001-IN-A	3.2E-03	6.000	0.053%			0.0060%
36	Propanenitrile	4	001-IN-B	4.5E-03	6.000	0.075%			0.0060%
36	Propanenitrile	6	001-IN-C	4.7E-03	6.000	0.079%			0.0060%
36	Propanenitrile	8	001-IN-D	4.8E-03	6.000	0.081%			0.0060%
36	Propanenitrile	10	001-IN-E	4.0E-03	6.000	0.066%			0.0060%
36	Propanenitrile	12	001-IN-F	3.8E-03	6.000	0.063%			0.0060%
36	Propanenitrile	14	001-IN-G	4.3E-03	6.000	0.072%			0.0060%
36	Propanenitrile	16	001-IN-H	3.1E-03	6.000	0.052%			0.0060%
36	Propanenitrile	2	001-EF-A	2.9E-04	6.000	0.005%	YES	U	0.0060%
36	Propanenitrile	4	001-EF-B	2.8E-04	6.000	0.005%	YES	U	0.0060%
36	Propanenitrile	6	001-EF-C	2.9E-04	6.000	0.005%	YES	U	0.0060%
36	Propanenitrile	8	001-EF-D	3.0E-04	6.000	0.005%	YES	U	0.0060%
36	Propanenitrile	10	001-EF-E	2.9E-04	6.000	0.005%	YES	U	0.0060%
36	Propanenitrile	12	001-EF-F	2.9E-04	6.000	0.005%	YES	U	0.0060%
36	Propanenitrile	14	001-EF-G	3.0E-04	6.000	0.005%	YES	U	0.0060%
36	Propanenitrile	16	001-EF-H	3.0E-04	6.000	0.005%	YES	U	0.0060%
36	Propanenitrile	2	002-IN-A	1.8E-03	6.000	0.030%			0.0060%
36	Propanenitrile	4	002-IN-B	4.5E-03	6.000	0.075%			0.0060%
36	Propanenitrile	6	002-IN-C	3.8E-03	6.000	0.063%			0.0060%
36	Propanenitrile	8	002-IN-D	3.4E-03	6.000	0.057%			0.0060%
36	Propanenitrile	10	002-IN-E	4.7E-03	6.000	0.078%			0.0060%
36	Propanenitrile	12	002-IN-F	3.6E-03	6.000	0.060%			0.0060%
36	Propanenitrile	14	002-IN-G	3.8E-03	6.000	0.064%			0.0060%
36	Propanenitrile	16	002-IN-H	3.6E-03	6.000	0.059%			0.0060%
36	Propanenitrile	2	002-EF-A	3.3E-04	6.000	0.006%	YES	U	0.0060%
36	Propanenitrile	4	002-EF-B	3.4E-04	6.000	0.006%	YES	U	0.0060%
36	Propanenitrile	6	002-EF-C	3.5E-04	6.000	0.006%	YES	U	0.0060%
36	Propanenitrile	8	002-EF-D	3.6E-04	6.000	0.006%	YES	U	0.0060%
36	Propanenitrile	10	002-EF-E	3.6E-04	6.000	0.006%	YES	U	0.0060%
36	Propanenitrile	12	002-EF-F	3.5E-04	6.000	0.006%	YES	U	0.0060%
36	Propanenitrile	14	002-EF-G	3.5E-04	6.000	0.006%	YES	U	0.0060%
36	Propanenitrile	16	002-EF-H	3.6E-04	6.000	0.006%	YES	U	0.0060%
37	Butanenitrile	2	001-IN-A	3.5E-03	8.000	0.044%			0.0030%
37	Butanenitrile	4	001-IN-B	4.3E-03	8.000	0.053%			0.0030%
37	Butanenitrile	6	001-IN-C	3.9E-03	8.000	0.049%			0.0030%
37	Butanenitrile	8	001-IN-D	4.3E-03	8.000	0.054%			0.0030%
37	Butanenitrile	10	001-IN-E	3.0E-03	8.000	0.037%			0.0030%
37	Butanenitrile	12	001-IN-F	3.5E-03	8.000	0.043%			0.0030%
37	Butanenitrile	14	001-IN-G	4.2E-03	8.000	0.053%			0.0030%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
37	Butanenitrile	16	001-IN-H	4.0E-03	8.000	0.050%			0.0030%
37	Butanenitrile	2	001-EF-A	2.3E-04	8.000	0.003%	YES	U	0.0030%
37	Butanenitrile	4	001-EF-B	2.3E-04	8.000	0.003%	YES	U	0.0030%
37	Butanenitrile	6	001-EF-C	2.3E-04	8.000	0.003%	YES	U	0.0030%
37	Butanenitrile	8	001-EF-D	2.4E-04	8.000	0.003%	YES	U	0.0030%
37	Butanenitrile	10	001-EF-E	2.3E-04	8.000	0.003%	YES	U	0.0030%
37	Butanenitrile	12	001-EF-F	2.3E-04	8.000	0.003%	YES	U	0.0030%
37	Butanenitrile	14	001-EF-G	2.4E-04	8.000	0.003%	YES	U	0.0030%
37	Butanenitrile	16	001-EF-H	2.4E-04	8.000	0.003%	YES	U	0.0030%
37	Butanenitrile	2	002-IN-A	2.3E-03	8.000	0.029%			0.0030%
37	Butanenitrile	4	002-IN-B	4.4E-03	8.000	0.055%			0.0030%
37	Butanenitrile	6	002-IN-C	3.7E-03	8.000	0.046%			0.0030%
37	Butanenitrile	8	002-IN-D	3.6E-03	8.000	0.045%			0.0030%
37	Butanenitrile	10	002-IN-E	4.2E-03	8.000	0.053%			0.0030%
37	Butanenitrile	12	002-IN-F	2.7E-03	8.000	0.034%			0.0030%
37	Butanenitrile	14	002-IN-G	3.3E-03	8.000	0.041%			0.0030%
37	Butanenitrile	16	002-IN-H	2.7E-03	8.000	0.034%			0.0030%
37	Butanenitrile	2	002-EF-A	1.5E-04	8.000	0.002%	YES	U	0.0030%
37	Butanenitrile	4	002-EF-B	1.5E-04	8.000	0.002%	YES	U	0.0030%
37	Butanenitrile	6	002-EF-C	1.6E-04	8.000	0.002%	YES	U	0.0030%
37	Butanenitrile	8	002-EF-D	1.6E-04	8.000	0.002%	YES	U	0.0030%
37	Butanenitrile	10	002-EF-E	1.6E-04	8.000	0.002%	YES	U	0.0030%
37	Butanenitrile	12	002-EF-F	1.5E-04	8.000	0.002%	YES	U	0.0030%
37	Butanenitrile	14	002-EF-G	1.6E-04	8.000	0.002%	YES	U	0.0030%
37	Butanenitrile	16	002-EF-H	1.6E-04	8.000	0.002%	YES	U	0.0030%
38	Pentanenitrile	2	001-IN-A	6.6E-04	6.000	0.011%		J	0.0032%
38	Pentanenitrile	4	001-IN-B	9.9E-04	6.000	0.017%			0.0032%
38	Pentanenitrile	6	001-IN-C	1.0E-03	6.000	0.017%			0.0032%
38	Pentanenitrile	8	001-IN-D	1.1E-03	6.000	0.019%			0.0032%
38	Pentanenitrile	10	001-IN-E	9.8E-04	6.000	0.016%			0.0032%
38	Pentanenitrile	12	001-IN-F	1.1E-04	6.000	0.002%	YES	U	0.0032%
38	Pentanenitrile	14	001-IN-G	1.0E-04	6.000	0.002%	YES	U	0.0032%
38	Pentanenitrile	16	001-IN-H	7.1E-04	6.000	0.012%		J	0.0032%
38	Pentanenitrile	2	001-EF-A	1.8E-04	6.000	0.003%	YES	U	0.0032%
38	Pentanenitrile	4	001-EF-B	1.8E-04	6.000	0.003%	YES	U	0.0032%
38	Pentanenitrile	6	001-EF-C	1.8E-04	6.000	0.003%	YES	U	0.0032%
38	Pentanenitrile	8	001-EF-D	1.9E-04	6.000	0.003%	YES	U	0.0032%
38	Pentanenitrile	10	001-EF-E	1.8E-04	6.000	0.003%	YES	U	0.0032%
38	Pentanenitrile	12	001-EF-F	1.8E-04	6.000	0.003%	YES	U	0.0032%
38	Pentanenitrile	14	001-EF-G	1.9E-04	6.000	0.003%	YES	U	0.0032%
38	Pentanenitrile	16	001-EF-H	1.9E-04	6.000	0.003%	YES	U	0.0032%
38	Pentanenitrile	2	002-IN-A	9.6E-04	6.000	0.016%			0.0032%
38	Pentanenitrile	4	002-IN-B	1.0E-03	6.000	0.017%			0.0032%
38	Pentanenitrile	6	002-IN-C	9.3E-04	6.000	0.015%			0.0032%
38	Pentanenitrile	8	002-IN-D	9.0E-04	6.000	0.015%			0.0032%
38	Pentanenitrile	10	002-IN-E	9.9E-04	6.000	0.016%			0.0032%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
38	Pentanenitrile	12	002-IN-F	9.7E-04	6.000	0.016%			0.0032%
38	Pentanenitrile	14	002-IN-G	8.5E-04	6.000	0.014%			0.0032%
38	Pentanenitrile	16	002-IN-H	1.1E-04	6.000	0.002%	YES	U	0.0032%
38	Pentanenitrile	2	002-EF-A	1.6E-04	6.000	0.003%		J	0.0032%
38	Pentanenitrile	4	002-EF-B	9.9E-05	6.000	0.002%	YES	U	0.0032%
38	Pentanenitrile	6	002-EF-C	1.0E-04	6.000	0.002%	YES	U	0.0032%
38	Pentanenitrile	8	002-EF-D	1.0E-04	6.000	0.002%	YES	U	0.0032%
38	Pentanenitrile	10	002-EF-E	1.0E-04	6.000	0.002%	YES	U	0.0032%
38	Pentanenitrile	12	002-EF-F	1.0E-04	6.000	0.002%	YES	U	0.0032%
38	Pentanenitrile	14	002-EF-G	1.0E-04	6.000	0.002%	YES	U	0.0032%
38	Pentanenitrile	16	002-EF-H	1.0E-04	6.000	0.002%	YES	U	0.0032%
39	Hexanenitrile	2	001-IN-A	5.6E-04	6.000	0.009%		J	0.0024%
39	Hexanenitrile	4	001-IN-B	8.5E-04	6.000	0.014%			0.0024%
39	Hexanenitrile	6	001-IN-C	1.0E-03	6.000	0.017%			0.0024%
39	Hexanenitrile	8	001-IN-D	1.5E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	10	001-IN-E	7.7E-04	6.000	0.013%			0.0024%
39	Hexanenitrile	12	001-IN-F	8.0E-04	6.000	0.013%		J	0.0024%
39	Hexanenitrile	14	001-IN-G	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	16	001-IN-H	5.5E-04	6.000	0.009%		J	0.0024%
39	Hexanenitrile	2	001-EF-A	1.3E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	4	001-EF-B	1.3E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	6	001-EF-C	1.3E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	8	001-EF-D	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	10	001-EF-E	1.3E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	12	001-EF-F	1.3E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	14	001-EF-G	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	16	001-EF-H	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	2	002-IN-A	5.8E-04	6.000	0.010%		J	0.0024%
39	Hexanenitrile	4	002-IN-B	7.1E-04	6.000	0.012%		J	0.0024%
39	Hexanenitrile	6	002-IN-C	7.3E-04	6.000	0.012%			0.0024%
39	Hexanenitrile	8	002-IN-D	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	10	002-IN-E	9.7E-04	6.000	0.016%			0.0024%
39	Hexanenitrile	12	002-IN-F	1.5E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	14	002-IN-G	6.0E-04	6.000	0.010%		J	0.0024%
39	Hexanenitrile	16	002-IN-H	6.5E-04	6.000	0.011%		J	0.0024%
39	Hexanenitrile	2	002-EF-A	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	4	002-EF-B	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	6	002-EF-C	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	8	002-EF-D	1.5E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	10	002-EF-E	1.5E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	12	002-EF-F	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	14	002-EF-G	1.4E-04	6.000	0.002%	YES	U	0.0024%
39	Hexanenitrile	16	002-EF-H	1.5E-04	6.000	0.002%	YES	U	0.0024%
43	Ethylamine	2	001-IN-A	9.0E-03	5.000	0.180%			0.09%
43	Ethylamine	4	001-IN-B	1.6E-02	5.000	0.312%			0.09%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
43	Ethylamine	6	001-IN-C	1.2E-02	5.000	0.249%			0.09%
43	Ethylamine	8	001-IN-D	9.0E-03	5.000	0.181%			0.09%
43	Ethylamine	10	001-IN-E	1.0E-02	5.000	0.202%			0.09%
43	Ethylamine	12	001-IN-F	1.1E-02	5.000	0.211%			0.09%
43	Ethylamine	14	001-IN-G	9.3E-03	5.000	0.185%			0.09%
43	Ethylamine	16	001-IN-H	1.4E-02	5.000	0.277%			0.09%
43	Ethylamine	2	001-EF-A	4.4E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	4	001-EF-B	4.4E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	6	001-EF-C	4.3E-03	5.000	0.085%	YES		0.09%
43	Ethylamine	8	001-EF-D	4.3E-03	5.000	0.085%	YES		0.09%
43	Ethylamine	10	001-EF-E	4.5E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	12	001-EF-F	4.6E-03	5.000	0.092%	YES		0.09%
43	Ethylamine	14	001-EF-G	4.4E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	16	001-EF-H	4.5E-03	5.000	0.089%	YES		0.09%
43	Ethylamine	2	002-IN-A	4.7E-03	5.000	0.094%			0.09%
43	Ethylamine	4	002-IN-B	1.1E-02	5.000	0.215%			0.09%
43	Ethylamine	6	002-IN-C	1.3E-02	5.000	0.265%			0.09%
43	Ethylamine	8	002-IN-D	8.0E-03	5.000	0.160%			0.09%
43	Ethylamine	10	002-IN-E	1.2E-02	5.000	0.230%			0.09%
43	Ethylamine	12	002-IN-F	1.3E-02	5.000	0.269%			0.09%
43	Ethylamine	14	002-IN-G	4.3E-03	5.000	0.085%	YES		0.09%
43	Ethylamine	16	002-IN-H	1.7E-02	5.000	0.340%			0.09%
43	Ethylamine	2	002-EF-A	4.1E-03	5.000	0.083%	YES		0.09%
43	Ethylamine	4	002-EF-B	4.3E-03	5.000	0.086%	YES		0.09%
43	Ethylamine	6	002-EF-C	4.6E-03	5.000	0.092%	YES		0.09%
43	Ethylamine	8	002-EF-D	4.6E-03	5.000	0.091%	YES		0.09%
43	Ethylamine	10	002-EF-E	4.4E-03	5.000	0.087%	YES		0.09%
43	Ethylamine	12	002-EF-F	4.4E-03	5.000	0.087%	YES		0.09%
43	Ethylamine	14	002-EF-G	4.4E-03	5.000	0.087%	YES		0.09%
43	Ethylamine	16	002-EF-H	4.4E-03	5.000	0.088%	YES		0.09%
44	N-Nitrosodimethylamine	2	001-IN-A	1.2E-02	0.0003	4029%		D	5.44%
44	N-Nitrosodimethylamine	4	001-IN-B	2.0E-02	0.0003	6723%		D	5.44%
44	N-Nitrosodimethylamine	6	001-IN-C	1.9E-02	0.0003	6346%		D	5.44%
44	N-Nitrosodimethylamine	8	001-IN-D	2.1E-02	0.0003	6935%		D	5.44%
44	N-Nitrosodimethylamine	10	001-IN-E	2.0E-02	0.0003	6677%		D	5.44%
44	N-Nitrosodimethylamine	12	001-IN-F	1.4E-02	0.0003	4608%		D	5.44%
44	N-Nitrosodimethylamine	14	001-IN-G	1.6E-02	0.0003	5456%		D	5.44%
44	N-Nitrosodimethylamine	16	001-IN-H	1.4E-02	0.0003	4730%		D	5.44%
44	N-Nitrosodimethylamine	2	001-EF-A	1.6E-05	0.0003	5.39%	YES		5.44%
44	N-Nitrosodimethylamine	4	001-EF-B	1.6E-05	0.0003	5.28%	YES		5.44%
44	N-Nitrosodimethylamine	6	001-EF-C	1.6E-05	0.0003	5.44%	YES		5.44%
44	N-Nitrosodimethylamine	8	001-EF-D	1.6E-05	0.0003	5.32%	YES		5.44%
44	N-Nitrosodimethylamine	10	001-EF-E	1.5E-05	0.0003	4.95%	YES		5.44%
44	N-Nitrosodimethylamine	12	001-EF-F	1.5E-05	0.0003	4.90%	YES		5.44%
44	N-Nitrosodimethylamine	14	001-EF-G	1.5E-05	0.0003	4.96%	YES		5.44%
44	N-Nitrosodimethylamine	16	001-EF-H	1.5E-05	0.0003	4.94%	YES		5.44%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
44	N-Nitrosodimethylamine	2	002-IN-A	8.3E-03	0.0003	2754%		D	5.44%
44	N-Nitrosodimethylamine	4	002-IN-B	1.9E-02	0.0003	6416%		D	5.44%
44	N-Nitrosodimethylamine	6	002-IN-C	1.8E-02	0.0003	6124%		D	5.44%
44	N-Nitrosodimethylamine	8	002-IN-D	9.6E-03	0.0003	3208%		D	5.44%
44	N-Nitrosodimethylamine	10	002-IN-E	1.8E-02	0.0003	5960%		D	5.44%
44	N-Nitrosodimethylamine	12	002-IN-F	4.5E-03	0.0003	1498%		D	5.44%
44	N-Nitrosodimethylamine	14	002-IN-G	1.4E-02	0.0003	4669%		D	5.44%
44	N-Nitrosodimethylamine	16	002-IN-H	6.1E-03	0.0003	2043%		D	5.44%
44	N-Nitrosodimethylamine	2	002-EF-A	1.5E-05	0.0003	4.93%	YES		5.44%
44	N-Nitrosodimethylamine	4	002-EF-B	1.4E-05	0.0003	4.60%	YES		5.44%
44	N-Nitrosodimethylamine	6	002-EF-C	1.5E-05	0.0003	5.07%	YES		5.44%
44	N-Nitrosodimethylamine	8	002-EF-D	1.5E-05	0.0003	4.85%	YES		5.44%
44	N-Nitrosodimethylamine	10	002-EF-E	1.5E-05	0.0003	4.89%	YES		5.44%
44	N-Nitrosodimethylamine	12	002-EF-F	1.5E-05	0.0003	4.86%	YES		5.44%
44	N-Nitrosodimethylamine	14	002-EF-G	1.5E-05	0.0003	4.89%	YES		5.44%
44	N-Nitrosodimethylamine	16	002-EF-H	1.5E-05	0.0003	4.98%	YES		5.44%
45	N-Nitrosodiethylamine	2	001-IN-A	4.2E-05	0.0001	42.1%			12.0%
45	N-Nitrosodiethylamine	4	001-IN-B	5.8E-05	0.0001	58.1%			12.0%
45	N-Nitrosodiethylamine	6	001-IN-C	7.3E-05	0.0001	73.4%			12.0%
45	N-Nitrosodiethylamine	8	001-IN-D	7.9E-05	0.0001	79.4%			12.0%
45	N-Nitrosodiethylamine	10	001-IN-E	5.1E-05	0.0001	50.7%			12.0%
45	N-Nitrosodiethylamine	12	001-IN-F	5.7E-05	0.0001	57.3%			12.0%
45	N-Nitrosodiethylamine	14	001-IN-G	4.0E-05	0.0001	40.5%			12.0%
45	N-Nitrosodiethylamine	16	001-IN-H	4.9E-05	0.0001	48.8%			12.0%
45	N-Nitrosodiethylamine	2	001-EF-A	1.2E-05	0.0001	11.7%	YES		12.0%
45	N-Nitrosodiethylamine	4	001-EF-B	1.1E-05	0.0001	11.5%	YES		12.0%
45	N-Nitrosodiethylamine	6	001-EF-C	1.2E-05	0.0001	11.8%	YES		12.0%
45	N-Nitrosodiethylamine	8	001-EF-D	1.2E-05	0.0001	11.6%	YES		12.0%
45	N-Nitrosodiethylamine	10	001-EF-E	1.1E-05	0.0001	10.8%	YES		12.0%
45	N-Nitrosodiethylamine	12	001-EF-F	1.1E-05	0.0001	10.7%	YES		12.0%
45	N-Nitrosodiethylamine	14	001-EF-G	1.1E-05	0.0001	10.8%	YES		12.0%
45	N-Nitrosodiethylamine	16	001-EF-H	1.1E-05	0.0001	10.7%	YES		12.0%
45	N-Nitrosodiethylamine	2	002-IN-A	3.4E-05	0.0001	34.4%			12.0%
45	N-Nitrosodiethylamine	4	002-IN-B	6.3E-05	0.0001	62.9%			12.0%
45	N-Nitrosodiethylamine	6	002-IN-C	5.3E-05	0.0001	53.5%			12.0%
45	N-Nitrosodiethylamine	8	002-IN-D	5.4E-05	0.0001	54.3%			12.0%
45	N-Nitrosodiethylamine	10	002-IN-E	4.2E-05	0.0001	41.6%			12.0%
45	N-Nitrosodiethylamine	12	002-IN-F	5.8E-05	0.0001	58.5%			12.0%
45	N-Nitrosodiethylamine	14	002-IN-G	5.5E-05	0.0001	54.6%			12.0%
45	N-Nitrosodiethylamine	16	002-IN-H	5.1E-05	0.0001	50.7%			12.0%
45	N-Nitrosodiethylamine	2	002-EF-A	1.2E-05	0.0001	11.7%	YES		12.0%
45	N-Nitrosodiethylamine	4	002-EF-B	1.1E-05	0.0001	10.9%	YES		12.0%
45	N-Nitrosodiethylamine	6	002-EF-C	1.2E-05	0.0001	12.0%	YES		12.0%
45	N-Nitrosodiethylamine	8	002-EF-D	1.2E-05	0.0001	11.5%	YES		12.0%
45	N-Nitrosodiethylamine	10	002-EF-E	1.2E-05	0.0001	11.6%	YES		12.0%
45	N-Nitrosodiethylamine	12	002-EF-F	1.2E-05	0.0001	11.5%	YES		12.0%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
45	N-Nitrosodiethylamine	14	002-EF-G	1.2E-05	0.0001	11.6%	YES		12.0%
45	N-Nitrosodiethylamine	16	002-EF-H	1.2E-05	0.0001	11.8%	YES		12.0%
46	N-Nitrosomethylethylamine	2	001-IN-A	1.7E-04	0.0003	55.2%			4.58%
46	N-Nitrosomethylethylamine	4	001-IN-B	3.0E-04	0.0003	99.2%			4.58%
46	N-Nitrosomethylethylamine	6	001-IN-C	2.8E-04	0.0003	92.5%			4.58%
46	N-Nitrosomethylethylamine	8	001-IN-D	2.9E-04	0.0003	95.4%			4.58%
46	N-Nitrosomethylethylamine	10	001-IN-E	2.5E-04	0.0003	83.6%			4.58%
46	N-Nitrosomethylethylamine	12	001-IN-F	2.1E-04	0.0003	70.9%			4.58%
46	N-Nitrosomethylethylamine	14	001-IN-G	2.2E-04	0.0003	72.2%			4.58%
46	N-Nitrosomethylethylamine	16	001-IN-H	1.9E-04	0.0003	64.8%			4.58%
46	N-Nitrosomethylethylamine	2	001-EF-A	1.4E-05	0.0003	4.53%	YES		4.58%
46	N-Nitrosomethylethylamine	4	001-EF-B	1.3E-05	0.0003	4.44%	YES		4.58%
46	N-Nitrosomethylethylamine	6	001-EF-C	1.4E-05	0.0003	4.58%	YES		4.58%
46	N-Nitrosomethylethylamine	8	001-EF-D	1.3E-05	0.0003	4.48%	YES		4.58%
46	N-Nitrosomethylethylamine	10	001-EF-E	1.2E-05	0.0003	4.16%	YES		4.58%
46	N-Nitrosomethylethylamine	12	001-EF-F	1.2E-05	0.0003	4.12%	YES		4.58%
46	N-Nitrosomethylethylamine	14	001-EF-G	1.3E-05	0.0003	4.17%	YES		4.58%
46	N-Nitrosomethylethylamine	16	001-EF-H	1.2E-05	0.0003	4.15%	YES		4.58%
46	N-Nitrosomethylethylamine	2	002-IN-A	1.3E-04	0.0003	41.8%			4.58%
46	N-Nitrosomethylethylamine	4	002-IN-B	2.8E-04	0.0003	93.8%			4.58%
46	N-Nitrosomethylethylamine	6	002-IN-C	3.0E-04	0.0003	100%			4.58%
46	N-Nitrosomethylethylamine	8	002-IN-D	2.8E-04	0.0003	94.0%			4.58%
46	N-Nitrosomethylethylamine	10	002-IN-E	2.7E-04	0.0003	90.5%			4.58%
46	N-Nitrosomethylethylamine	12	002-IN-F	1.9E-04	0.0003	63.0%			4.58%
46	N-Nitrosomethylethylamine	14	002-IN-G	2.0E-04	0.0003	67.4%			4.58%
46	N-Nitrosomethylethylamine	16	002-IN-H	1.7E-04	0.0003	55.7%			4.58%
46	N-Nitrosomethylethylamine	2	002-EF-A	1.2E-05	0.0003	4.14%	YES		4.58%
46	N-Nitrosomethylethylamine	4	002-EF-B	1.2E-05	0.0003	3.87%	YES		4.58%
46	N-Nitrosomethylethylamine	6	002-EF-C	1.3E-05	0.0003	4.26%	YES		4.58%
46	N-Nitrosomethylethylamine	8	002-EF-D	1.2E-05	0.0003	4.07%	YES		4.58%
46	N-Nitrosomethylethylamine	10	002-EF-E	1.2E-05	0.0003	4.11%	YES		4.58%
46	N-Nitrosomethylethylamine	12	002-EF-F	1.2E-05	0.0003	4.08%	YES		4.58%
46	N-Nitrosomethylethylamine	14	002-EF-G	1.2E-05	0.0003	4.11%	YES		4.58%
46	N-Nitrosomethylethylamine	16	002-EF-H	1.3E-05	0.0003	4.19%	YES		4.58%
47	N-Nitrosomorpholine	2	001-IN-A	4.6E-05	0.001	7.65%			1.74%
47	N-Nitrosomorpholine	4	001-IN-B	5.8E-05	0.001	9.66%			1.74%
47	N-Nitrosomorpholine	6	001-IN-C	6.4E-05	0.001	10.6%			1.74%
47	N-Nitrosomorpholine	8	001-IN-D	6.6E-05	0.001	11.1%			1.74%
47	N-Nitrosomorpholine	10	001-IN-E	5.5E-05	0.001	9.15%			1.74%
47	N-Nitrosomorpholine	12	001-IN-F	2.7E-05	0.001	4.46%			1.74%
47	N-Nitrosomorpholine	14	001-IN-G	2.0E-05	0.001	3.37%			1.74%
47	N-Nitrosomorpholine	16	001-IN-H	2.3E-05	0.001	3.90%			1.74%
47	N-Nitrosomorpholine	2	001-EF-A	1.0E-05	0.001	1.72%	YES		1.74%
47	N-Nitrosomorpholine	4	001-EF-B	1.0E-05	0.001	1.68%	YES		1.74%
47	N-Nitrosomorpholine	6	001-EF-C	1.0E-05	0.001	1.74%	YES		1.74%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
47	N-Nitrosomorpholine	8	001-EF-D	1.0E-05	0.001	1.70%	YES		1.74%
47	N-Nitrosomorpholine	10	001-EF-E	9.5E-06	0.001	1.58%	YES		1.74%
47	N-Nitrosomorpholine	12	001-EF-F	9.4E-06	0.001	1.56%	YES		1.74%
47	N-Nitrosomorpholine	14	001-EF-G	9.5E-06	0.001	1.58%	YES		1.74%
47	N-Nitrosomorpholine	16	001-EF-H	9.4E-06	0.001	1.57%	YES		1.74%
47	N-Nitrosomorpholine	2	002-IN-A	3.4E-05	0.001	5.62%			1.74%
47	N-Nitrosomorpholine	4	002-IN-B	6.7E-05	0.001	11.2%			1.74%
47	N-Nitrosomorpholine	6	002-IN-C	5.9E-05	0.001	9.84%			1.74%
47	N-Nitrosomorpholine	8	002-IN-D	4.7E-05	0.001	7.82%			1.74%
47	N-Nitrosomorpholine	10	002-IN-E	6.0E-05	0.001	10.1%			1.74%
47	N-Nitrosomorpholine	12	002-IN-F	4.1E-05	0.001	6.88%			1.74%
47	N-Nitrosomorpholine	14	002-IN-G	3.7E-05	0.001	6.18%			1.74%
47	N-Nitrosomorpholine	16	002-IN-H	1.7E-04	0.001	29.2%			1.74%
47	N-Nitrosomorpholine	2	002-EF-A	9.4E-06	0.001	1.57%	YES		1.74%
47	N-Nitrosomorpholine	4	002-EF-B	8.8E-06	0.001	1.47%	YES		1.74%
47	N-Nitrosomorpholine	6	002-EF-C	9.7E-06	0.001	1.62%	YES		1.74%
47	N-Nitrosomorpholine	8	002-EF-D	9.3E-06	0.001	1.55%	YES		1.74%
47	N-Nitrosomorpholine	10	002-EF-E	9.4E-06	0.001	1.56%	YES		1.74%
47	N-Nitrosomorpholine	12	002-EF-F	9.3E-06	0.001	1.55%	YES		1.74%
47	N-Nitrosomorpholine	14	002-EF-G	9.4E-06	0.001	1.56%	YES		1.74%
47	N-Nitrosomorpholine	16	002-EF-H	9.5E-06	0.001	1.59%	YES		1.74%
48	Tributyl phosphate	2	001-IN-A	1.3E-04	0.200	0.064%	YES	U	0.27%
48	Tributyl phosphate	4	001-IN-B	1.3E-04	0.200	0.064%	YES	U	0.27%
48	Tributyl phosphate	6	001-IN-C	1.2E-04	0.200	0.062%	YES	U	0.27%
48	Tributyl phosphate	8	001-IN-D	1.3E-04	0.200	0.063%	YES	U	0.27%
48	Tributyl phosphate	10	001-IN-E	1.3E-04	0.200	0.067%	YES	QU	0.27%
48	Tributyl phosphate	12	001-IN-F	1.3E-04	0.200	0.065%	YES	QU	0.27%
48	Tributyl phosphate	14	001-IN-G	1.3E-04	0.200	0.066%	YES	QU	0.27%
48	Tributyl phosphate	16	001-IN-H	1.4E-04	0.200	0.068%	YES	QU	0.27%
48	Tributyl phosphate	2	001-EF-A	1.3E-04	0.200	0.064%	YES	U	0.27%
48	Tributyl phosphate	4	001-EF-B	1.3E-04	0.200	0.064%	YES	U	0.27%
48	Tributyl phosphate	6	001-EF-C	1.3E-04	0.200	0.063%	YES	QU	0.27%
48	Tributyl phosphate	8	001-EF-D	1.3E-04	0.200	0.065%	YES	U	0.27%
48	Tributyl phosphate	10	001-EF-E	1.3E-04	0.200	0.064%	YES	U	0.27%
48	Tributyl phosphate	12	001-EF-F	1.1E-04	0.200	0.053%	YES	U	0.27%
48	Tributyl phosphate	14	001-EF-G	1.4E-04	0.200	0.068%	YES	QU	0.27%
48	Tributyl phosphate	16	001-EF-H	1.3E-04	0.200	0.067%	YES	QU	0.27%
48	Tributyl phosphate	2	002-IN-A	1.3E-04	0.200	0.063%	YES	U	0.27%
48	Tributyl phosphate	4	002-IN-B	1.3E-04	0.200	0.065%	YES	U	0.27%
48	Tributyl phosphate	6	002-IN-C	1.3E-04	0.200	0.067%	YES	U	0.27%
48	Tributyl phosphate	8	002-IN-D	5.4E-04	0.200	0.268%	YES	U	0.27%
48	Tributyl phosphate	10	002-IN-E	1.3E-04	0.200	0.063%	YES	U	0.27%
48	Tributyl phosphate	12	002-IN-F		0.200				0.27%
48	Tributyl phosphate	14	002-IN-G	1.3E-04	0.200	0.065%	YES	U	0.27%
48	Tributyl phosphate	16	002-IN-H	1.3E-04	0.200	0.066%	YES	HU	0.27%
48	Tributyl phosphate	2	002-EF-A	1.2E-04	0.200	0.059%	YES	U	0.27%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
48	Tributyl phosphate	4	002-EF-B	1.3E-04	0.200	0.065%	YES	QU	0.27%
48	Tributyl phosphate	6	002-EF-C	1.2E-04	0.200	0.061%	YES	U	0.27%
48	Tributyl phosphate	8	002-EF-D	1.2E-04	0.200	0.061%	YES	U	0.27%
48	Tributyl phosphate	10	002-EF-E	1.3E-04	0.200	0.066%	YES	U	0.27%
48	Tributyl phosphate	12	002-EF-F	1.2E-04	0.200	0.061%	YES	QU	0.27%
48	Tributyl phosphate	14	002-EF-G	1.2E-04	0.200	0.061%	YES	QU	0.27%
48	Tributyl phosphate	16	002-EF-H	1.3E-04	0.200	0.065%	YES	QU	0.27%
49	Dibutyl butylphosphonate	2	001-IN-A	8.8E-05	0.007	1.26%	YES	U	5.23%
49	Dibutyl butylphosphonate	4	001-IN-B	8.8E-05	0.007	1.25%	YES	U	5.23%
49	Dibutyl butylphosphonate	6	001-IN-C	8.5E-05	0.007	1.21%	YES	U	5.23%
49	Dibutyl butylphosphonate	8	001-IN-D	8.6E-05	0.007	1.24%	YES	U	5.23%
49	Dibutyl butylphosphonate	10	001-IN-E	9.2E-05	0.007	1.31%	YES	U	5.23%
49	Dibutyl butylphosphonate	12	001-IN-F	8.9E-05	0.007	1.27%	YES	U	5.23%
49	Dibutyl butylphosphonate	14	001-IN-G	9.1E-05	0.007	1.30%	YES	U	5.23%
49	Dibutyl butylphosphonate	16	001-IN-H	9.3E-05	0.007	1.34%	YES	U	5.23%
49	Dibutyl butylphosphonate	2	001-EF-A	8.7E-05	0.007	1.25%	YES	U	5.23%
49	Dibutyl butylphosphonate	4	001-EF-B	8.7E-05	0.007	1.24%	YES	QU	5.23%
49	Dibutyl butylphosphonate	6	001-EF-C	8.7E-05	0.007	1.24%	YES	U	5.23%
49	Dibutyl butylphosphonate	8	001-EF-D	8.9E-05	0.007	1.28%	YES	U	5.23%
49	Dibutyl butylphosphonate	10	001-EF-E	8.7E-05	0.007	1.24%	YES	U	5.23%
49	Dibutyl butylphosphonate	12	001-EF-F	7.3E-05	0.007	1.04%	YES	U	5.23%
49	Dibutyl butylphosphonate	14	001-EF-G	9.3E-05	0.007	1.33%	YES	U	5.23%
49	Dibutyl butylphosphonate	16	001-EF-H	9.1E-05	0.007	1.30%	YES	U	5.23%
49	Dibutyl butylphosphonate	2	002-IN-A	8.6E-05	0.007	1.22%	YES	U	5.23%
49	Dibutyl butylphosphonate	4	002-IN-B	8.9E-05	0.007	1.27%	YES	U	5.23%
49	Dibutyl butylphosphonate	6	002-IN-C	9.2E-05	0.007	1.31%	YES	U	5.23%
49	Dibutyl butylphosphonate	8	002-IN-D	3.7E-04	0.007	5.23%	YES	U	5.23%
49	Dibutyl butylphosphonate	10	002-IN-E	8.7E-05	0.007	1.24%	YES	U	5.23%
49	Dibutyl butylphosphonate	12	002-IN-F		0.007				5.23%
49	Dibutyl butylphosphonate	14	002-IN-G	8.8E-05	0.007	1.26%	YES	U	5.23%
49	Dibutyl butylphosphonate	16	002-IN-H	9.0E-05	0.007	1.29%	YES	HU	5.23%
49	Dibutyl butylphosphonate	2	002-EF-A	8.1E-05	0.007	1.15%	YES	U	5.23%
49	Dibutyl butylphosphonate	4	002-EF-B	8.9E-05	0.007	1.27%	YES	U	5.23%
49	Dibutyl butylphosphonate	6	002-EF-C	8.4E-05	0.007	1.20%	YES	U	5.23%
49	Dibutyl butylphosphonate	8	002-EF-D	8.3E-05	0.007	1.18%	YES	U	5.23%
49	Dibutyl butylphosphonate	10	002-EF-E	9.0E-05	0.007	1.28%	YES	U	5.23%
49	Dibutyl butylphosphonate	12	002-EF-F	8.4E-05	0.007	1.20%	YES	U	5.23%
49	Dibutyl butylphosphonate	14	002-EF-G	8.3E-05	0.007	1.19%	YES	U	5.23%
49	Dibutyl butylphosphonate	16	002-EF-H	8.9E-05	0.007	1.27%	YES	U	5.23%
52	Pyridine	2	001-IN-A	8.1E-04	1.000	0.081%		J	0.038%
52	Pyridine	4	001-IN-B	8.9E-04	1.000	0.089%			0.038%
52	Pyridine	6	001-IN-C	9.4E-04	1.000	0.094%			0.038%
52	Pyridine	8	001-IN-D	8.6E-04	1.000	0.086%		J	0.038%
52	Pyridine	10	001-IN-E	7.9E-04	1.000	0.079%		J	0.038%
52	Pyridine	12	001-IN-F	8.0E-04	1.000	0.080%		J	0.038%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
52	Pyridine	14	001-IN-G	7.7E-04	1.000	0.077%		J	0.038%
52	Pyridine	16	001-IN-H	7.7E-04	1.000	0.077%		J	0.038%
52	Pyridine	2	001-EF-A	3.6E-04	1.000	0.036%	YES	U	0.038%
52	Pyridine	4	001-EF-B	3.6E-04	1.000	0.036%	YES	U	0.038%
52	Pyridine	6	001-EF-C	3.6E-04	1.000	0.036%	YES	U	0.038%
52	Pyridine	8	001-EF-D	3.7E-04	1.000	0.037%	YES	U	0.038%
52	Pyridine	10	001-EF-E	3.6E-04	1.000	0.036%	YES	U	0.038%
52	Pyridine	12	001-EF-F	3.6E-04	1.000	0.036%	YES	U	0.038%
52	Pyridine	14	001-EF-G	3.8E-04	1.000	0.038%	YES	U	0.038%
52	Pyridine	16	001-EF-H	3.8E-04	1.000	0.038%	YES	U	0.038%
52	Pyridine	2	002-IN-A	5.4E-04	1.000	0.054%		J	0.038%
52	Pyridine	4	002-IN-B	9.5E-04	1.000	0.095%			0.038%
52	Pyridine	6	002-IN-C	9.0E-04	1.000	0.090%		J	0.038%
52	Pyridine	8	002-IN-D	8.0E-04	1.000	0.080%		J	0.038%
52	Pyridine	10	002-IN-E	9.6E-04	1.000	0.096%			0.038%
52	Pyridine	12	002-IN-F	7.5E-04	1.000	0.075%		J	0.038%
52	Pyridine	14	002-IN-G	8.2E-04	1.000	0.082%		J	0.038%
52	Pyridine	16	002-IN-H	6.5E-04	1.000	0.065%		J	0.038%
52	Pyridine	2	002-EF-A	1.4E-04	1.000	0.014%	YES	U	0.038%
52	Pyridine	4	002-EF-B	1.4E-04	1.000	0.014%	YES	U	0.038%
52	Pyridine	6	002-EF-C	1.4E-04	1.000	0.014%	YES	U	0.038%
52	Pyridine	8	002-EF-D	1.5E-04	1.000	0.015%	YES	U	0.038%
52	Pyridine	10	002-EF-E	1.5E-04	1.000	0.015%	YES	U	0.038%
52	Pyridine	12	002-EF-F	1.4E-04	1.000	0.014%	YES	U	0.038%
52	Pyridine	14	002-EF-G	1.4E-04	1.000	0.014%	YES	U	0.038%
52	Pyridine	16	002-EF-H	1.5E-04	1.000	0.015%	YES	U	0.038%
53	2,4-Dimethylpyridine	2	001-IN-A	2.0E-04	0.500	0.040%	YES	U	0.044%
53	2,4-Dimethylpyridine	4	001-IN-B	2.0E-04	0.500	0.040%	YES	U	0.044%
53	2,4-Dimethylpyridine	6	001-IN-C	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	8	001-IN-D	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	10	001-IN-E	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	12	001-IN-F	2.2E-04	0.500	0.043%	YES	U	0.044%
53	2,4-Dimethylpyridine	14	001-IN-G	2.1E-04	0.500	0.041%	YES	U	0.044%
53	2,4-Dimethylpyridine	16	001-IN-H	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	2	001-EF-A	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	4	001-EF-B	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	6	001-EF-C	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	8	001-EF-D	2.2E-04	0.500	0.043%	YES	U	0.044%
53	2,4-Dimethylpyridine	10	001-EF-E	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	12	001-EF-F	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	14	001-EF-G	2.2E-04	0.500	0.044%	YES	U	0.044%
53	2,4-Dimethylpyridine	16	001-EF-H	2.2E-04	0.500	0.044%	YES	U	0.044%
53	2,4-Dimethylpyridine	2	002-IN-A	2.1E-04	0.500	0.041%	YES	U	0.044%
53	2,4-Dimethylpyridine	4	002-IN-B	1.9E-04	0.500	0.039%	YES	U	0.044%
53	2,4-Dimethylpyridine	6	002-IN-C	2.0E-04	0.500	0.040%	YES	U	0.044%
53	2,4-Dimethylpyridine	8	002-IN-D	1.9E-04	0.500	0.039%	YES	U	0.044%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
53	2,4-Dimethylpyridine	10	002-IN-E	2.0E-04	0.500	0.039%	YES	U	0.044%
53	2,4-Dimethylpyridine	12	002-IN-F	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	14	002-IN-G	2.0E-04	0.500	0.039%	YES	U	0.044%
53	2,4-Dimethylpyridine	16	002-IN-H	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	2	002-EF-A	1.9E-04	0.500	0.039%	YES	U	0.044%
53	2,4-Dimethylpyridine	4	002-EF-B	2.0E-04	0.500	0.040%	YES	U	0.044%
53	2,4-Dimethylpyridine	6	002-EF-C	2.0E-04	0.500	0.040%	YES	U	0.044%
53	2,4-Dimethylpyridine	8	002-EF-D	2.1E-04	0.500	0.041%	YES	U	0.044%
53	2,4-Dimethylpyridine	10	002-EF-E	2.1E-04	0.500	0.042%	YES	U	0.044%
53	2,4-Dimethylpyridine	12	002-EF-F	2.0E-04	0.500	0.040%	YES	U	0.044%
53	2,4-Dimethylpyridine	14	002-EF-G	2.0E-04	0.500	0.040%	YES	U	0.044%
53	2,4-Dimethylpyridine	16	002-EF-H	2.1E-04	0.500	0.042%	YES	U	0.044%
Data below is obtained through secondary analysis methods									
16	Butanal/Butyraldehyde	2	001-IN-A	6.8E-02	25.000	0.274%			0.0029%
16	Butanal/Butyraldehyde	4	001-IN-B	7.9E-02	25.000	0.318%			0.0029%
16	Butanal/Butyraldehyde	6	001-IN-C	7.9E-02	25.000	0.315%			0.0029%
16	Butanal/Butyraldehyde	8	001-IN-D	7.4E-02	25.000	0.294%			0.0029%
16	Butanal/Butyraldehyde	10	001-IN-E	7.0E-02	25.000	0.278%			0.0029%
16	Butanal/Butyraldehyde	12	001-IN-F	7.0E-02	25.000	0.279%			0.0029%
16	Butanal/Butyraldehyde	14	001-IN-G	3.8E-02	25.000	0.150%			0.0029%
16	Butanal/Butyraldehyde	16	001-IN-H	6.9E-02	25.000	0.277%			0.0029%
16	Butanal/Butyraldehyde	2	001-EF-A	2.0E-04	25.000	0.001%	YES		0.0029%
16	Butanal/Butyraldehyde	4	001-EF-B	7.1E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	6	001-EF-C	6.9E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	8	001-EF-D	7.0E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	10	001-EF-E	6.9E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	12	001-EF-F	6.9E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	14	001-EF-G	6.9E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	16	001-EF-H	7.0E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	2	002-IN-A	5.1E-02	25.000	0.205%			0.0029%
16	Butanal/Butyraldehyde	4	002-IN-B	7.7E-02	25.000	0.308%			0.0029%
16	Butanal/Butyraldehyde	6	002-IN-C	7.2E-02	25.000	0.290%			0.0029%
16	Butanal/Butyraldehyde	8	002-IN-D	6.5E-02	25.000	0.262%			0.0029%
16	Butanal/Butyraldehyde	10	002-IN-E	7.3E-02	25.000	0.294%			0.0029%
16	Butanal/Butyraldehyde	12	002-IN-F	6.6E-02	25.000	0.264%			0.0029%
16	Butanal/Butyraldehyde	14	002-IN-G	6.9E-02	25.000	0.278%			0.0029%
16	Butanal/Butyraldehyde	16	002-IN-H	8.0E-02	25.000	0.318%			0.0029%
16	Butanal/Butyraldehyde	2	002-EF-A	7.1E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	4	002-EF-B	6.8E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	6	002-EF-C	7.3E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	8	002-EF-D	7.1E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	10	002-EF-E	6.9E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	12	002-EF-F	6.9E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	14	002-EF-G	6.8E-04	25.000	0.003%	YES		0.0029%
16	Butanal/Butyraldehyde	16	002-EF-H	6.9E-04	25.00	0.003%	YES		0.0029%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
20	Furan	2	001-IN-A	5.8E-04	0.001	58.2%		J	28.5%
20	Furan	4	001-IN-B	2.6E-04	0.001	25.9%	YES	U	28.5%
20	Furan	6	001-IN-C	2.7E-04	0.001	27.2%	YES	U	28.5%
20	Furan	8	001-IN-D	2.7E-04	0.001	27.3%	YES	U	28.5%
20	Furan	10	001-IN-E	2.8E-04	0.001	27.6%	YES	U	28.5%
20	Furan	12	001-IN-F	2.8E-04	0.001	28.5%	YES	U	28.5%
20	Furan	14	001-IN-G	2.7E-04	0.001	27.0%	YES	U	28.5%
20	Furan	16	001-IN-H	3.9E-04	0.001	38.6%		J	28.5%
20	Furan	2	001-EF-A	2.5E-04	0.001	24.9%	YES	U	28.5%
20	Furan	4	001-EF-B	2.5E-04	0.001	24.8%	YES	U	28.5%
20	Furan	6	001-EF-C	2.5E-04	0.001	25.2%	YES	U	28.5%
20	Furan	8	001-EF-D	2.6E-04	0.001	25.7%	YES	U	28.5%
20	Furan	10	001-EF-E	2.5E-04	0.001	24.9%	YES	U	28.5%
20	Furan	12	001-EF-F	2.5E-04	0.001	25.1%	YES	U	28.5%
20	Furan	14	001-EF-G	2.6E-04	0.001	26.4%	YES	U	28.5%
20	Furan	16	001-EF-H	2.6E-04	0.001	26.1%	YES	U	28.5%
20	Furan	2	002-IN-A	4.5E-04	0.001	45.2%		J	28.5%
20	Furan	4	002-IN-B	2.5E-04	0.001	25.4%	YES	U	28.5%
20	Furan	6	002-IN-C	2.6E-04	0.001	26.2%	YES	U	28.5%
20	Furan	8	002-IN-D	2.5E-04	0.001	25.3%	YES	U	28.5%
20	Furan	10	002-IN-E	2.6E-04	0.001	25.8%	YES	U	28.5%
20	Furan	12	002-IN-F	1.0E-03	0.001	100%		J	28.5%
20	Furan	14	002-IN-G	7.0E-04	0.001	69.8%		J	28.5%
20	Furan	16	002-IN-H	5.0E-04	0.001	50.1%		J	28.5%
20	Furan	2	002-EF-A	2.5E-04	0.001	25.3%	YES	U	28.5%
20	Furan	4	002-EF-B	2.6E-04	0.001	26.0%	YES	U	28.5%
20	Furan	6	002-EF-C	2.7E-04	0.001	26.5%	YES	U	28.5%
20	Furan	8	002-EF-D	2.7E-04	0.001	27.1%	YES	U	28.5%
20	Furan	10	002-EF-E	2.7E-04	0.001	27.3%	YES	U	28.5%
20	Furan	12	002-EF-F	2.6E-04	0.001	26.2%	YES	U	28.5%
20	Furan	14	002-EF-G	2.6E-04	0.001	26.4%	YES	U	28.5%
20	Furan	16	002-EF-H	2.7E-04	0.00	27.4%	YES	U	28.5%
22	2,5-Dihydrofuran	2	001-IN-A	2.1E-04	0.001	20.8%	YES	U	52.5%
22	2,5-Dihydrofuran	4	001-IN-B	4.8E-04	0.001	47.8%	YES	U	52.5%
22	2,5-Dihydrofuran	6	001-IN-C	5.0E-04	0.001	50.3%	YES	U	52.5%
22	2,5-Dihydrofuran	8	001-IN-D	5.0E-04	0.001	50.3%	YES	U	52.5%
22	2,5-Dihydrofuran	10	001-IN-E	5.1E-04	0.001	50.9%	YES	U	52.5%
22	2,5-Dihydrofuran	12	001-IN-F	5.3E-04	0.001	52.5%	YES	U	52.5%
22	2,5-Dihydrofuran	14	001-IN-G	5.0E-04	0.001	49.8%	YES	U	52.5%
22	2,5-Dihydrofuran	16	001-IN-H	2.2E-04	0.001	21.8%	YES	U	52.5%
22	2,5-Dihydrofuran	2	001-EF-A	2.2E-04	0.001	21.6%	YES	U	52.5%
22	2,5-Dihydrofuran	4	001-EF-B	2.2E-04	0.001	21.5%	YES	U	52.5%
22	2,5-Dihydrofuran	6	001-EF-C	2.2E-04	0.001	21.9%	YES	U	52.5%
22	2,5-Dihydrofuran	8	001-EF-D	2.2E-04	0.001	22.3%	YES	U	52.5%
22	2,5-Dihydrofuran	10	001-EF-E	2.2E-04	0.001	21.6%	YES	U	52.5%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
22	2,5-Dihydrofuran	12	001-EF-F	2.2E-04	0.001	21.8%	YES	U	52.5%
22	2,5-Dihydrofuran	14	001-EF-G	2.3E-04	0.001	22.9%	YES	U	52.5%
22	2,5-Dihydrofuran	16	001-EF-H	2.3E-04	0.001	22.6%	YES	U	52.5%
22	2,5-Dihydrofuran	2	002-IN-A	5.0E-04	0.001	50.0%	YES	U	52.5%
22	2,5-Dihydrofuran	4	002-IN-B	4.7E-04	0.001	46.9%	YES	U	52.5%
22	2,5-Dihydrofuran	6	002-IN-C	4.8E-04	0.001	48.3%	YES	U	52.5%
22	2,5-Dihydrofuran	8	002-IN-D	4.7E-04	0.001	46.7%	YES	U	52.5%
22	2,5-Dihydrofuran	10	002-IN-E	4.8E-04	0.001	47.7%	YES	U	52.5%
22	2,5-Dihydrofuran	12	002-IN-F	5.0E-04	0.001	50.3%	YES	U	52.5%
22	2,5-Dihydrofuran	14	002-IN-G	4.8E-04	0.001	47.7%	YES	U	52.5%
22	2,5-Dihydrofuran	16	002-IN-H	5.1E-04	0.001	51.3%	YES	U	52.5%
22	2,5-Dihydrofuran	2	002-EF-A	4.7E-04	0.001	46.8%	YES	U	52.5%
22	2,5-Dihydrofuran	4	002-EF-B	4.8E-04	0.001	47.9%	YES	U	52.5%
22	2,5-Dihydrofuran	6	002-EF-C	4.9E-04	0.001	49.0%	YES	U	52.5%
22	2,5-Dihydrofuran	8	002-EF-D	5.0E-04	0.001	50.0%	YES	U	52.5%
22	2,5-Dihydrofuran	10	002-EF-E	5.0E-04	0.001	50.3%	YES	U	52.5%
22	2,5-Dihydrofuran	12	002-EF-F	4.8E-04	0.001	48.3%	YES	U	52.5%
22	2,5-Dihydrofuran	14	002-EF-G	4.9E-04	0.001	48.7%	YES	U	52.5%
22	2,5-Dihydrofuran	16	002-EF-H	5.0E-04	0.00	50.5%	YES	U	52.5%
23	2-Methylfuran	2	001-IN-A	1.9E-04	0.001	19.1%	YES	U	21.1%
23	2-Methylfuran	4	001-IN-B	1.1E-04	0.001	11.5%	YES	U	21.1%
23	2-Methylfuran	6	001-IN-C	1.2E-04	0.001	12.0%	YES	U	21.1%
23	2-Methylfuran	8	001-IN-D	1.2E-04	0.001	12.1%	YES	U	21.1%
23	2-Methylfuran	10	001-IN-E	1.2E-04	0.001	12.2%	YES	U	21.1%
23	2-Methylfuran	12	001-IN-F	1.3E-04	0.001	12.6%	YES	U	21.1%
23	2-Methylfuran	14	001-IN-G	1.2E-04	0.001	11.9%	YES	U	21.1%
23	2-Methylfuran	16	001-IN-H	2.0E-04	0.001	20.1%	YES	U	21.1%
23	2-Methylfuran	2	001-EF-A	2.0E-04	0.001	19.9%	YES	U	21.1%
23	2-Methylfuran	4	001-EF-B	2.0E-04	0.001	19.8%	YES	U	21.1%
23	2-Methylfuran	6	001-EF-C	2.0E-04	0.001	20.2%	YES	U	21.1%
23	2-Methylfuran	8	001-EF-D	2.1E-04	0.001	20.6%	YES	U	21.1%
23	2-Methylfuran	10	001-EF-E	2.0E-04	0.001	19.9%	YES	U	21.1%
23	2-Methylfuran	12	001-EF-F	2.0E-04	0.001	20.1%	YES	U	21.1%
23	2-Methylfuran	14	001-EF-G	2.1E-04	0.001	21.1%	YES	U	21.1%
23	2-Methylfuran	16	001-EF-H	2.1E-04	0.001	20.9%	YES	U	21.1%
23	2-Methylfuran	2	002-IN-A	1.2E-04	0.001	12.0%	YES	U	21.1%
23	2-Methylfuran	4	002-IN-B	1.1E-04	0.001	11.2%	YES	U	21.1%
23	2-Methylfuran	6	002-IN-C	1.2E-04	0.001	11.6%	YES	U	21.1%
23	2-Methylfuran	8	002-IN-D	1.1E-04	0.001	11.2%	YES	U	21.1%
23	2-Methylfuran	10	002-IN-E	1.1E-04	0.001	11.4%	YES	U	21.1%
23	2-Methylfuran	12	002-IN-F	1.2E-04	0.001	12.1%	YES	U	21.1%
23	2-Methylfuran	14	002-IN-G	1.1E-04	0.001	11.4%	YES	U	21.1%
23	2-Methylfuran	16	002-IN-H	1.2E-04	0.001	12.3%	YES	U	21.1%
23	2-Methylfuran	2	002-EF-A	1.1E-04	0.001	11.2%	YES	U	21.1%
23	2-Methylfuran	4	002-EF-B	1.1E-04	0.001	11.5%	YES	U	21.1%
23	2-Methylfuran	6	002-EF-C	1.2E-04	0.001	11.7%	YES	U	21.1%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
23	2-Methylfuran	8	002-EF-D	1.2E-04	0.001	12.0%	YES	U	21.1%
23	2-Methylfuran	10	002-EF-E	1.2E-04	0.001	12.1%	YES	U	21.1%
23	2-Methylfuran	12	002-EF-F	1.2E-04	0.001	11.6%	YES	U	21.1%
23	2-Methylfuran	14	002-EF-G	1.2E-04	0.001	11.7%	YES	U	21.1%
23	2-Methylfuran	16	002-EF-H	1.2E-04	0.00	12.1%	YES	U	21.1%
35	Acetonitrile	2	001-IN-A	4.7E-01	20.000	2.36%	YES		2.56%
35	Acetonitrile	4	001-IN-B	5.0E-01	20.000	2.48%	YES		2.56%
35	Acetonitrile	6	001-IN-C	4.9E-01	20.000	2.47%	YES		2.56%
35	Acetonitrile	8	001-IN-D	5.0E-01	20.000	2.48%	YES		2.56%
35	Acetonitrile	10	001-IN-E	4.6E-01	20.000	2.30%	YES		2.56%
35	Acetonitrile	12	001-IN-F	4.9E-01	20.000	2.47%	YES		2.56%
35	Acetonitrile	14	001-IN-G	4.9E-01	20.000	2.43%	YES		2.56%
35	Acetonitrile	16	001-IN-H	4.9E-01	20.000	2.44%	YES		2.56%
35	Acetonitrile	2	001-EF-A	4.8E-01	20.000	2.40%	YES		2.56%
35	Acetonitrile	4	001-EF-B	4.9E-01	20.000	2.45%	YES		2.56%
35	Acetonitrile	6	001-EF-C	4.8E-01	20.000	2.42%	YES		2.56%
35	Acetonitrile	8	001-EF-D	5.1E-01	20.000	2.56%	YES		2.56%
35	Acetonitrile	10	001-EF-E	5.0E-01	20.000	2.52%	YES		2.56%
35	Acetonitrile	12	001-EF-F	4.8E-01	20.000	2.42%	YES		2.56%
35	Acetonitrile	14	001-EF-G	4.9E-01	20.000	2.44%	YES		2.56%
35	Acetonitrile	16	001-EF-H	4.9E-01	20.000	2.44%	YES		2.56%
35	Acetonitrile	2	002-IN-A	4.6E-01	20.000	2.32%	YES		2.56%
35	Acetonitrile	4	002-IN-B	4.7E-01	20.000	2.34%	YES		2.56%
35	Acetonitrile	6	002-IN-C	4.8E-01	20.000	2.41%	YES		2.56%
35	Acetonitrile	8	002-IN-D	4.8E-01	20.000	2.38%	YES		2.56%
35	Acetonitrile	10	002-IN-E	4.8E-01	20.000	2.42%	YES		2.56%
35	Acetonitrile	12	002-IN-F	4.8E-01	20.000	2.42%	YES		2.56%
35	Acetonitrile	14	002-IN-G	4.8E-01	20.000	2.42%	YES		2.56%
35	Acetonitrile	16	002-IN-H	4.9E-01	20.000	2.44%	YES		2.56%
35	Acetonitrile	2	002-EF-A	4.7E-01	20.000	2.35%	YES		2.56%
35	Acetonitrile	4	002-EF-B	4.4E-01	20.000	2.21%	YES		2.56%
35	Acetonitrile	6	002-EF-C	5.0E-01	20.000	2.49%	YES		2.56%
35	Acetonitrile	8	002-EF-D	5.0E-01	20.000	2.49%	YES		2.56%
35	Acetonitrile	10	002-EF-E	4.8E-01	20.000	2.41%	YES		2.56%
35	Acetonitrile	12	002-EF-F	5.0E-01	20.000	2.48%	YES		2.56%
35	Acetonitrile	14	002-EF-G	4.9E-01	20.000	2.44%	YES		2.56%
35	Acetonitrile	16	002-EF-H	4.8E-01	20.00	2.40%	YES		2.56%
52	Pyridine	2	001-IN-A	1.2E-03	1.000	0.125%	YES		0.39%
52	Pyridine	4	001-IN-B	1.3E-03	1.000	0.126%	YES		0.39%
52	Pyridine	6	001-IN-C	1.3E-03	1.000	0.126%	YES		0.39%
52	Pyridine	8	001-IN-D	1.2E-03	1.000	0.122%	YES		0.39%
52	Pyridine	10	001-IN-E	1.2E-03	1.000	0.117%	YES		0.39%
52	Pyridine	12	001-IN-F	3.9E-03	1.000	0.391%	YES	, S*	0.39%
52	Pyridine	14	001-IN-G	1.0E-03	1.000	0.103%	YES		0.39%
52	Pyridine	16	001-IN-H	1.2E-03	1.000	0.123%	YES		0.39%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
52	Pyridine	2	001-EF-A	1.2E-03	1.000	0.122%	YES		0.39%
52	Pyridine	4	001-EF-B	1.2E-03	1.000	0.121%	YES		0.39%
52	Pyridine	6	001-EF-C	1.3E-03	1.000	0.126%	YES		0.39%
52	Pyridine	8	001-EF-D	1.3E-03	1.000	0.127%	YES		0.39%
52	Pyridine	10	001-EF-E	1.2E-03	1.000	0.122%	YES		0.39%
52	Pyridine	12	001-EF-F	1.2E-03	1.000	0.119%	YES		0.39%
52	Pyridine	14	001-EF-G	1.2E-03	1.000	0.119%	YES		0.39%
52	Pyridine	16	001-EF-H	1.2E-03	1.000	0.118%	YES		0.39%
52	Pyridine	2	002-IN-A	1.3E-03	1.000	0.132%	YES		0.39%
52	Pyridine	4	002-IN-B	1.3E-03	1.000	0.130%	YES		0.39%
52	Pyridine	6	002-IN-C	1.3E-03	1.000	0.130%	YES		0.39%
52	Pyridine	8	002-IN-D	1.3E-03	1.000	0.134%	YES		0.39%
52	Pyridine	10	002-IN-E	1.3E-03	1.000	0.130%	YES		0.39%
52	Pyridine	12	002-IN-F	1.3E-03	1.000	0.127%	YES		0.39%
52	Pyridine	14	002-IN-G	1.2E-03	1.000	0.125%	YES		0.39%
52	Pyridine	16	002-IN-H	1.2E-03	1.000	0.123%	YES		0.39%
52	Pyridine	2	002-EF-A	1.3E-03	1.000	0.129%	YES		0.39%
52	Pyridine	4	002-EF-B	1.3E-03	1.000	0.129%	YES		0.39%
52	Pyridine	6	002-EF-C	1.3E-03	1.000	0.126%	YES		0.39%
52	Pyridine	8	002-EF-D	1.3E-03	1.000	0.132%	YES		0.39%
52	Pyridine	10	002-EF-E	1.3E-03	1.000	0.127%	YES		0.39%
52	Pyridine	12	002-EF-F	1.3E-03	1.000	0.126%	YES		0.39%
52	Pyridine	14	002-EF-G	1.2E-03	1.000	0.123%	YES		0.39%
52	Pyridine	16	002-EF-H	1.2E-03	1.00	0.123%	YES		0.39%
53	2,4-Dimethylpyridine	2	001-IN-A	9.2E-04	0.500	0.184%	YES		0.58%
53	2,4-Dimethylpyridine	4	001-IN-B	9.3E-04	0.500	0.187%	YES		0.58%
53	2,4-Dimethylpyridine	6	001-IN-C	9.3E-04	0.500	0.187%	YES		0.58%
53	2,4-Dimethylpyridine	8	001-IN-D	9.0E-04	0.500	0.180%	YES		0.58%
53	2,4-Dimethylpyridine	10	001-IN-E	8.7E-04	0.500	0.173%	YES		0.58%
53	2,4-Dimethylpyridine	12	001-IN-F	2.9E-03	0.500	0.577%	YES	, S*	0.58%
53	2,4-Dimethylpyridine	14	001-IN-G	7.6E-04	0.500	0.152%	YES		0.58%
53	2,4-Dimethylpyridine	16	001-IN-H	9.1E-04	0.500	0.181%	YES		0.58%
53	2,4-Dimethylpyridine	2	001-EF-A	9.0E-04	0.500	0.180%	YES		0.58%
53	2,4-Dimethylpyridine	4	001-EF-B	8.9E-04	0.500	0.178%	YES		0.58%
53	2,4-Dimethylpyridine	6	001-EF-C	9.3E-04	0.500	0.186%	YES		0.58%
53	2,4-Dimethylpyridine	8	001-EF-D	9.3E-04	0.500	0.187%	YES		0.58%
53	2,4-Dimethylpyridine	10	001-EF-E	9.0E-04	0.500	0.181%	YES		0.58%
53	2,4-Dimethylpyridine	12	001-EF-F	8.8E-04	0.500	0.175%	YES		0.58%
53	2,4-Dimethylpyridine	14	001-EF-G	8.8E-04	0.500	0.175%	YES		0.58%
53	2,4-Dimethylpyridine	16	001-EF-H	8.7E-04	0.500	0.174%	YES		0.58%
53	2,4-Dimethylpyridine	2	002-IN-A	9.8E-04	0.500	0.196%	YES		0.58%
53	2,4-Dimethylpyridine	4	002-IN-B	9.6E-04	0.500	0.191%	YES		0.58%
53	2,4-Dimethylpyridine	6	002-IN-C	9.6E-04	0.500	0.192%	YES		0.58%
53	2,4-Dimethylpyridine	8	002-IN-D	9.9E-04	0.500	0.198%	YES		0.58%
53	2,4-Dimethylpyridine	10	002-IN-E	9.6E-04	0.500	0.193%	YES		0.58%
53	2,4-Dimethylpyridine	12	002-IN-F	9.4E-04	0.500	0.188%	YES		0.58%

Table D.2. SX-104 (continued)

COPC #	Analyte	End Time (h)	Position	Conc. (ppm)	OEL (ppm)	Fraction of OEL	Measurement < DL|RL?	Quality Code	Approx. DL|RL (%OEL)
53	2,4-Dimethylpyridine	14	002-IN-G	9.2E-04	0.500	0.184%	YES		0.58%
53	2,4-Dimethylpyridine	16	002-IN-H	9.1E-04	0.500	0.181%	YES		0.58%
53	2,4-Dimethylpyridine	2	002-EF-A	9.5E-04	0.500	0.190%	YES		0.58%
53	2,4-Dimethylpyridine	4	002-EF-B	9.5E-04	0.500	0.191%	YES		0.58%
53	2,4-Dimethylpyridine	6	002-EF-C	9.3E-04	0.500	0.186%	YES		0.58%
53	2,4-Dimethylpyridine	8	002-EF-D	9.7E-04	0.500	0.195%	YES		0.58%
53	2,4-Dimethylpyridine	10	002-EF-E	9.3E-04	0.500	0.187%	YES		0.58%
53	2,4-Dimethylpyridine	12	002-EF-F	9.3E-04	0.500	0.186%	YES		0.58%
53	2,4-Dimethylpyridine	14	002-EF-G	9.1E-04	0.500	0.182%	YES		0.58%
53	2,4-Dimethylpyridine	16	002-EF-H	9.1E-04	0.50	0.181%	YES		0.58%

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 Value

E.1 SX-101

Formaldehyde *(see Figure E.1)* – The RL for formaldehyde corresponds to approximately 0.6% of its OEL. Inlet values measured for MSA-TL (TL1) respirator cartridge were <10% of the OEL and specifically <1.9% of the OEL. Initial inlet values measured for 3M FR-57 (TL2) respirator cartridges were <10% of the OEL and specifically <3.8% of the OEL, and the concentrations decreased to <2% by the end of the test. Most of the outlet measurements for both cartridges were less than the RL, except for the first measurements for each cartridge, which were above the RL but <2% of the OEL. There is no evidence of breakthrough over the measured time period for either cartridge tested.

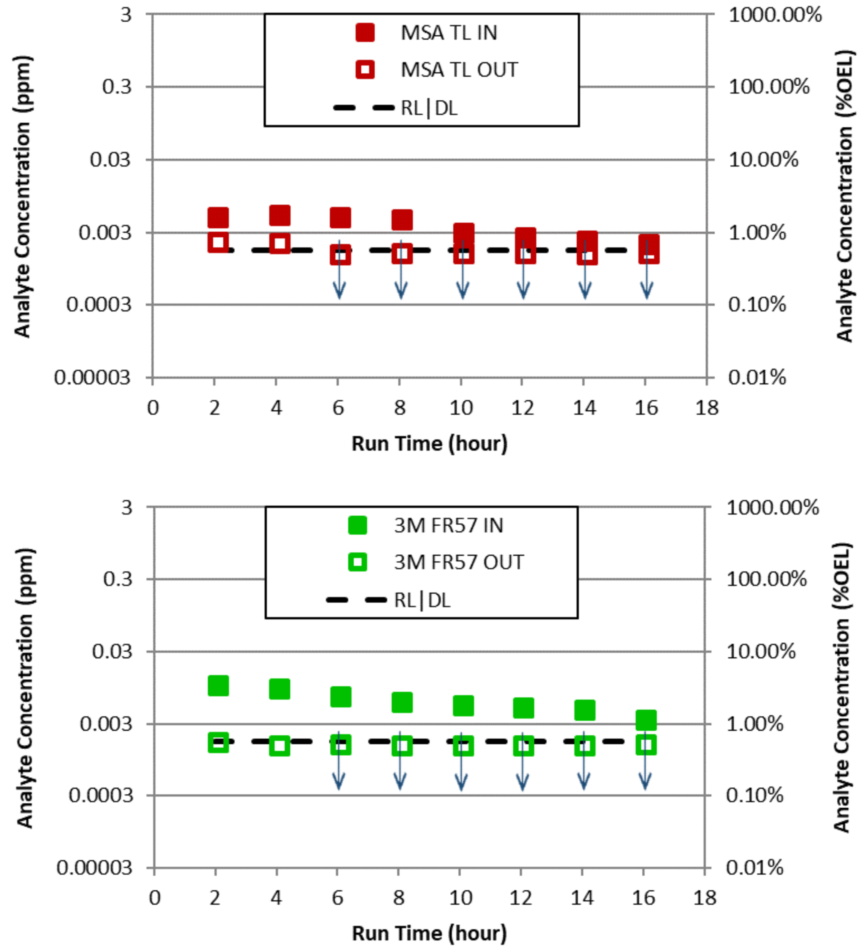
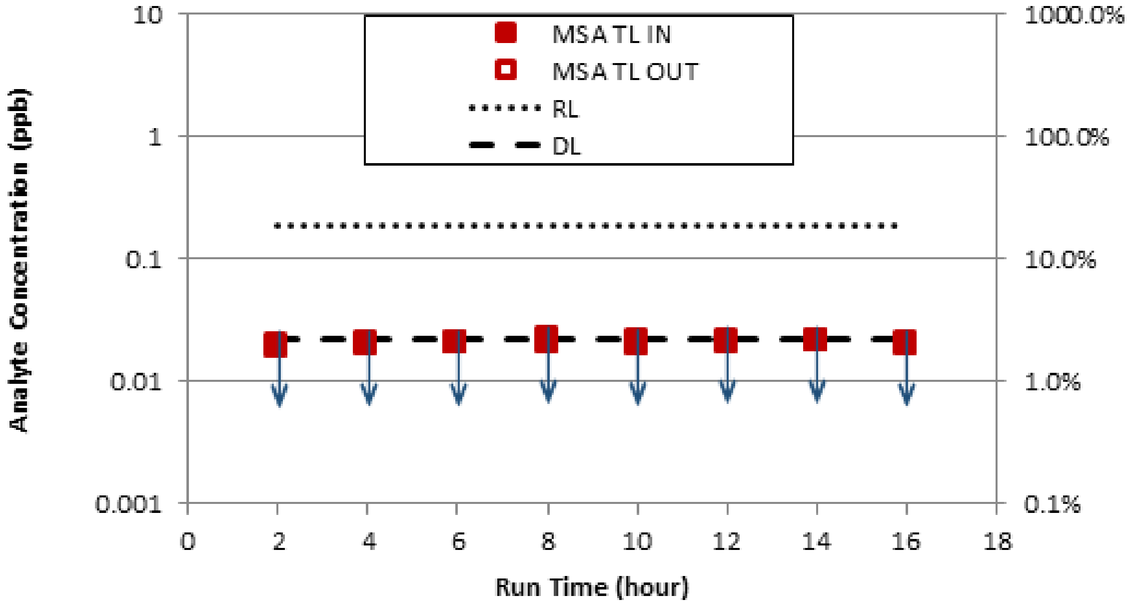


Figure E.1. Plots of Measured Formaldehyde Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]). Data points noted with ↓ indicates measurements less than the DL or RL.

Furan and Substituted Furans. Eight furan COPCs are measured and quantified during cartridge testing using calibration standards and two different sorbent tube methods. The Carbotrap 300 TDU tube is used to sample three of the lower boiling point calibrated furans including furan, 2,5-dihydrofuran, and 2-methylfuran. The Furans TENAX TA TDU tube is used to sample the remaining non-TIC substituted furans, including 2,3-dihydrofuran, 2,5-dimethylfuran, 2-pentylfuran, 2-heptylfuran, and 2-propylfuran. The DL for all eight furan COPCs exceeds 2% of OEL. In the SX-101 testing, only 2,3-dihydrofuran and 2-pentylfuran were measured at concentrations above the DL, and those results are described and plotted below. For the other six COPCs, all measured inlet and outlet concentrations from cartridge testing were less than both the DL and RL, and were, therefore, not plotted here. The specific DL and RL values for each COPC are identified in Tables 1 and 2 and range from approximately 2.4 to 4.1% of the OEL for those substituted furans measured using the TENAX TA sorbent tube, and from approximately 13 to 53% of OEL for furan and substituted furans measured using the Carbotrap 300 sorbent tube.

2,3-Dihydrofuran *(see Figure E.2)* – The DL for 2,3-dihydrofuran corresponds to approximately 2.2% of its OEL, and the RL corresponds to approximately 18.8% of its OEL. All inlet and outlet values measured for the two respirator cartridges were less than the RL, <10% of the OEL, and less than the analytical DL, except for a single outlet concentration measurement for the 3M FR-57 (TL2) cartridge after 4 hours that exceeded the DL, measuring 4.3 % of the OEL, but well below the RL. Based on the data, there is no evidence of breakthrough over the measured time period for either cartridge tested.



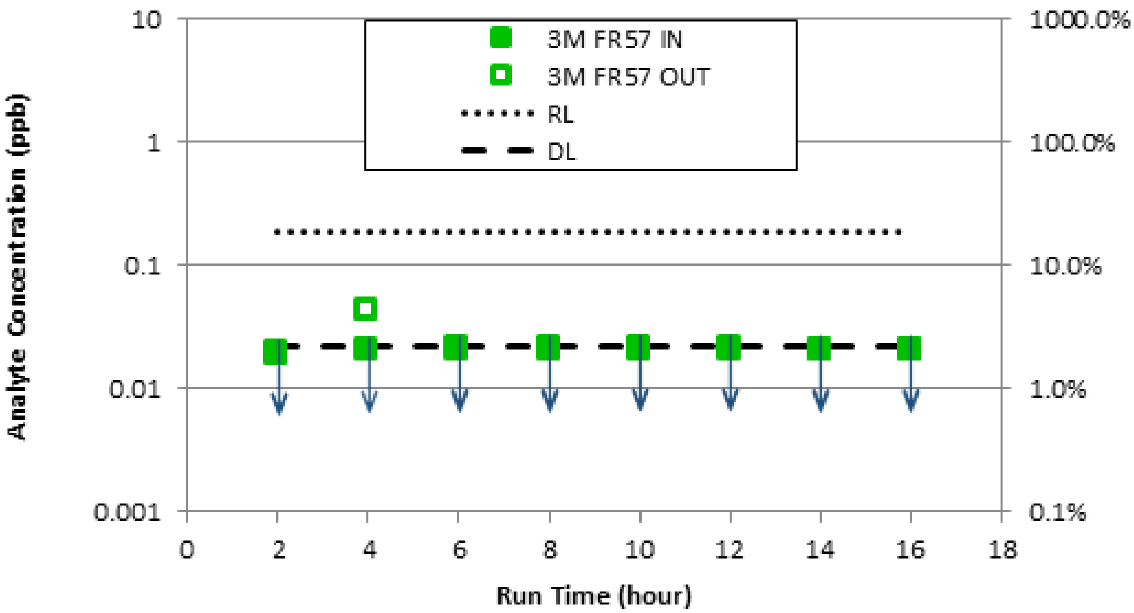


Figure E.2. Plots of Measured 2,3-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]). Data points noted with ↓ indicates measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

2-Pentylfuran *(see Figure E.3)* – The DL for 2-pentylfuran corresponds to approximately 3.4% of its OEL, and the RL corresponds to approximately 9.5% of its OEL. All inlet values measured for the two respirator cartridges were less than the RL, <10% of the OEL, and less than the analytical DL, except for the initial inlet concentration for MSA-TL (TL1) at 5.1% of the OEL and the first two inlet concentrations for 3M FR-57 (TL2) at 6.9 and 4.6% of the OEL. All outlet values measured for both respirator cartridges were less than the RL and the DL, except for the first outlet concentration from 3M FR-57 (TL2), which was greater than the DL but less than the RL at 5.0% of the OEL. Based on the data, there is no evidence of breakthrough over the measured time period for either cartridge tested.

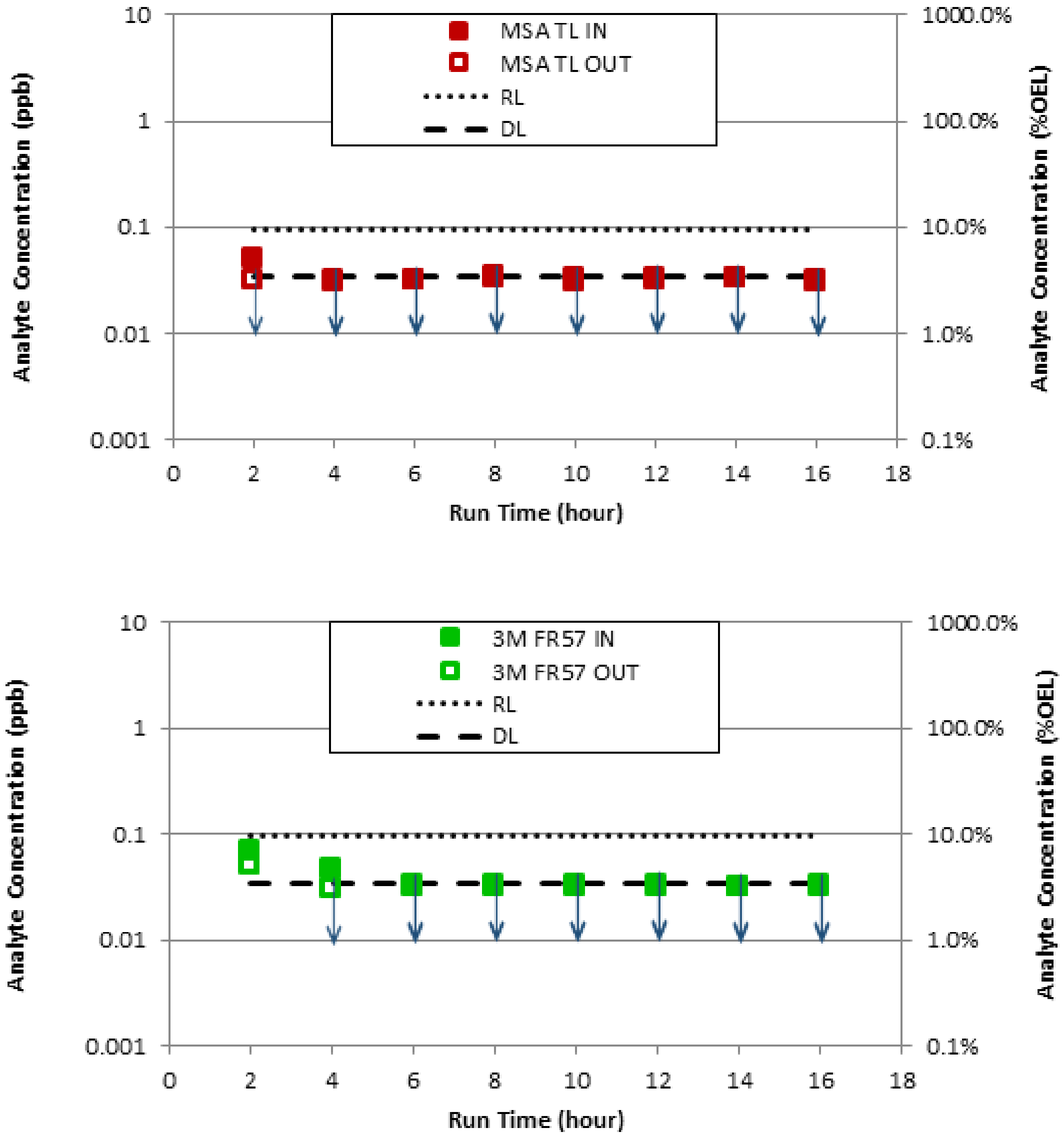


Figure E.3. Plots of Measured 2-Pentylfuran Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]). Data points noted with ↓ indicate measurements less than the DL or the RL. Outlet data points not visible are obscured by the inlet data points.

***Acetonitrile** (see Figure E.4)* – The DL for acetonitrile corresponds to 0.002% of its OEL. All inlet and outlet values measured for the two respirator cartridges were <10% of the OEL, but greater than the analytical DL, specifically <3.1% of the OEL. Based on the data, there could be evidence of early bleed through of acetonitrile for both cartridges but not >3% of its OEL, and specifically less than the 10% OEL breakthrough level in both cases.

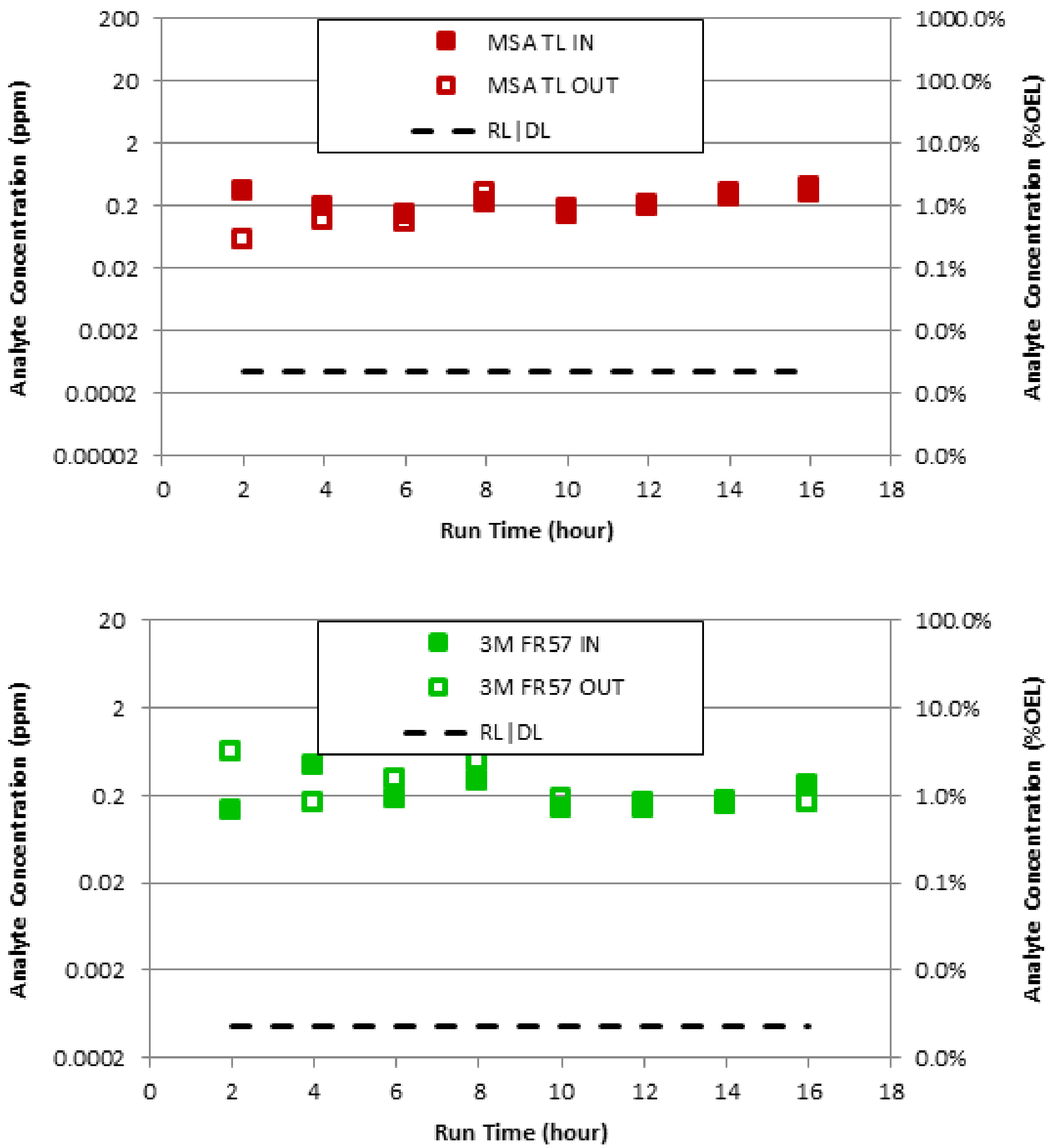
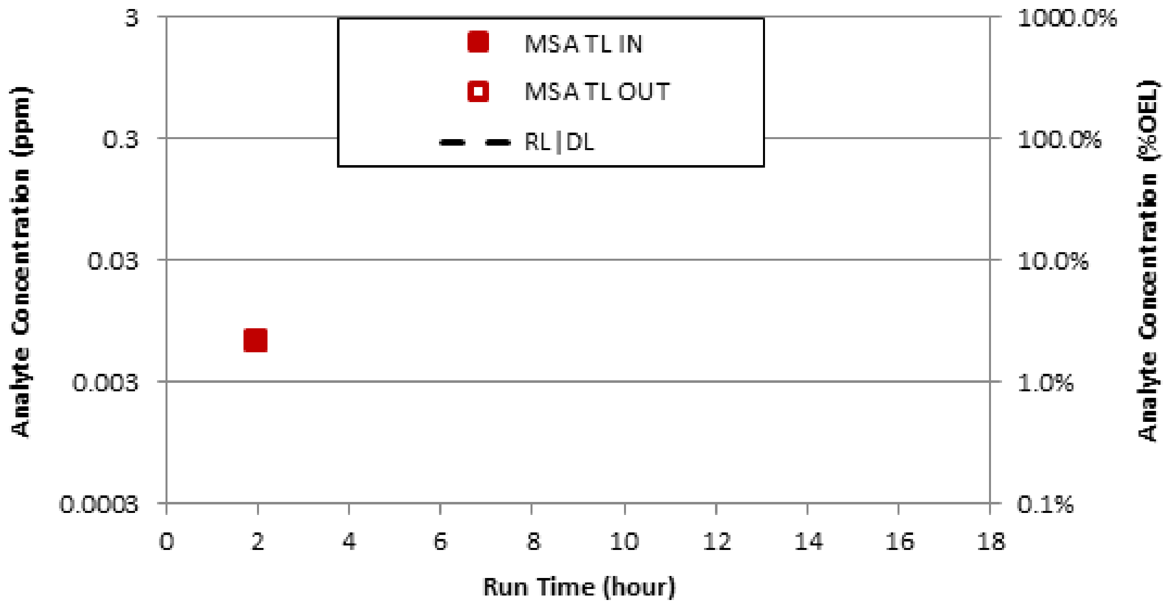


Figure E.4 Plots of Measured Acetonitrile Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]). Outlet data points not visible are obscured by the inlet data points.

2-Nitro-2-methylpropane *(see Figure E.5)* – Only one concentration was reported for 2-nitro-2-methylpropane, which is a TIC measurement. Inlet value measured for the MSA-TL [TL1] respirator cartridge was <10% of the OEL. Based on the data, there is no evidence of breakthrough over the measured time period for either cartridge tested.



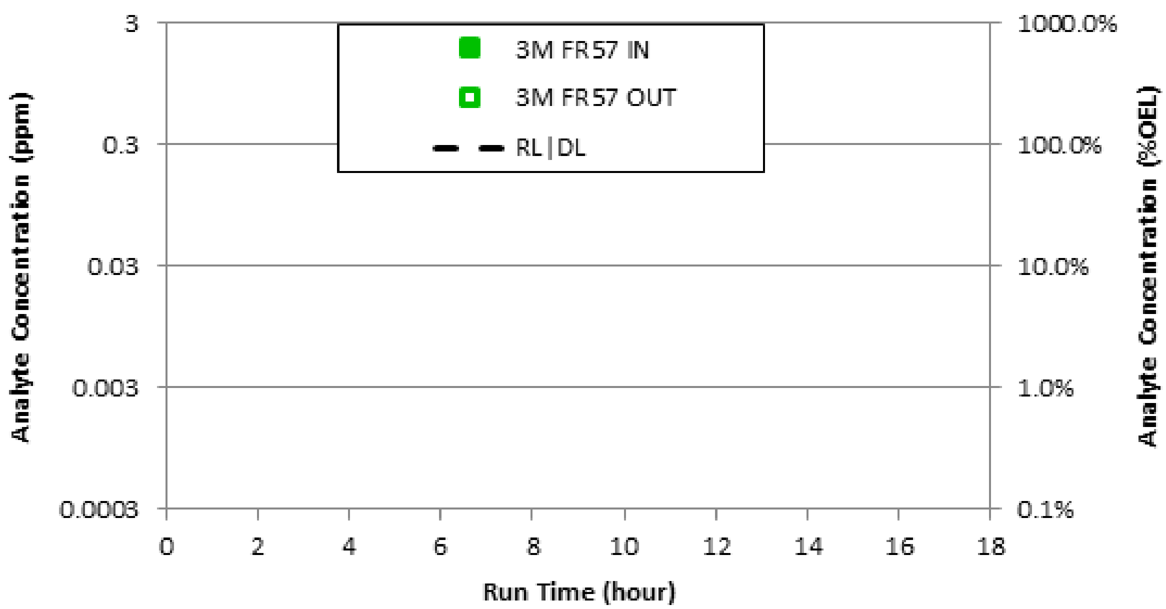
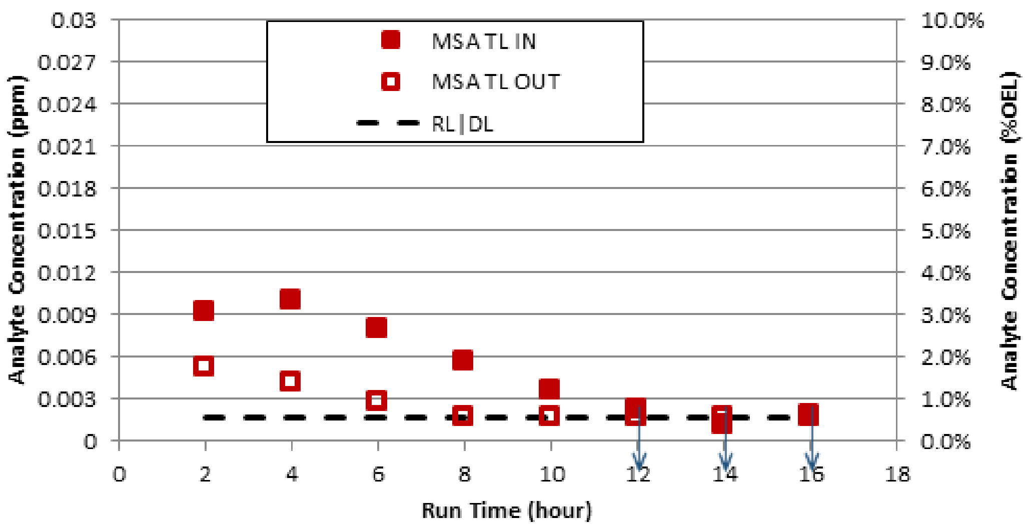


Figure E.5. Plots of Measured 2-Nitro-2-methylpropane Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]).

E.2 SX-104

Formaldehyde *(see Figure E.6)* – The RL for formaldehyde corresponds to approximately 0.6% of its OEL. Inlet values measured for MSA-TL (TL1) respirator cartridge were scattered, but <10% of the OEL, and specifically <3.3% of the OEL. Initial inlet values measured for 3M FR-57 (TL2) respirator cartridges were <10% of the OEL, and specifically <5.5% of the OEL. The inlet concentrations for both cartridges decreased to <2% of the OEL by the end of the test. The initial outlet concentrations from MSA-TL (TL1) were greater than the DL, reaching as high as 5.5% of the OEL. All of the other outlet measurements were <2% of the OEL for both respirator cartridges. Thus, there is no evidence of breakthrough over the measured time period for either cartridge tested.



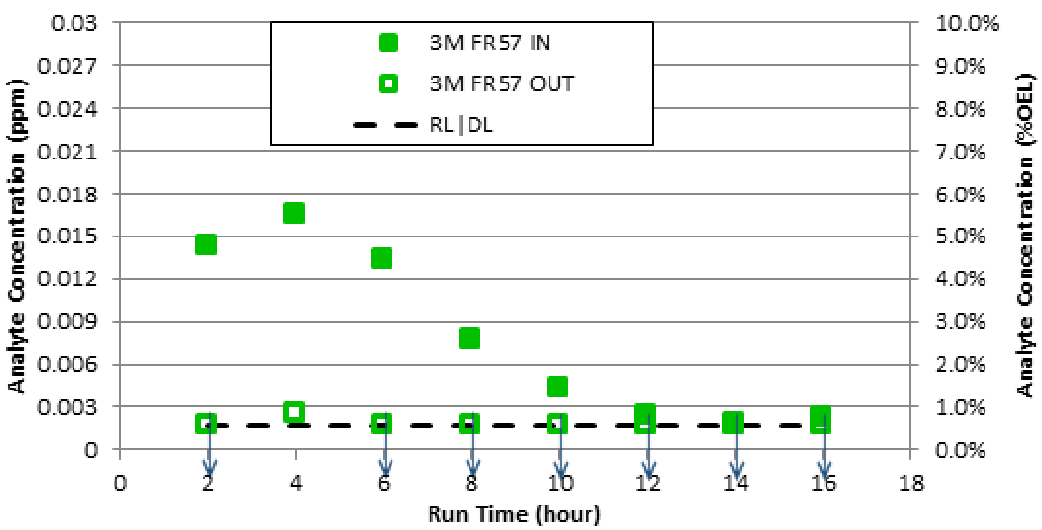
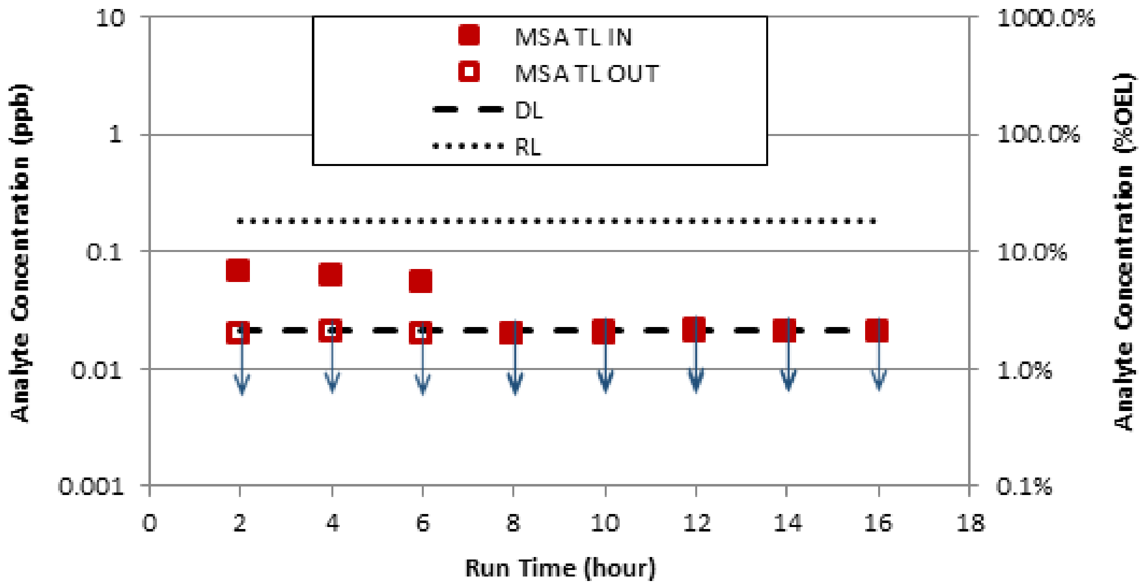


Figure E.6. Plots of Measured Formaldehyde Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]). Data points noted with ↓ indicates measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

Furan and Substituted Furans – Eight furan COPCs are measured and quantified during cartridge testing using calibration standards and two different sorbent tube methods. Carbotrap 300 TDU tubes were used to collect samples for three of the lower boiling point calibrated furans including furan, 2,5-dihydrofuran, and 2-methylfuran. Furans TENAX TA TDU tubes were used to collect samples for the remaining non-TIC substituted furans, including 2,3-dihydrofuran, 2,5-dimethylfuran, 2-pentylfuran, 2-heptylfuran, and 2-propylfuran. The DLs for all eight furan COPCs exceed 2% of OEL. In SX-104 testing, furan and 2,5-dimethylfuran were detected at levels >10% of OEL and are described and plotted in Chapter 5. Two additional furan COPCs (2,3-dihydrofuran and 2-pentylfuran) were measured at concentrations above their DLs, but <10% of OEL, and are described and plotted below. For each of the other four furan COPCs, all measured inlet and outlet concentrations from cartridge testing were less than both the DLs and the RLs and were, therefore, not plotted here. The specific DL and RL values for each COPC are identified in Tables 1 and 2 in Chapter 4, and range from approximately 2.2 to 4.1% of the OEL for those substituted furans measured using TENAX TA sorbent tubes, and from approximately 14 to 53% of OEL for furan and substituted furans measured using the Carbotrap 300 sorbent tubes.

2,3-Dihydrofuran *(see Figure E.7)* – The DL for 2,3-dihydrofuran corresponds to approximately 2.2% of its OEL and the RL corresponds to approximately 18.5% of its OEL. For the MSA-TL (TL1) cartridge, the first three initial inlet 2,3-dihydrofuran concentrations were higher than the DL but less than the RL, with a maximum of 10% of the OEL. Inlet concentrations decreased to less than the DL after 6 hours. All other inlet and outlet values measured for both cartridges were less than the DL. Based on the outlet data, there is no evidence of breakthrough over the measured time period for either cartridge tested.



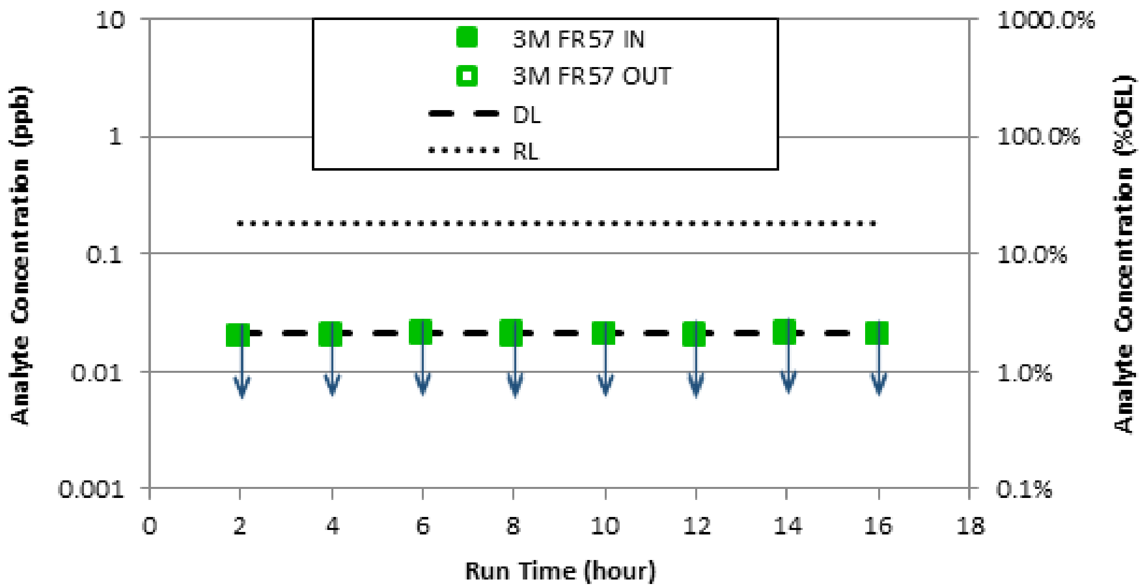


Figure E.7. Plots of Measured 2,3-Dihydrofuran Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]). Data points noted with ↓ indicate measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

2-Pentylfuran *(see Figure E.8)* – The DL for 2-pentylfuran corresponds to approximately 3.3% of its OEL, and the RL corresponds to approximately 9.4% of its OEL. The initial inlet concentration measurements for both the MSA-TL (TL1) and 3M FR-57 (TL2) cartridges were <10% of the OEL and the RL, but greater than analytical DL. The first two outlet measurements for TL1 were slightly above, but near the DL. However, the machine baseline also indicated a higher than DL concentration, indicating that the slightly elevated measurements may have been a result of elevated sorbent tube background contamination. All other inlet and outlet values measured for the two respirator cartridges were less than the RL, <10% of the OEL, and less than the analytical DL. Based on the data, there is no evidence of breakthrough over the measured time period for either cartridge tested.

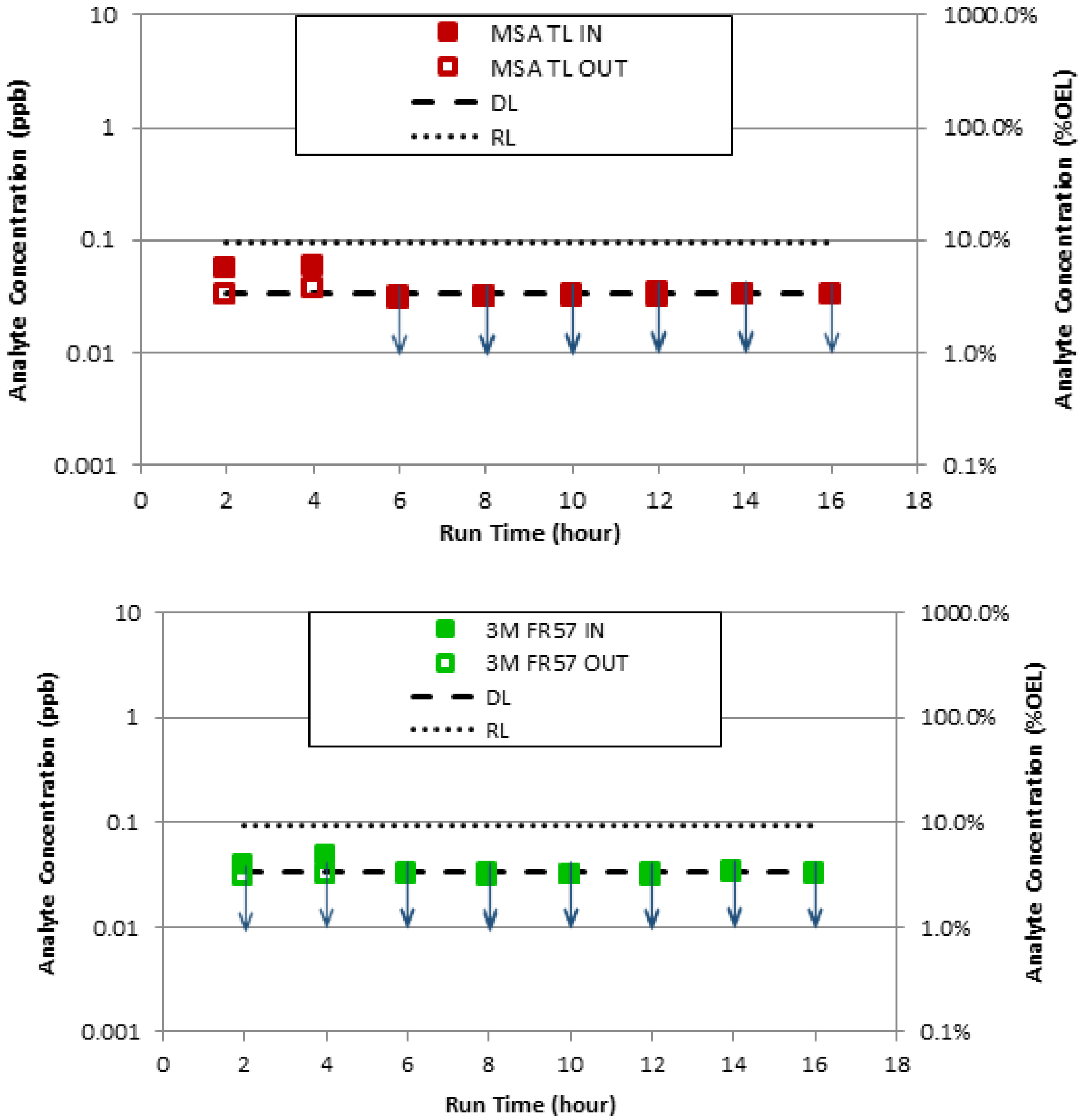


Figure E.8. Plot of Measured 2-Pentylfuran Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]). Data points noted with ↓ indicates measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

Acetonitrile *(see Figure E. 9)* – The DL for acetonitrile corresponds to 0.002% of its OEL. All inlet and outlet values measured for the two respirator cartridges were <10% of the OEL, but greater than the analytical DL, specifically <2.6% of the OEL. Based on the data, there could be evidence of early breakthrough of acetonitrile for both cartridges but not above 1% of its OEL, and specifically <10% of the OEL breakthrough level in both cases.

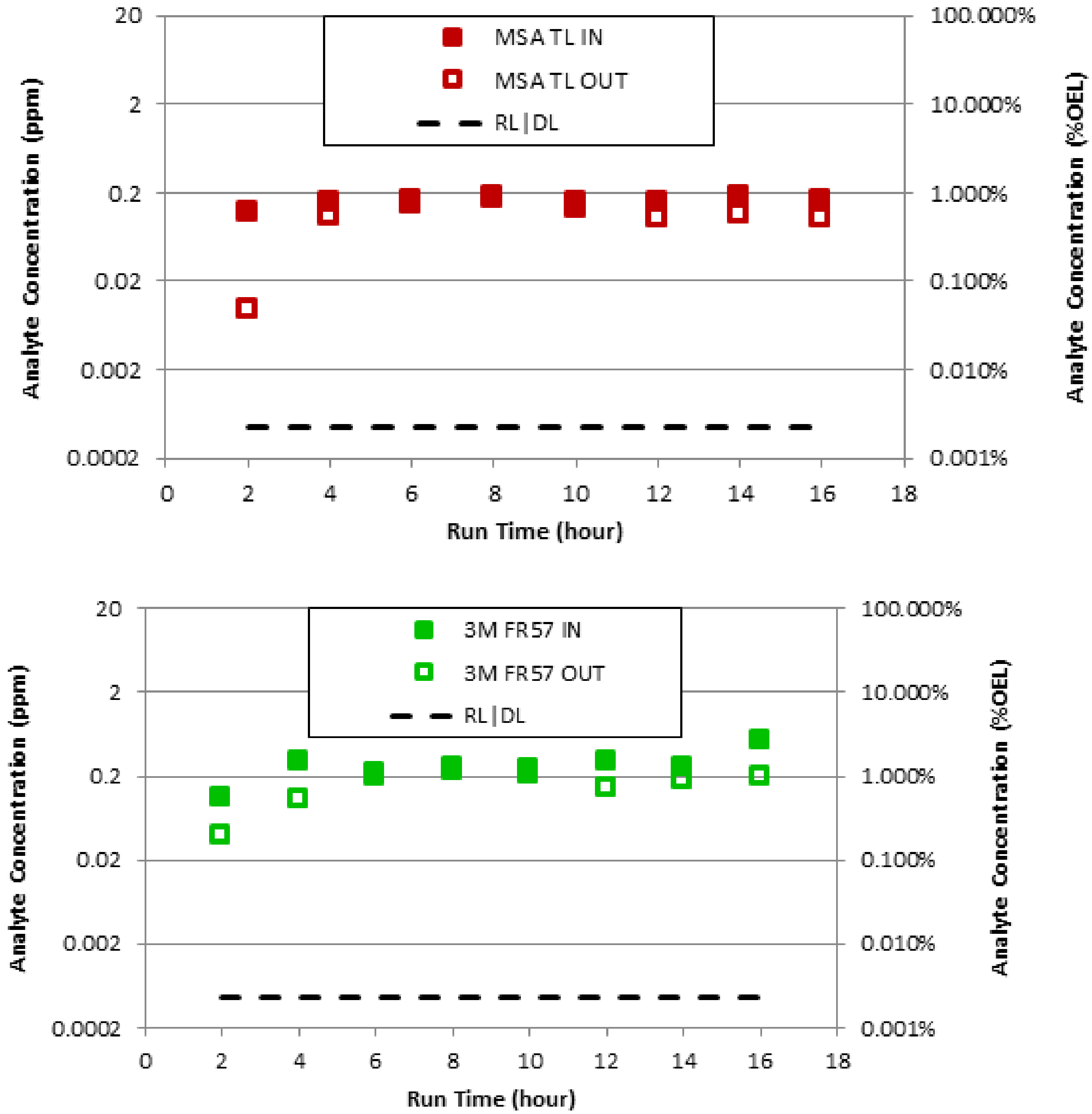
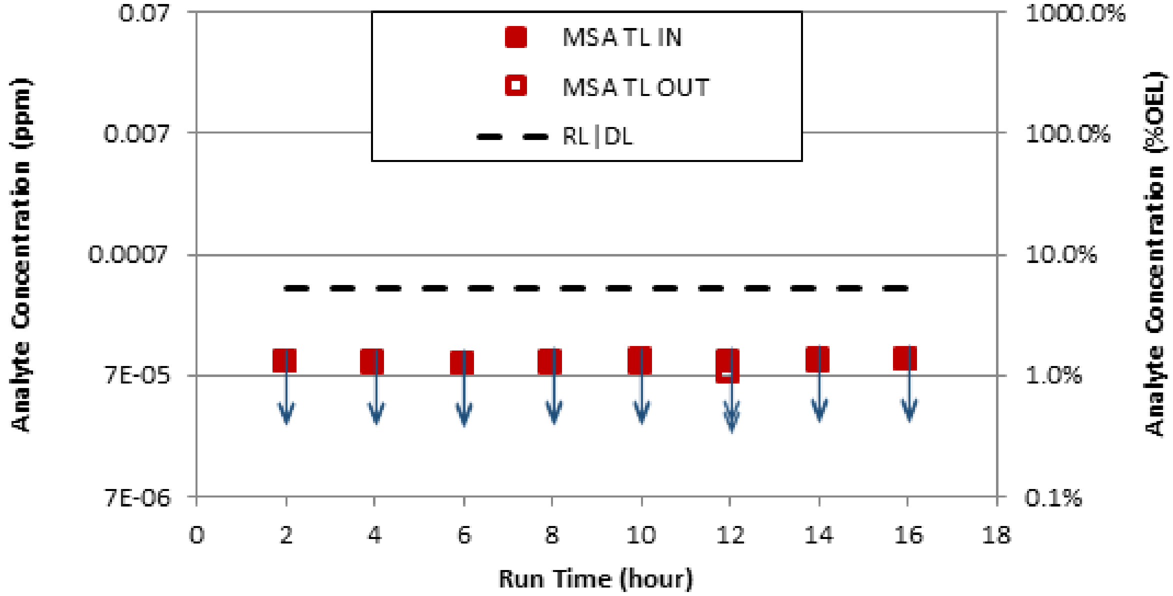


Figure E.9. Plot of Measured Acetonitrile Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]). Data points noted with ↓ indicates measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

Dibutyl butylphosphonate *(see Figure E.10)* – The DL for Dibutyl butylphosphonate corresponds to approximately 5.2% of its OEL. All inlet and outlet values measured for the two respirator cartridges were less than the DL and <10% of the OEL. Based on the data, there is no evidence of breakthrough over the measured time period for either cartridge tested.



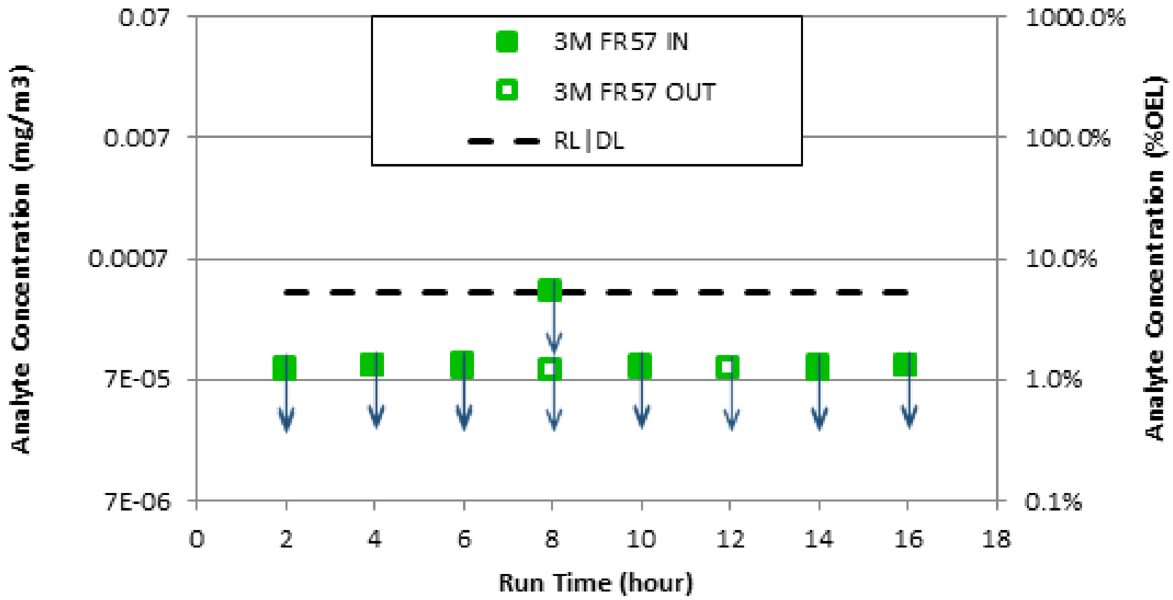


Figure E.10. Plot of Measured Dibutyl Butylphosphonate Concentrations before the Inlets and after the Outlets of the Two PAPR Cartridges Tested (MSA-TL [TL1] and 3M FR-57 [TL2]). Data points noted with ↓ indicates measurements less than the DL or RL. Outlet data points not visible are obscured by the inlet data points.

Appendix F

Historical Data Comparison

Appendix F

Historical Data Comparison

Headspace-characterization data and Industrial Hygiene (IH) data—hereafter referred to as "TWINS HS" and "TWINS IH"—were obtained from the Tank Characterization Database via the Tank Waste Information Network System (TWINS). All vapor analysis results for the SX-101 headspace were obtained via a TWINS query on June 20, 2016, for TWINS HS,[1] and another query on March 8, 2017, for TWINS IH.[2] More recent headspace data also were obtained from the Site-Wide Industrial Hygiene Database (SWIHD) by a query on March 8, 2017, that obtained all headspace data that were present as of that date, producing a set referred to as "SWIHD HS."

F.1 Data Handling and Filtering

For the TWINS IH data set, each line of data in the set represents a measurement made on the contents of a single sorbent tube (or other collector). Frequently, a single sample air stream passed through a series of two or more collectors, which meant that the actual sample concentration was the sum of contributions from all the collectors in the series. The intent of this sample collection method was to have most or all vapor deposited in the first collector, with a relatively small amount of breakthrough into the second collector. The TWINS IH data set currently does not contain explicit information to denote which data came from specific collectors in series or to identify which collectors belong in a set. This absence causes some difficulty in identifying which data should be summed to obtain the true concentration for the sample stream. For the purpose of providing a historical data set for comparison to cartridge data, use of the uncombined raw data was considered to be adequate. Some historical concentration maxima and averages will be underestimated as a result; the underestimates are expected to be within a factor of 2 of the true (summed) concentration value, because in almost all cases, there are no more than two collectors in series.

Like the TWINS IH data set, the SWIHD HS data set does not contain explicit information to denote which data came from specific collectors in series or to identify which collectors belong in a set. However, the SWIHD HS samples are recent (2014 to 2016) and have more standardized sample naming conventions than many of the older data in TWINS HS. In addition, the sample volumes reported in TWINS HS all have three or more significant figures. This is crucial because a main identifying feature of samples in series is that they necessarily have identical sample volumes. With the additional information in SWIHD HS, it was possible to plausibly identify which lines of data needed to have concentrations summed to provide the total (true) sample concentrations.

Some historical concentration data were removed from consideration because they were flagged as being "bad" data for the current purpose; that is, they had certain measurement quality issues. TWINS HS data were eliminated from consideration if they were:

[1] No data have been added to TWINS HS since March 2005, so the June 2016 download does not require updating. TWINS HS downloaded from https://twins.labworks.org/twinsdata/Forms/BuildQuery.aspx?SourceName=vapor.dbo.sp_WEB_TVD_analysis_results&whatsnew=Vapor.

[2] TWINS IH downloaded from https://twins.labworks.org/twinsdata/Forms/BuildQuery.aspx?SourceName=vapor.dbo.v_ih_sampling_results&whatsnew=Vapor.

- 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)
- Marked with a laboratory-defined flag whose meaning was not generically defined and might indicate a serious data-quality issue (Data Qualifier flag Y).

TWINS IH and SWIHD HS data were eliminated from consideration as “bad” if they:

- Were associated with a contaminant in a blank (Data Qualifier flag b or B), a laboratory control sample that was out of range (Data Qualifier flag a), or a low-level standard with percent recovery outside the specified range (Data Qualifier flag L)
- Had an excessive relative percent difference between duplicates (Data Qualifier flag c)
- Were marked with a laboratory-defined flag whose meaning was not generically defined and might indicate a serious data-quality issue (Data Qualifier flag Y).

TWINS HS results associated with chemicals that were ambiguously identified (e.g., “alkane,” “unknown,” “C6 ketone”) were deleted unless the molecular weight of one of the chemicals could be unambiguously specified (e.g., “octanenitrile and others” was kept). In these mixture cases, where the Chemical ID consisted of a Chemical Abstracts Service (CAS) number followed by M, the molecular weight of the identified chemical was added to the data record, the CAS number was used for the Chemical ID, and the concentration was 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.

Several chemicals in the TWINS IH data set had “needs conversion” notes in the concentration (mg/m^3 and ppm) columns of the database, rather than numbers. It was necessary to use values already in the database to determine these concentrations via ideal-gas calculations (i.e., the molecular weight, the “Reported Value” and its units, and the “Sample Volume” and its units). The temperature and pressure were assumed to be 25°C and 1 atm, respectively.

The method summarized above was consistent with that used in PNNL-26820 Rev. A (the FY 2017 update to the COPC assessment),[1] except that measurements that were below-reports—less than the reporting limit (RL) for the analyte were excluded in PNNL-26820 and were not excluded in this study. More detail of the data processing method is given in PNNL-26820.

For comparison to cartridge tests conducted using a gas stream from the SX-101 and SX-104 headspaces, only tank headspace, inlet filter, or breather filter measurements were considered appropriate. Therefore, the data were filtered to make sure the historical sampling location was similar to the cartridge test sampling location:

- The TWINS HS database contained headspace data identified as SX-101 and SX-104 measurements, which were considered initially for this analysis. All of the TWINS HS data for organic compounds and ammonia in these two SX tanks were from measurements made in 1999 or before. However, these data were taken while a sludge cooler (active ventilation) was in place. Active ventilation ended in 2003,[(2)] and only data collected later than 2003 are relevant to the current passively ventilated conditions.

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[1] Mahoney LA and EW Hoppe. 2017. *Hanford Tank Vapors FY 2017 Chemicals of Potential Concern*. PNNL-26820 Rev. A, Pacific Northwest National Laboratory, Richland Washington. Unpublished.
[2] Email from JE Meacham to LA Mahoney, “RE: Exhauster system changes,” December 21, 2017, 3:11:18 PM.

- The SWIHD HS database contained no headspace data for SX-101 and therefore was not used in the SX-101 analysis. However, SWIHD HS data for SX-104, based on measurements taken in July 2015, were in the database.
- All of the TWINS IH data that had “SX101” or “SX104” noted in the “Location” field of the database were used. These data had survey titles that alluded to “BF” (breather filter) and “S-complex COPC summa sampling,” and were taken in 2006.

F.2 Data Tabulation

For each of the two tank headspaces, maximum and average[1] headspace concentrations were found for each analyte for the combined TWINS IH and SWIHD HS[2] databases.[3] These maxima and averages are given in Table F.1 and Table F.2,[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 that might have been present during cartridge testing. The practice in other cartridge testing reports has been to omit TWINS HS data from the calculations that support the tables in this appendix unless the maximum and average for an analyte were considerably different if they were determined from a combination of all three databases. In such cases italics have been used to indicate the effect of data from TWINS HS. However, all TWINS HS data predate the establishment of the current passive ventilation conditions and therefore were not used here and generated no italicized entries.

Because the RLs on concentrations in the historical database were generally higher than the RLs or detection limits (DL) in the cartridge tests, it was necessary to analyze data in a way that would let the effect of less-than-RL historical data (a.k.a., below-reports) be recognized. To do this, it was assumed that all of the below-reports in the databases had concentrations equal to the RLs of the measurement. In addition, it was useful to identify situations where there was a maximum concentration that was singularly high, compared to all other measurements. These kinds of information are shown in Table F.1 and Table F.2 using the conventions described below.

Each entry may be either a single value or one value that is not in parentheses followed by another that is in parentheses. If there is a single value, it is based only on below-report data if preceded by “<”; otherwise, it comes from above-report data. If there are two values, the first value is for the overall data set, above-reports, and below-reports taken all together. The second, parenthesized value is for above-reports alone. The notation “n/a” indicates when there are no data at all.

Some examples to help to clarify this are described below.

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[1] Arithmetic average

[2] 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.

[3] Because the SWIHD HS database contained no data for SX-101, the TWINS IH data were the only concentrations present in the “two-database” combination.

[4] All % OEL values were calculated from concentration data that had been rounded to a minimum of 3 significant figures.

- If the number of values is given as “46 (35)”, there were 46 total data points, 35 above-reports and 46 – 35 = 11 below-reports. If the number of values is “1 (0)”, there was one below-report and no above-reports.
- If the maximum is “<0.04 (0.01)”, it means there was a below-report with a RL of 0.04, whereas the highest above-report was only 0.01. It seems counter-intuitive for below-reports to increase the maximum over the above-report value, but it can happen when some measurements were made with much less sensitivity (much higher RLs) than others.
- If the average is “0.04 (0.01)”, it means the average including below-reports was 0.04, whereas the average for above-reports only was 0.01. The average for the overall data set is preceded by “<” only if all data were below-reports.

These notations apply to the concentration/OEL percentages as well as to the concentrations.

F.3 Identifying Maxima Measured During Disturbances

To better understand the historical maxima, the historical data sets were reviewed to determine which data were taken during planned tank operations that caused waste disturbance or were taken during or just after ventilation system outages.[1)]

Note that procedures already in place prevent air-purifying respirators from being used in downwind areas during certain types of planned operations; for example, waste transfers, other waste-disturbing activities, and ventilation restarts after outages. Tank farm personnel would use more protective equipment such as self-contained breathing apparatus or supplied air. Thus, maxima that come from data taken during these operations need to be recognized as such because they may be less pertinent to the intended purpose of cartridge testing

Waste transfers, waste recirculation, and addition of water from evaporators are considered to be waste-disturbing activities in the discussion in this appendix. Raw water additions also are discussed when present; however, for dates when they are present without waste transfers, they are not taken as waste-disturbing events.

Only TWINS IH data were checked for the presence of disturbance conditions. Headspace data were not so reviewed because it was expected to be rare for headspace sampling to be conducted during planned operations that caused waste disturbances.

The first type of information used to identify waste-disturbing or ventilation-disturbing activities was the title of the Industrial Hygiene survey in the TWINS IH database. Surveys were considered to reflect waste-disturbing operations if their titles included a reference to “retrieval,” “transfer,” “tank Y to tank Z,” “Z% complete” (referring to a retrieval), ALC (air-lift circulator), recirculation, portable exhausters on single-shell tanks, or the 242-A evaporator (implying an ongoing evaporation campaign). However, if the title also included the words “baseline,”, “re,” or “start,” the survey was considered to precede transfer operations and to not include the effects of waste disturbance.

[1] Because tanks SX-101 and SX-104 are passively ventilated, they are not subject to ventilation-disturbing operations, which are mentioned only for completeness.

Information in the survey title was tested and supplemented by consulting the TWINS databases of tank transfers (pre-2001 and post-2000).[1] These databases are related to Best Basis Inventory[2] determinations and focus on activities that change the waste inventories in tanks. They do not include any information about ventilation disturbances, and only include information on in-tank recirculation if it indirectly changed the inventory (e.g., by inducing a gas release).

F.4 Comparison with Historical Data – Approach

The maximum and average COPC concentrations measured during cartridge testing were compared to the maximum and average historical concentrations. Where differences were found, the historical data were examined for explanations in the type or circumstances of sampling (e.g., waste-disturbing operations).

The cartridge inlet concentrations discussed in the following sections include (as appropriate) above-report concentrations, below-report concentrations (in which case RLs were used for comparison), and below-detects (in which case DLs were used for comparison). The use of below-detect versus below-report depends on the type of sample analysis performed on the cartridge inlet samples. For more background, see Appendix D of Freeman et al. 2017, which discusses the difference between DLs and RLs for furans. The maximum cartridge inlet concentrations for APR cartridges (SC1 and SD1) and PAPR cartridges (TL and FR-57)[3] are discussed separately when they are different enough to justify it.

The larger discrepancies, or apparent discrepancies, between historical data and cartridge inlet concentrations are discussed below. Discrepancies are discussed if the cartridge inlet concentration appeared to be low compared to historical maxima that, if present, might have been more of a challenge to the cartridge. The criteria for this condition are 1) the historical concentration of a compound was >10% of the OEL and 2) the cartridge inlet concentration was between 20% and 50% of the historical value. However, discrepancies are considered significant only if the historical concentration was >10% of the OEL and the cartridge inlet concentration is <20% of the historical value. In addition, if ammonia, mercury, nitrous oxide, and nitrosamines had cartridge inlet concentrations or historical concentrations that were >10% of their OELs, they are also included below (even if not discrepant by the above definition) because these compounds are of general interest.

In cases where the cartridge inlet concentration (maximum or average) was below the RL or the DL, the RL or DL is used as a basis for comparison. The same approach is taken for historical concentrations that were below the RL ("below-report" or "<RL").

A comparison between cartridge inlet and historical maximum concentrations is made in the following sections.

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[1] See the "Tank Transfers" menu item under https://twins.labworks.org/twinsdata/Forms /About.aspx. Note that many entries in these databases refer to inventory changes caused not by a waste-affecting operation but by re-baselining, changes in inventory calculation assumptions, changes in level instrumentation, etc. Some (not all) spontaneous gas releases also are included.

[2] The Best-Basis Inventory (BBI) establishes the inventory of the underground waste storage tanks at Hanford by using sample data, process knowledge, surveillance data, and waste stream composition information from the Hanford Defined Waste (HDW) computer model (Agnew et al. 1997).

[3] The PAPR cartridges TL and FR-57 are sometimes referred to as "TL1" and "TL2."

F.5 Comparison with SX-101 Historical Data

SX-101 has been almost inactive since 2003. A small volume addition of raw water was made in 2005. The sludge-cooler ventilation was not shut down until 2003. Because of the change in ventilation, headspace and activity data collected prior to 2004 are considered irrelevant.

With respect to waste disturbance, it must be noted that SX Farm tanks are arranged in three-tank cascades. Tanks SX-101, SX-102, and SX-103 are connected with each other by overflow lines through which vapors may move from one tank headspace to another (Huckaby et al. 2004). It is physically possible for waste disturbances in SX-102 and SX-103 to have affected vapor concentrations in SX-101. However, there were no waste-disturbing operations in any of the tanks of the SX-101 cascade in 2006, the only year for which post-2003 SX-101 headspace data are available. Hence none of the available data for SX-101 were taken during waste-disturbing conditions.

F.5.1 Ammonia – SX-101

The maximum cartridge inlet concentrations were 1385% of the OEL for the APR cartridges and 796% of the OEL for the PAPR cartridges. Both of these cartridge inlet maxima are high compared to the historical maximum concentration of 6.22 ppm (25% of the OEL). This data point comes from the TWINS IH database and was a breather filter measurement made on August 7, 2006. The historical data apparently do not provide good guidance for the presence of high concentrations under current headspace conditions.

F.5.2 Nitrous Oxide – SX-101

Nitrous oxide was not measured in cartridge testing. There is one historical concentration in TWINS IH, 2.1 ppm (4.2% of the OEL). The maximum above-report concentration in the TWINS HS database was measured in 1997 and is not relevant.

F.5.3 Mercury – SX-101

The maximum cartridge inlet concentrations were 13.8% of the OEL for the APR cartridges and 25.9% of the OEL for the PAPR cartridges. Both are high compared to the sole historical measurement, a below-report with a RL of 0.000051 mg/m^3 (concentration <0.204% of the OEL). This measurement came from TWINS IH; it was a breather filter measurement made on August 7, 2006. For this chemical, the historical data apparently do not provide good guidance for the presence of high concentrations under current headspace conditions.

F.5.4 Furan and Substituted Furans – SX-101

For APR cartridges, the above-detection-limit cartridge inlet maxima for furan was 169% of the OEL, by the Carbotrap 300 TDU method. For PAPR cartridges, the maximum inlet concentration of furan was below the DL of the Carbotrap 300 TDU method (i.e., <28.5% of OEL).

All the APR inlet concentrations of substituted furans were below their DLs for both the species measured by the Carbotrap 300 TDU method (2,5-dihydrofuran and 2-methylfuran) and those measured by the furans method (all others in Table F.1). The maximum PAPR inlet concentration of 2-pentylfuran was 6.85% of the OEL. The other PAPR cartridge inlet concentrations were below the applicable DL.

None of the furan chemicals had historical concentration data given in the TWINS HS database. The TWINS IH database contained data for only three of these chemicals: furan, 2,5-dihydrofuran, and 2-methylfuran. All three of these were measured only in 2006 and had only two measurements each, all of which were below-reports. These below-report maxima, measured by the Carbotrap 300 TDU method, had RLs of <230% of the OEL for furan, <730% for 2,5-dihydrofuran, and <1300% for 2-methylfuran. There are no above-report historical data for these chemicals, so no conclusion can be drawn about where their cartridge inlet concentrations lie with respect to historical data.

F.5.5 N-nitrosodimethylamine (NDMA) – SX-101

The maximum cartridge inlet concentrations were 4750% of the OEL for the APR cartridges and 3358% of the OEL for the PAPR cartridges. These are very high compared to the sole historical concentration, a below-report datum that had an RL of 0.0070 ppb (<2.3% of the OEL). This value came from the TWINS IH database; it was a breather filter measurement made on August 7, 2006. There are no TWINS HS data for nitrosamines in this tank. For this chemical, the historical data apparently do not provide good guidance for the presence of high concentrations under current headspace conditions.

F.5.6 N-nitrosodiethylamine (NDEA), N-nitrosomethylethylamine (NMEA), N-nitrosomorpholine – SX-101

The comparison between the cartridge inlet maxima and the historical maxima gives the same type of results for these nitrosamines as for NDMA. For the APR cartridges, the cartridge inlet maxima were 56.5% of the OEL for NDEA, 68.5% of the OEL for NMEA, and 8.59% of the OEL for N-nitrosomorpholine. Similar maxima were measured for the PAPR cartridges: 43.8% of the OEL for NDEA, 30.9% of the OEL for NMEA, and 10.6% of the OEL for N-nitrosomorpholine

The historical maxima were below-reports that had RLs of <5.09% of the OEL for NDEA, <1.97% for NMEA, and <0.75% for N-nitrosomorpholine. These values were from the sole historical sample, which was in the TWINS IH database; it was a breather filter measurement made on August 7, 2006. There are no TWINS HS data for nitrosamines in this tank. For these chemicals, the historical data apparently do not provide good guidance for the presence of high concentrations under current headspace conditions.

F.5.7 Summary of Historical Data Comparisons – SX-101

In summary, most cartridge inlet maxima for the chemicals of interest in the SX-101 headspace were substantially higher than the historical maxima. These included ammonia, mercury, NDMA, NDEA, NMEA, and N-nitrosomorpholine.

The cartridge inlet concentrations that were substantially lower than historical data can be described as follows:

Differences could not be resolved because of the scarcity of above-report historical data: furan, 2,3-dihydrofuran, 2,5-dihydrofuran, 2-methylfuran, 2,5-dimethylfuran, 2-pentylfuran, 2-heptylfuran, and 2-propylfuran.

Table F.1. COPC Comparison to Historical SX-101 Headspace Measurements

						Historical Measurements[1]					Measurements in this study			
COPC Number and Name		CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Number of Values	Maximum Value (in OEL units)	Average Value (in OEL units)	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[12] (%OEL)
Inorganic														
1	Ammonia	7664-41-7	-28	Poling et al., 2007[2]	25 ppm	1 (1)	6.22	6.22	24.9%	24.9%	796%	663%	761%	2.37% (RL)
2	Nitrous Oxide	10024-97-2	-127	Poling et al., 2007	50 ppm	1 (1)	2.10	2.10	4.20%	4.20%	Not Measured			
3	Mercury	7439-97-6	674	Poling et al., 2007	0.025 mg/m^3	1 (0)	<0.000051	<0.000051	<0.20%	<0.20%	25.9%	23.9%	<RL	6.79% (RL)
Hydrocarbons														
4	1,3-Butadiene	106-99-0	24	Poling et al., 2007	1 ppm	1 (0)	<0.0021	<0.0021	<0.21%	<0.21%	<RL	<RL	<RL	1.89% (RL)
5	Benzene	71-43-2	176	Poling et al., 2007	0.5 ppm	2 (0)	<0.003	<0.0022	<0.60%	<0.43%	0.39%	0.34%	0.061%	0.025%
6	Biphenyl	92-52-4	491	Poling et al., 2007	0.2 ppm	1 (0)	<0.00019	<0.00019	<0.095%	<0.095%	<DL	<DL	<DL	0.084%
Alcohols														
7	1-Butanol	71-36-3	243	NIOSH[3]	20 ppm	2 (1)	0.0089	0.005 (0.009)	0.045%	0.024% (0.045%)	0.12%	0.086%	0.011%	0.001%
8	Methanol	67-56-1	148	Poling et al., 2007	200 ppm	0	n/a	n/a	n/a	n/a	<RL	<RL	<RL	1.01% (RL)
Ketones														
9	2-Hexanone	591-78-6	262	NIOSH	5 ppm	2 (0)	<0.0042	<0.0028	<0.084%	<0.055%	0.21%	0.12%	<DL	0.002%
10	3-Methyl-3-butene-2-one	814-78-8	208	CRC Handbook 1989[4]	0.02 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC[11]			
11	4-Methyl-2-hexanone	105-42-0	282	Predicted ACD/Labs[5]	0.5 ppm	0	n/a	n/a	n/a	n/a	0.13%	0.087%	<DL	0.018%
12	6-Methyl-2-heptanone	928-68-7	333	Predicted ACD/Labs	8 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
13	3-Buten-2-one	78-94-4	179	CRC Handbook 1989	0.2 ppm	1 (0)	<0.005	<0.005	<2.50%	<2.50%	0.62%	0.47%	<DL	0.12%
Aldehydes														
14	Formaldehyde	50-00-0	-6	NIOSH	0.3 ppm	1 (1)	0.014	0.014	4.57%	4.57%	3.76%	1.84%	0.81%	0.57% (RL)
15	Acetaldehyde	75-07-0	69	NIOSH	25 ppm	0	n/a	n/a	n/a	n/a	0.31%	0.26%	0.15%	0.005% (RL)
16	Butanal	123-72-8	167	Oxford safety data[6]	25 ppm	1 (1)	0.010	0.010	0.040%	0.040%	0.010%	0.006%	<DL	0.001%
17	2-Methyl-2-butenal	1115-11-3	244	United Nations[7]	0.03 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
18	2-Ethyl-hex-2-enal	645-62-5	347	Predicted ACD/Labs	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
New[15]	2-Propenal	107-02-8	127	NIOSH	0.1 ppm	0	n/a	n/a	n/a	n/a	<DL	<DL	<DL	0.91%

Table F.1. (continued)

	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[1] Number of Values	Maximum Value (in OEL units)	Average Value (in OEL units)	Maximum Value (%OEL)	Average Value (%OEL)	Measurements in this study Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[12] (%OEL)
Furans														
19	Furan	110-00-9	88	Poling et al., 2007	1 ppb	2 (0)	<2.3	<2.16	<230%	<216%	<DL	<DL	<DL	DL/RL[12] 28.5%/114%[13]
20	2,3-Dihydrofuran	1191-99-7	130	Alfa Aesar[8]	1 ppb	0	n/a	n/a	n/a	n/a	<DL	<DL	4.25%	[illegible].18%/18.8%
21	2,5-Dihydrofuran	1708-29-8	152	Aldrich[9]	1 ppb	2 (0)	<7.3	<4.52	<730%	<452%	<DL	<DL	<DL	52.5%/111%[13]
22	2-Methylfuran	534-22-5	147	Oxford safety data	1 ppb	2 (0)	<13	<7.19	<1300%	<719%	<DL	<DL	<DL	12.6%/94.4%[13]
23	2,5-Dimethylfuran	625-86-5	199	Alfa Aesar	1 ppb	0	n/a	n/a	n/a	n/a	<DL	<DL	<DL	4.11%/13.7%
24	2-Ethyl-5-methylfuran	1703-52-2	246	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
25	4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9	328	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
26	3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4	306	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
27	2-Pentylfuran	3777-69-3	333	Alfa Aesar	1 ppb	0	n/a	n/a	n/a	n/a	6.85%	3.64%	5.03%	3.38%/9.53%
28	2-Heptylfuran	3777-71-7	410	Alfa Aesar	1 ppb	0	n/a	n/a	n/a	n/a	<DL	<DL	<DL	2.56%/7.92%
29	2-Propylfuran	4229-91-8	231	Alfa Aesar	1 ppb	0	n/a	n/a	n/a	n/a	<DL	<DL	<DL	2.55%/12.0%
30	2-Octylfuran	4179-38-8	452	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
31	2-(3-Oxo-3-phenylprop-1-enyl)furan	717-21-5	605	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
32	2-(2-Methyl-6-oxoheptyl)furan	51595-87-0	Not available	Not available	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Phthalates														
33	Diethylphthalate	84-66-2	563	NIOSH	5 mg/m^3	1 (0)	<0.00073	<0.00073	<0.015%	<0.015%	<DL	<DL	<DL	0.038%

Table F.1. (continued)

						Historical Measurements[1]					Measurements in this study			
COPC Number and Name		CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Number of Values	Maximum Value (in OEL units)	Average Value (in OEL units)	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[12] (%OEL)
Nitriles														
34	Acetonitrile	75-05-8	179	NIOSH	20 ppm	1 (0)	<0.0032	<0.0032	<0.016%	<0.016%	2.13%	1.14%	3.09%	0.002%
35	Propanenitrile	107-12-0	207	NIOSH	6 ppm	2 (0)	<0.0038	<0.0027	<0.063%	<0.045%	0.046%	0.036%	<DL	0.006%
36	Butanenitrile	109-74-0	244	NIOSH	8 ppm	2 (0)	<0.017	<0.0093	<0.21%	<0.12%	0.052%	0.033%	<DL	0.002%
37	Pentanenitrile	110-59-8	284	Alfa Aesar	6 ppm	2 (0)	<0.0097	<0.0053	<0.16%	<0.088%	0.050%	0.027%	0.003%	0.002%
38	Hexanenitrile	628-73-9	328	Predicted ACD/Labs	6 ppm	2 (0)	<0.0053	<0.0032	<0.088%	<0.053%	0.020%	0.015%	<DL	0.003%
39	Heptanenitrile	629-08-3	368	Alfa Aesar	6 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
40	2-Methylene butanenitrile	1647-11-6	Not available	Not available	0.3 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
41	2,4-Pentadienenitrile	1615-70-9	278	Predicted ACD/Labs	0.3 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Amines														
42	Ethylamine	75-04-7	62	Poling et al., 2007	5 ppm	0	n/a	n/a	n/a	n/a	<RL	<RL	<RL	0.091% (RL)
Nitrosamines														
43	N-Nitrosodimethylamine	62-75-9	306	NIOSH	0.3 ppb	1 (0)	<0.0070	<0.0070	<2.34%	<2.34%	3358%	2660%	<RL	5.12% (RL)
44	N-Nitrosodiethylamine	55-18-5	351	Oxford safety data	0.1 ppb	1 (0)	<0.0051	<0.0051	<5.09%	<5.09%	43.8%	24.5%	<RL	11.1% (RL)
45	N-Nitrosomethylethylamine	10595-95-6	310	Predicted ACD/Labs	0.3 ppb	1 (0)	<0.0059	<0.0059	<1.97%	<1.97%	30.9%	19.9%	<RL	4.30% (RL)
46	N-Nitrosomorpholine	59-89-2	435	Oxford safety data	0.6 ppb	1 (0)	<0.0045	<0.0045	<0.75%	<0.75%	10.6%	5.12%	<RL	1.48% (RL)
Organophosphates														
47	Tributyl phosphate	126-73-8	552	NIOSH	0.2 ppm	1 (0)	<0.00012	<0.00012	<0.058%	<0.058%	<DL	<DL	<DL	0.068%
48	Dibutyl butylphosphonate	78-46-6	602	Predicted ACD/Labs	0.007 ppm	1 (0)	<0.000075	<0.000075	<1.07%	<1.07%	<DL	<DL	<DL	1.33%
Halogenated														
49	Chlorinated Biphenyls	Varies	Varies	Varies	1 mg/m^3	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
50	2-Fluoropropene	1184-60-7	-11	SynQuest[10]	0.1 ppm	1 (0)	<0.0022	<0.0022	<2.20%	<2.20%	Not Detected - TIC			
Pyridines														
51	Pyridine	110-86-1	240	NIOSH	1 ppm	1 (0)	<0.0012	<0.0012	<0.12%	<0.12%	0.040%	0.033%	<RL	0.016% (RL)
52	2,4-Dimethylpyridine	108-47-4	318	Alfa Aesar	0.5 ppm	1 (0)	<0.0019	<0.0019	<0.38%	<0.38%	<RL	<RL	<RL	0.043% (RL)

Table F.1. (continued)

COPC Number and Name		CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[1] Number of Values	Maximum Value (in OEL units)	Average Value (in OEL units)	Maximum Value (%OEL)	Average Value (%OEL)	Measurements in this study Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[12] (%OEL)
Organonitrites														
53	Methyl nitrite	624-91-9	10	Oxford safety data	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
54	Butyl nitrite	544-16-1	172	Alfa Aesar	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Organonitrates														
55	Butyl nitrate	928-45-0	276	Predicted ACD/Labs	2.5 ppm	0	n/a	n/a	n/a	n/a	0.015%	0.015%	<DL	TIC[14]
56	1,4-Butanediol, dinitrate	3457-91-8	499	Predicted ACD/Labs	0.05 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
57	2-Nitro-2-methylpropane	594-70-7	260	Alfa Aesar	0.3 ppm	0	n/a	n/a	n/a	n/a	2.09%	2.09%	<DL	TIC[14]
58	1,2,3-Propanetriol, 1,3-dinitrate	623-87-0	338	Predicted ACD/Labs	0.05 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Isocyanates														
59	Methyl Isocyanate	624-83-9	103	NIOSH	0.02 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Organometallic														
New[15]	Dimethylmercury	593-74-8	199	NIOSH	0.010 mg/m3 (as Hg)	0	n/a	n/a	n/a	n/a	Not Measured			

[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.*

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

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

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

[3] NIOSH: National Institute of Occupational Safety and Health

[4] CRC Handbook of Chemistry and Physics, CRC Press, 1989.

[5] ACD/Labs software http://www.acdlabs.com/products/percepta/predictors.php

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

[7] Food and Agriculture Organization of the United Nations

[8] Alfa Aesar: https://www.alfa.com/

[9] Aldrich: https://www.sigmaaldrich.com/

[10] SynQuest: http://synquestlabs.com/product/id/8330.html

[11] TIC: Tentatively Identified Compounds that were not observed in this study using the specified analytical methods.

[12] Approximate Detection Limit (DL) is calculated using the reported detection limit (or reporting limit - RL where noted) from the analytical laboratory and the average volume (from flowrate x time) of vapor exposed to the sorbent tube.

For Furans, both DL and RL values are reported as "DL / RL".

[13] Furans measured using VOA (Volatile Organic Analysis) method.

[14] TIC (see footnote 11) do not have analytical calibration standards or quantified detection limits. Mass and concentration are estimates only.

[15] 2-Propenal and Dimethyl Mercury were added to the COPC List in September, 2017.

F.6 Comparison with SX-104 Historical Data

The SX-104 tank underwent saltwell pumping in 1997–1999, which substantially reduced its waste volume from 587 kgal to 466 kgal. This pumping is considered to have changed the waste sufficiently to make pre-2000 data irrelevant, thereby excluding TWINS HS data that were measured in 1995. Furthermore, pre-2004 data are irrelevant because of the change from active to passive ventilation in 2003.

Because SX Farm tanks are arranged in three-tank cascades, tanks SX-104, SX-105, and SX-106 are connected with each other by overflow lines through which vapors may move from one tank headspace to another (Huckaby et al. 2004). It is physically possible for waste disturbances in SX-105 and SX-106 to have affected vapor concentrations in SX-104. There was no activity in SX-104 after 1999. The other tanks in its cascade—SX-105 and SX-106—had no waste-disturbing operations in 1995, 2006, or 2015, the only years for which SX-104 headspace data are available. Hence, none of the available data for SX-104 were taken during waste-disturbing conditions.

F.6.1 Ammonia – SX-104

The maximum cartridge inlet concentrations of 828% of the OEL (APR cartridges) and 1213% of the OEL (PAPR cartridges) are within a factor of two of the historical maximum concentration of 393 ppm (1572% of the OEL). This data point came from the SWIHD HS database and was measured on July 10, 2015. By contrast, the single ammonia measurement in the TWINS IH database, made in 2006 at the breather filter, was 47 ppm. The more recent historical data are considered to be comparable with the cartridge testing inlet concentrations.

F.6.2 Nitrous Oxide – SX-104

Nitrous oxide was not measured in cartridge testing, and there are no nitrous oxide data in the SWIHD HS database. There is one historical concentration in TWINS IH, 17.3 ppm (35% of the OEL), measured in 2006.

F.6.3 Mercury – SX-104

The maximum cartridge inlet concentrations were 66.7% of the OEL for the APR cartridges and 15.5% of the OEL for the PAPR cartridges. The sole historical measurement was 0.008 mg/m^3 (32% of the OEL). This data point came from the SWIHD HS database and was measured on July 10, 2015. The single mercury measurement in the TWINS IH database, made in 2006 at the breather filter, was 0.002 mg/m^3. The 2015 historical datum for mercury is in the range of 20 to 50% of the APR cartridge inlet maximum. The PAPR cartridge inlet maximum is about 50% of the 2015 historical datum. The cartridge inlet maxima are considered comparable to the available historical datum.

F.6.4 1,3-Butadiene – SX-104

The maximum cartridge inlet concentration was less than the RL for both types of cartridges (RLs of 1.93% OEL for APR cartridges and 1.98% OEL for PAPR cartridges). This is low compared to the historical maximum concentration of 0.293 ppm (29% of the OEL). This data point came from the SWIHD HS database and was measured on July 10, 2015. By contrast, the single measurement in the TWINS IH database, made in 2006, was less than the RL of 0.0028 ppm (<0.28% OEL). The cartridge testing inlet concentrations were consistently <20% of the historical maximum.

F.6.5 Furan – SX-104

For APR cartridges, the inlet maximum concentration was below the DL for furan, <28.6% of the OEL (Carbotrap 300 TDUmethod). For PAPR cartridges, the inlet maximum concentration was 100% of the OEL (Carbotrap 300 TDU method). The historical maximum was a 2006 below-report with an RL of 3.1 ppb (concentration <310% of the OEL). The highest above-report historical concentration was in the SWIHD HS database, measured on July 10, 2015. This concentration was 1.43 ppb (143% of the OEL measured using the Carbotrap 300 TDU method). The cartridge testing inlet concentrations for the APR cartridges were consistently <20% of the historical maximum and therefore are not considered comparable. The cartridge testing inlet concentrations for the PAPR cartridges were comparable with the historical maximum.

F.6.6 Substituted Furans – SX-104

For APR cartridges, the substituted furans that were measured using the furans method were 2,3-dihydrofuran (9.77% of the OEL), 2,5-dimethylfuran (26.6% of the OEL), 2-pentylfuran (less than the DL [5.36% of the OEL]), 2-heptylfuran (less than the DL [4.05% of the OEL]), and 2-propylfuran (3.77% of the OEL). The substituted furans measured by the Carbotrap 300 TDU method were below their DLs, with concentrations of <52.8% of the OEL for 2,5-dihydrofuran and <20.9% of the OEL for
2-methylfuran. For PAPR cartridges, the substituted furans that were measured by the furans method were 2,3-dihydrofuran (6.55% of the OEL), 2,5-dimethylfuran (25.2% of the OEL), 2-pentylfuran (5.69% of the OEL), 2-heptylfuran (less than the DL [2.52% of the OEL]), and 2-propylfuran (less than the DL [2.51% of the OEL]). The substituted furans measured by the Carbotrap 300 TDU method were below their DLs, with concentrations of <52.5% of OEL for 2,5-dihydrofuran and <21.1% OEL for 2-methylfuran.

The TWINS IH and SWIHD HS databases contained only below-report data for all the substituted furans. The below-report maxima have RLs of <34% of the OEL for 2,3-dihydrofuran (2015 SWIHD HS), <980% of the OEL for 2,5-dihydrofuran (2006 TWINS IH), <1800% of the OEL for 2-methylfuran (2006 TWINS IH), <25% of the OEL for 2,5-dimethylfuran (2015 SWIHD HS), <21% of the OEL for 2-propylfuran (2015 SWIHD HS), <17% of the OEL for 2-pentylfuran (2015 SWIHD HS), and <14% of the OEL for 2-heptylfuran (2015 SWIHD HS).

The cartridge inlet maxima for 2,5-dimethylfuran, which were 26.6% of the OEL for the APR cartridges and 25.2% of the OEL for the PAPR cartridges, were higher than the RL of the below-report historical maximum (<25% of the OEL), suggesting higher concentration during the cartridge test. However, there are no above-report historical data for these chemicals, so no firm conclusion can be drawn about where their cartridge inlet concentrations lie with respect to historical data. In addition, one blank and one baseline concentration of 2,5-dimethylfuran were above the DL, and the blank also was above the RL. These data call the elevated inlet measurements for this COPC into question.

F.6.7 Acetonitrile – SX-104

Maximum cartridge inlet concentrations measured using the Carbotrap 300 TDU method were 1.59% of the OEL for
the APR cartridges and 2.61% of the OEL for the PAPR cartridges. These values are low compared to the historical maximum concentration of 2.82 ppm (14% of the OEL using the acetonitrile method), or 0.803 ppm (4.02% of the OEL using the Carbotrap 300 TDU method). These two historical measurements were from the same sampling event, but different analytical methods were used. They came from the SWIHD HS database and were measured on July 10, 2015. The single measurement in the

TWINS IH database, made in 2006 at the breather filter, was less than the RL of 0.0028 ppm (<0.014% of the OEL). Although the difference in measurement methods might account for some of the differences between cartridge-inlet and historical maxima concentrations, the maximum cartridge testing inlet concentration was <20% of the recent historical maximum.

F.6.8 N-nitrosodimethylamine (NDMA) – SX-104

The maximum cartridge inlet concentrations were 2119% of the OEL for the APR cartridges and 6935% of the OEL for the PAPR cartridges. The historical maximum concentration was 27.9 ppb (9300% of the OEL). The historical value came from the SWIHD HS database; it was measured on July 10, 2015. The cartridge testing inlet concentrations >20% of the historical maximum and therefore are considered comparable. The comparability is closer for the PAPR cartridges than for the APR cartridges.

F.6.9 N-nitrosodiethylamine (NDEA), N-nitrosomethylethylamine (NMEA), N-nitrosomorpholine – SX-104

The APR cartridge inlet maxima were above their DLs for NDEA, NMEA, and N-nitrosomorpholine, at values of 412%, 32.3%, and 11.2% of the OEL respectively. The PAPR cartridge inlet maxima were 79.4%, 100%, and 29.2% of the OEL for the same chemicals.

The TWINS IH and SWIHD HS databases contained only below-report data for these three nitrosamines. The maximum historical RLs, which were all from 2015 SWIHD HS data, were <37% of the OEL for NDEA, <14% of the OEL for NMEA, and <5.7% of the OEL for N-nitrosomorpholine. Although all the historical maxima are below-report, their RLs are so much lower than the concentrations measured during cartridge testing that it is clear the cartridge-testing concentrations were higher.

F.6.10 Summary of Historical Data Comparisons – SX-104

Some cartridge inlet maxima for the chemicals of interest in the SX-104 headspace were substantially higher than the historical maxima. These included NDEA, NMEA, and N-nitrosomorpholine. Other chemicals—ammonia, mercury, furan (for PAPR only), and NDMA—had cartridge inlet maxima that were considered comparable.

The cartridge inlet concentrations that were lower than historical data can be described as follows:

- Differences could not be resolved because of the scarcity of above-report data: 2,3-dihydrofuran, 2,5-dihydrofuran, 2-methylfuran, 2,5-dimethylfuran, 2-propylfuran, 2-pentylfuran, 2-heptylfuran.
- Cartridge inlet concentrations were determined to be significantly lower than above-report historical concentrations: 1,3-butadiene, furan (for APR only), acetonitrile.
- In the case of acetonitrile, one possible reason for concentration differences between the cartridge-inlet maxima and the historical maxima was that the former were measured using the Carbotrap 300 TDU method and the latter using the acetonitrile method.

F.7 References

Agnew SF, J. Boyer, RA Corbin, TB Duran, JR FitzPatrick, KA Jurgensen, TP Ortiz, and BL Young. 1997. *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 4*. LA-UR-96-3860, Los Alamos National Laboratory, Los Alamos, New Mexico.

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

Huckaby, JL, LA Mahoney, JG Droppo, and JE Meacham. 2004. *Overview of Hanford Site High-Level Waste Tank Gas and Vapor Dynamics*, PNNL-14831, Pacific Northwest National Laboratory, Richland, Washington. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-14831.pdf.

Table F.2. COPC Comparison to Historical SX-104 Headspace Measurements

No.	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[1]: Number of Values	Historical Measurements[1]: Maximum Value (in OEL units)	Historical Measurements[1]: Average Value (in OEL units)	Historical Measurements[1]: Maximum Value (%OEL)	Historical Measurements[1]: Average Value (%OEL)	Measurements in this study: Max Inlet (%OEL)	Measurements in this study: Avg. Inlet (%OEL)	Measurements in this study: Max outlet (%OEL)	Measurements in this study: Approx. DL[12] (%OEL)
Inorganic														
1	Ammonia	7664-41-7	-28	Poling et al., 2007[2]	25 ppm	2 (2)	393	220	1572%	880.0%	1213%	1036%	1163%	2.41% (RL)
2	Nitrous Oxide	10024-97-2	-127	Poling et al., 2007	50 ppm	1 (1)	17.3	17.3	34.6%	34.6%	Not Measured			
3	Mercury	7439-97-6	674	Poling et al., 2007	0.025 mg/m^3	2 (2)	0.008	0.00498	32.0%	19.9%	15.5%	12.9%	<RL	7.59% (RL)
Hydrocarbons														
4	1,3-Butadiene	106-99-0	24	Poling et al., 2007	1 ppm	2 (1)	0.293	0.148 (0.293)	29.3%	14.8% (29.3%)	<RL	<RL	<RL	1.98% (RL)
5	Benzene	71-43-2	176	Poling et al., 2007	0.5 ppm	3 (1)	0.004	0.0031 (0.004)	0.80%	0.61% (0.80%)	0.52%	0.46%	0.074%	0.044%
6	Biphenyl	92-52-4	491	Poling et al., 2007	0.2 ppm	1 (0)	<0.000186	<0.000186	<0.093%	<0.093%	<DL	<DL	0.088%	0.33%
Alcohols														
7	1-Butanol	71-36-3	243	NIOSH	20 ppm	2 (2)	0.114	0.0577	0.57%	0.29%	0.39%	0.34%	0.016%	0.002%
8	Methanol	67-56-1	148	Poling et al., 2007	200 ppm	0	n/a	n/a	n/a	n/a	<RL	<RL	<RL	1.03% (RL)
Ketones														
9	2-Hexanone	591-78-6	262	NIOSH	5 ppm	3 (2)	0.012	0.0084 (0.012)	0.24%	0.17% (0.24%)	0.39%	0.20%	<DL	0.003%
10	3-Methyl-3-butene-2-one	814-78-8	208	CRC Handbook 1989[4]	0.02 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC[11,14]			
11	4-Methyl-2-hexanone	105-42-0	282	Predicted ACD/Labs[5]	0.5 ppm	0	n/a	n/a	n/a	n/a	0.064%	0.049%	<DL	0.026%
12	6-Methyl-2-heptanone	928-68-7	333	Predicted ACD/Labs	8 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
13	3-Buten-2-one	78-94-4	179	CRC Handbook 1989	0.2 ppm	2 (2)	0.0091	0.0061	4.55%	3.03%	1.23%	0.83%	<DL	0.16%
Aldehydes														
14	Formaldehyde	50-00-0	-6	NIOSH	0.3 ppm	2 (2)	0.014	0.00935	4.67%	3.12%	5.49%	2.17%	1.73%	0.58% (RL)
15	Acetaldehyde	75-07-0	69	NIOSH	25 ppm	1 (1)	0.23	0.23	0.91%	0.91%	0.56%	0.48%	0.36%	0.007% (RL)
16	Butanal	123-72-8	167	Oxford safety data[6]	25 ppm	3 (3)	0.13	0.084	0.54%	0.33%	0.055%	0.036%	<DL	0.001%
17	2-Methyl-2-butenal	1115-11-3	244	United Nations[7]	0.03 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
18	2-Ethyl-hex-2-enal	645-62-5	347	Predicted ACD/Labs	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
New[15]	2-Propenal	107-02-8	127	NIOSH	0.1 ppm	1 (0)	<0.0009	<0.0009	<0.90%	<0.90%	<DL	<DL	<DL	0.93%

Table F.2. (continued)

						Historical Measurements[1]					Measurements in this study			
COPC Number and Name		CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Number of Values	Maximum Value (in OEL units)	Average Value (in OEL units)	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[12] (%OEL)
Furans														
19	Furan	110-00-9	88	Poling et al., 2007	1 ppb	4 (2)	<3.1 (1.43)	1.7 (0.941)	<310% (143%)	170% (94%)	100%	39.2%	<DL	DL/RL[12] 28.5%/114%[13]
20	2,3-Dihydrofuran	1191-99-7	130	Alfa Aesar[8]	1 ppb	1 (0)	<0.337	<0.337	<33.7%	<33.7%	6.55%	2.77%*	<DL	2.15%/18.5%
21	2,5-Dihydrofuran	1708-29-8	152	Aldrich[9]	1 ppb	3 (0)	<9.8	<3.9	<980%	<390%	<DL	<DL	<DL	52.5%/111%[13]
22	2-Methylfuran	534-22-5	147	Oxford safety data	1 ppb	3 (0)	<18	<6.51	<1800%	<651%	<DL	<DL	<DL	21.1%/94.4%[13]
23	2,5-Dimethylfuran	625-86-5	199	Alfa Aesar	1 ppb	1 (0)	<0.246	<0.246	<24.6%	<24.6%	25.2%	5.14%*	34.0%	4.05%/13.5%
24	2-Ethyl-5-methylfuran	1703-52-2	246	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
25	4-(1-Methylpropyl)-2,3-dihydrofuran	34379-54-9	328	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
26	3-(1,1-Dimethylethyl)-2,3-dihydrofuran	34314-82-4	306	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
27	2-Pentylfuran	3777-69-3	333	Alfa Aesar	1 ppb	1 (0)	<0.171	<0.171	<17.1%	<17.1%	5.69%	3.59%	3.68%	3.33%/9.39%
28	2-Heptylfuran	3777-71-7	410	Alfa Aesar	1 ppb	1 (0)	<0.142	<0.142	<14.2%	<14.2%	<DL	<DL	<DL	2.52%/7.81%
29	2-Propylfuran	4229-91-8	231	Alfa Aesar	1 ppb	1 (0)	<0.214	<0.214	<21.4%	<21.4%	<DL	<DL	<DL	2.51%/11.8%
30	2-Octylfuran	4179-38-8	452	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
31	2-(3-Oxo-3-phenylprop-1-enyl)furan	717-21-5	605	Predicted ACD/Labs	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
32	2-(2-Methyl-6-oxoheptyl)furan	51595-87-0	Not available	Not available	1 ppb	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Phthalates														
33	Diethylphthalate	84-66-2	563	NIOSH	5 mg/m^3	1 (0)	<0.000716	<0.000716	<0.014%	<0.014%	0.044%	0.044%	<DL	0.15%

Table F.2. (continued)

	COPC Number and Name	CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[1]					Measurements in this study			
						Number of Values	Maximum Value (in OEL units)	Average Value (in OEL units)	Maximum Value (%OEL)	Average Value (%OEL)	Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[12] (%OEL)
Nitriles														
34	Acetonitrile	75-05-8	179	NIOSH	20 ppm	2 (1)	2.82	1.41 (2.82)	14.1%	7.05% (14.1%)	2.61%	1.08%	1.27%	0.002%
35	Propanenitrile	107-12-0	207	NIOSH	6 ppm	3 (1)	<0.005 (0.003)	0.00313 (0.003)	<0.083% (0.050%)	0.052% (0.050%)	0.081%	0.064%	<DL	0.006%
36	Butanenitrile	109-74-0	244	NIOSH	8 ppm	3 (1)	<0.023 (0.006)	0.0101 (0.006)	<0.29% (0.075%)	0.13% (0.075%)	0.055%	0.045%	<DL	0.003%
37	Pentanenitrile	110-59-8	284	Alfa Aesar	6 ppm	2 (0)	<0.013	<0.0069	<0.22%	<0.12%	0.019%	0.013%	<DL	0.003%
38	Hexanenitrile	628-73-9	328	Predicted ACD/Labs	6 ppm	3 (1)	<0.0071 (0.001)	0.00302 (0.001)	<0.12% (0.017%)	0.050% (0.017%)	0.017%	0.010%	<DL	0.002%
39	Heptanenitrile	629-08-3	368	Alfa Aesar	6 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
40	2-Methylene butanenitrile	1647-11-6	Not available	Not available	0.3 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
41	2,4-Pentadienenitrile	1615-70-9	278	Predicted ACD/Labs	0.3 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Amines														
42	Ethylamine	75-04-7	62	Poling et al., 2007	5 ppm	2 (0)	<0.0338	<0.0264	<0.68%	<0.53%	0.34%	0.22%	<RL	0.092% (RL)
Nitrosamines														
43	N-Nitrosodimethylamine	62-75-9	306	NIOSH	0.3 ppb	2 (2)	27.9	14.2	9300%	4733%	6935%	4886%	<RL	5.45% (RL)
44	N-Nitrosodiethylamine	55-18-5	351	Oxford safety data	0.1 ppb	2 (0)	<0.037	<0.021	<37.0%	<21.0%	79.4%	53.8%	<RL	12.0% (RL)
45	N-Nitrosomethylethylamine	10595-95-6	310	Predicted ACD/Labs	0.3 ppb	2 (0)	<0.043	<0.024	<14.3%	<8.13%	100%	77.5%	<RL	4.58% (RL)
46	N-Nitrosomorpholine	59-89-2	435	Oxford safety data	0.6 ppb	2 (0)	<0.034	<0.019	<5.67%	<3.20%	29.2%	9.17%	<RL	1.74% (RL)
Organophosphates														
47	Tributyl phosphate	126-73-8	552	NIOSH	0.2 ppm	1 (0)	<0.00011	<0.00011	<0.057%	<0.057%	<DL	<DL	<DL	0.27%
48	Dibutyl butylphosphonate	78-46-6	602	Predicted ACD/Labs	0.007 ppm	1 (0)	<0.000073	<0.000073	<1.04%	<1.04%	<DL	<DL	<DL	5.24%
Halogenated														
49	Chlorinated Biphenyls	Varies	Varies	Varies	1 mg/m^3	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
50	2-Fluoropropene	1184-60-7	-11	SynQuest[10]	0.1 ppm	1 (0)	<0.003	<0.003	<3.00%	<3.00%	Not Detected - TIC			
Pyridines														
51	Pyridine	110-86-1	240	NIOSH	1 ppm	3 (1)	0.002	0.0017 (0.002)	0.20%	0.17% (0.20%)	0.096%	0.081%	<RL	0.038% (RL)
52	2,4-Dimethylpyridine	108-47-4	318	Alfa Aesar	0.5 ppm	2 (0)	<0.002	<0.00185	<0.40%	<0.37%	<RL	<RL	<RL	0.044% (RL)

Table F.2. (continued)

COPC Number and Name		CAS Number	Boiling Point (°F)	Boiling Point Source	Occupational Exposure Limit (OEL)	Historical Measurements[1] Number of Values	Maximum Value (in OEL units)	Average Value (in OEL units)	Maximum Value (%OEL)	Average Value (%OEL)	Measurements in this study Max Inlet (%OEL)	Avg. Inlet (%OEL)	Max outlet (%OEL)	Approx. DL[12] (%OEL)
Organonitrites														
53	Methyl nitrite	624-91-9	10	Oxford safety data	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
54	Butyl nitrite	544-16-1	172	Alfa Aesar	0.1 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Organonitrates														
55	Butyl nitrate	928-45-0	276	Predicted ACD/Labs	2.5 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
56	1,4-Butanediol, dinitrate	3457-91-8	499	Predicted ACD/Labs	0.05 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
57	2-Nitro-2-methylpropane	594-70-7	260	Alfa Aesar	0.3 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
58	1,2,3-Propanetriol, 1,3-dinitrate	623-87-0	338	Predicted ACD/Labs	0.05 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Isocyanates														
59	Methyl Isocyanate	624-83-9	103	NIOSH	0.02 ppm	0	n/a	n/a	n/a	n/a	Not Detected - TIC			
Organometallic														
New[15]	Dimethylmercury	593-74-8	199	NIOSH	0.010 mg/m3 (as Hg)	0	n/a	n/a	n/a	n/a	Not Measured			

[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.*

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

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

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

[3] *NIOSH: National Institute of Occupational Safety and Health*

[4] *CRC Handbook of Chemistry and Physics, CRC Press, 1989.*

[5] *ACD/Labs software http://www.acdlabs.com/products/percepta/predictors.php*

[6] *Oxford safety data from The Physical and Theoretical Chemistry Laboratory at Oxford University*

[7] *Food and Agriculture Organization of the United Nations*

[8] *Alfa Aesar: https://www.alfa.com/*

[9] *Aldrich: https://www.sigmaaldrich.com/*

[10] *SynQuest: http://synquestlabs.com/product/id/8330.html*

[11] *TIC: Tentatively Identified Compounds that were not observed in this study using the specified analytical methods.*

[12] *Approximate Detection Limit (DL) is calculated using the reported detection limit (or reporting limit - RL where noted) from the analytical laboratory and the average volume (from flowrate x time) of vapor exposed to the sorbent tube.*
For Furans, both DL and RL values are reported as "DL / RL".

[13] *Furans measured using VOA (Volatile Organic Analysis) method.*

[14] *TIC (see footnote 11) do not have analytical calibration standards or quantified detection limits. Mass and concentration are estimates only.*

[15] *2-Propenal and Dimethyl Mercury were added to the COPC List in September, 2017.*

Appendix G

Manufacturer's Service Life Estimation

Appendix G

Manufacturer's Service Life Estimation

The experimental breakthrough times for ammonia from both the SX-101 and SX-104 waste storage tanks were compared to the estimated service life of the cartridges, using the online calculators or recommended service life estimation methods provided by the vendors. Although the experimental breakthrough time was obtained under a mixture composed of potentially over a thousand chemicals while the estimated service life of the cartridge is usually obtained with single component, the estimated service life of the cartridge can be used as a reference.

The breakthrough signature of ammonia was further assessed to infer a higher resolution than the 2-hour collection times. An interpolation was used to determine the time when 10% of the Occupational Exposure Limit (OEL) concentration at the outlet would have occurred. Based on theoretical adsorption information, a semi-logarithmic relationship was found between the cumulative ammonia mass fed to the cartridge and the cartridge outlet concentration. Therefore, the approximate cumulative mass of ammonia fed at 10% of the OEL can be interpolated based on this relationship. Then, the breakthrough time at 10% of the OEL can be linearly interpolated based on the cumulative ammonia mass and the recorded breakthrough time. Once the interpolated breakthrough time was determined, the average inlet concentrations and measured gas stream properties were determined up until that point for use in subsequent estimation of service life using the manufacture's calculator or algorithm. The estimated service lives compared to the interpolated experimental breakthrough times for the PAPR cartridge tests are shown in Table G.1.

Table G.1. Comparison of Interpolated Experimental Breakthrough Times to Manufacturer Service Life Estimates.

COPCs	Cartridge	Tank	T (°F)	RH (%)	OEL (ppm)	Break-through criterion (%OEL)	^Avg. Inlet Conc.(ppm)	Exptl. flow rate (L/min)	Exptl. Pressure (Torr)	Exptl. Breakthrough time (h)	*Calculator flow rate (L/min)	Estimated service Life (h)
NH_3	TL1	SX-101	77.4	77.8	25	10	141	95	675.4	4.7	102.5	2.9
	TL1	SX-104	92.7	49.5	25	10	272	95	666.9	2.0	102.5	1.6
NH_3	TL2	SX-101	84.6	80.5	25	10	174	95	669.8	1.7	57	0.7
	TL2	SX-104	96.1	60.8	25	10	254	95	669.4	1.6	57	0.5

^The pressure is the average value up to the breakthrough point.
* There are two cartridges in the MSA respirator and three cartridges in the 3M cartridge. The flow rates were converted to per cartridge basis. In the 3M case, the per cartridge flow rate was calculated based on the NIOSH test procedure.

The TL1 cartridge is a type TL (AM/CL/CD/FM/HC/MA/SD/HE) PAPR cartridge from MSA (order #10080456). The TL2 cartridge is a type FR-57 (OV/SD/HC/CL/CD/HF/AM/MA/FM/HE) PAPR cartridge from 3M. In the field test, only one cartridge was used so the flow rate of in the table is for one cartridge. The flow rate in the calculators provided by vendors are converted to flow rate per cartridge for the comparison. The estimated service life for TL1 cartridge was obtained with the parameters in Table G.1 using the online calculator provided by MSA.

These estimated service-life times are a little bit shorter than the breakthrough times obtained in the field test. This indicates that MSA calculator is conservative in this case. For the TL2 cartridge, the FR-57 cartridge is available for organic vapor service-life estimation using the online calculator provide by 3M[1]. However, 3M did not have a model to describe the adsorption performance of ammonia in the FR-57 cartridge as stated in a correspondence from a 3M specialist. A rough estimation was done mainly based on a linear assumption between the service life and the ratio of inlet and permissive concentration. An email from the 3M specialist describing the calculation procedure is provided as Figure G.1. The estimated service-life time reflects the parameters in Table G.1. It seems that the estimation results also are conservative based on the shorter length of time comparing to the experiment breakthrough time. Although the 3M method is a conservative estimation based on a minimum service life NIOSH requirement (25 minutes), the resulting service life estimates are not as comprehensive as manufacturers' service life calculators that relate experimental and model-derived performance data to important variables. Therefore, there is greater uncertainty in results obtained from the estimation algorithm for the 3M FR-57 cartridge.

[1] 3M Service Life Software Version: 3.3.
http://extra8.3m.com/SLSWeb/chemicalInformationSLife.html?page=serviceLife&disclaimerPageFlag=Y,

From: Erik Johnson
To: Liu, Jian (LSL2)
Subject: RE: PAPR cartridge service life estimation
Date: Friday, October 27, 2017 11:03:41 AM
Attachments: image003.png
image002.png

Jian,

The FR-57 is in the 3M Service Life Software for organic vapors. Unfortunately there are fewer math models for non-organic vapors. For other gases/vapors, please see the following technical data bulletins.
https://www.dqeready.com/Documents/Products/3M-FR-57-Technical-Data.aspx
https://multimedia.3m.com/mws/media/471663O/determination-of-service-life-for-niosh-cbrn-cartridges.pdf

For example, the NIOSH test criteria for ammonia is 1000 ppm challenge, and at least 25 minutes before 50 ppm breakthrough. Temperature and humidity ranges you mentioned are less of a concern for ammonia as opposed to organic vapor service life. The Breathe Easy PAPR flow rate is about 220 L/min for the system (73 L/min per cartridge); as opposed to the NIOSH testing at 170 L/min (57 L/min per cartridge).

It is best to have service life data at multiple exposure levels in order to estimate service life. As a very rough estimate, one could use an inverse linear relationship (e.g. decrease exposure in half and double service life). However, it is more often an exponential relationship (longer service life). The effect of breakthrough concentration is difficult to include because once breakthrough starts, it increases rapidly. Therefore, based on the graph below, a correction factor of 2 seems more than adequate for differing breakthrough quantities.

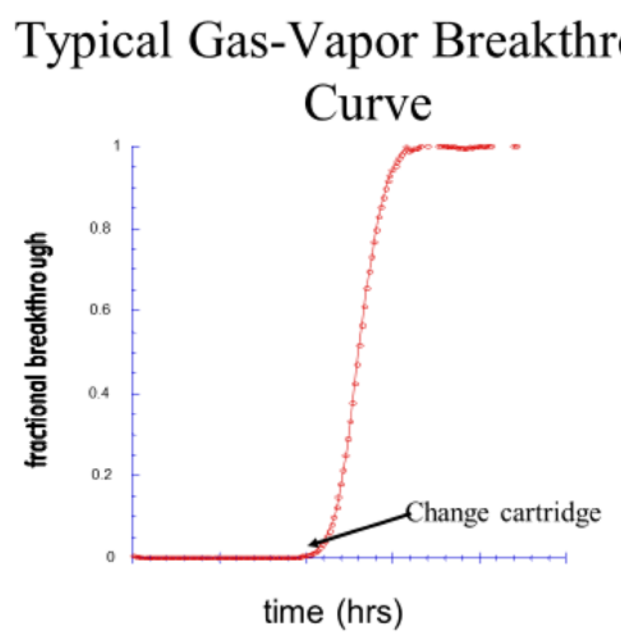

Figure G.1. Email Correspondence between PNNL and 3M Regarding the Breakthrough Calculation Procedure

Putting this all together, a rough estimate of service life at 193 ppm would be:
25 minutes * (1000 ppm / 193 ppm) * (170 L/min / 220 L/min) * (1/2) = 50 minutes

Likewise at 311 ppm would be = 31 minutes.

Mind you these are based on the minimum NIOSH service life requirements and some conservative assumptions. Actual service life may be longer. However, cartridges must be changes sooner if contaminant odor/irritation is detected.

-Erik

3M
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From: Liu, Jian (LSL2) [mailto:Jian.Liu@pnnl.gov]
Sent: Friday, October 27, 2017 11:31 AM
To: Erik Johnson <erikwjohnson@mmm.com>
Subject: [EXTERNAL] PAPR cartridge service life estimation

Hi Erik,

It was nice talking to you. I would like to ask you to estimate the service life of the FR57 (OV/SD/HC/CL/CD/HF/AM/MA/FM/HE) for some chemicals using your online calculator.

Scenario 1. Temperature: 26.5 C, RH: 81%, flowrate 95 L/min (for one cartridge)

Ammonia inlet concentration 193 ppm/breakthrough limit 2.5 ppm

Scenario 2. Temperature: 33.3 C, RH: 58%, flowrate 95 L/min (for one cartridge)

Ammonia inlet concentration 311 (or 300 if 311 is not possible) ppm/breakthrough limit 2.5 ppm

Thank you.

Best regards,

Jian

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