Pacific Northwest National Laboratory

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TANK VAPOR CHARACTERIZATION PROJECT

**Tank 241-BX-103 Headspace Gas and Vapor
Characterization Results from Samples
Collected on August 1, 1996**

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August 1997

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Summary

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-BX-103 (Tank BX-103) at the Hanford Site in Washington State. Tank headspace samples collected by Westinghouse Hanford Company (WHC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample volumes provided by WHC.

No analytes were determined to be above the immediate notification limits specified by the sampling and analysis plan (SAP) (Buckley 1996). Hydrogen was the principal flammable constituent of the Tank BX-103 headspace, determined to be present at approximately 0.385% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <0.633% of the LFL.

Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

Table S.1. Average Measured Concentrations of Gases and Inorganic and Organic Vapors in Tank BX-103 Sampled on 8/1/96

<u>Category</u>	<u>Sample Medium</u>	<u>Analyte</u>	<u>Concentration^(a)</u>	<u>Units</u>
Inorganic Vapors	Sorbent Traps	Ammonia	91	ppmv
		Nitrogen Dioxide (NO ₂)	<0.16	ppmv
		Nitric Oxide (NO)	<0.16	ppmv
		Water	15.8	mg/L
Permanent Gases	SUMMA™ Canisters	Hydrogen	154	ppmv
		Methane	<25	ppmv
		Carbon Dioxide	750	ppmv
		Carbon Monoxide	<17	ppmv
		Nitrous Oxide (N ₂ O)	80	ppmv
Total Non-Methane Organic Compounds	SUMMA™ Canisters	Total Non-Methane Organic Compounds	51.61	mg/m ³
Volatile Organic Vapors	SUMMA™ Canisters	Tridecane	10.015	mg/m ³
		Dodecane	8.079	mg/m ³
		Undecane	4.111	mg/m ³
Volatile Organic Vapors	Sorbent Traps	Toluene	4.763	mg/m ³
		1-Butanol	2.632	mg/m ³
		2-Methylbutane	1.883	mg/m ³
Flammables	SUMMA™ Canisters and Sorbent Traps	Flammables	<0.633	% LFL

(a) Concentrations were determined using sample-volume data provided by Westinghouse Hanford Company and are based on averaged data from three samples. Mass concentrations are at reference temperature and pressure of 0°C and 1.013 bar.

Acknowledgments

The authors gratefully acknowledge the support of other project staff at PNNL who contributed to the successful completion of this sampling and analysis activity. S. O. Slate, K. P. Schielke, L. M. P. Thomas, and G. W. Dennis supported inorganic laboratory work.

Terms and Abbreviations

% D	% Difference
CAS	Chemical Abstracts Service
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain-of-custody
DIW	deionized water
EPA	U.S. Environmental Protection Agency
EQL	estimated quantitation limit
GC/FID	gas chromatography/flame ionization detector
GC/MS	gas chromatograph/mass spectrometer
GC/TCD	gas chromatography/thermal conductivity detection
IC	ion chromatography
ICB	initial calibration blank
ICV	initial calibration verification
IDL	instrument detection limit
IS	internal standard
ISE	ion selective electrode
ISVS	In Situ Vapor Sampling System
LFL	lower flammability limit
MW	molecular weight
NIST	National Institute for Standards and Technology
OSHA	Occupational Safety and Health Administration
PNL	Pacific Northwest Laboratory (previous name for the laboratory)
PNNL	Pacific Northwest National Laboratory
ppbv	part per billion by volume
ppm	parts per million
ppmv	part per million by volume
QA	quality assurance
RPD	relative percent difference
RSD	relative standard deviation
SAP	sample and analysis plan
SCIC	suppressed-conductivity ion chromatography
SRM	standard reference material
STP	standard temperature and pressure
SUMMA™	process for passivating stainless steel
TBP	tributyl phosphate
TEA	triethanolamine
TIC	tentatively identified compound
TNMOC	total non-methane organic compound
TST	triple sorbent trap
UHP	ultra high purity
UQL	upper quantitation limit
VAL	Vapor Analytical Laboratory
VSS	vapor sampling system
WHC	Westinghouse Hanford Company

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1.0 Introduction

This report presents results of chemical analyses of vapor samples collected by WHC on August 1, 1996 from the headspace of waste storage tank 241-BX-103 (Tank BX-103) at the Hanford Site in Washington State. Pacific Northwest National Laboratory^(a) provided SUMMA™ canisters and sorbent traps for sample collection, and analyzed the samples according to instructions in the SAP (Buckley 1996). Analytical work was performed by the PNNL VAL in the 300 Area of the Hanford Site under the PNNL Tank Vapor Characterization Project.

Pacific Northwest National Laboratory provided six sets of sorbent traps for selected inorganic analytes (four samples and two field blanks), five SUMMA™ canisters for permanent gases and organic analytes (three headspace samples and two ambient air samples), and eight triple sorbent traps (TSTs) for organic analytes (four samples, two field blanks, and two trip blanks). Sample devices and controls were provided to WHC on July 31, 1996; TSTs were returned to PNNL on August 3, 1996 and sorbent traps for inorganic analytes and SUMMA™ canisters were returned on August 13, 1996. Westinghouse Hanford Company measured and reported to PNNL the sample volumes needed to determine headspace concentrations from sorbent trap samples.

Specific analytical methods for sample analysis are described in Section 2.0. Results and known sampling and analytical variances from established quality assurance (QA) requirements, where significant, are documented in Section 3.0. Chain-of-custody forms used to document possession and transfer of samples and controls are provided in Appendix A. Appendix B contains a complete listing of target analyte results for the organic analyses.

^(a) Pacific Northwest National Laboratory is operated for the U. S. Department of Energy by Battelle under Contract DE-AC06-76RLO 1830. The previous name of the laboratory was Pacific Northwest Laboratory. The former name is used when previously published documents are referenced.

2.0 Analytical Methods

Table 2.1 summarizes the analytes, sampling media, analytical methods, and laboratory procedures. Table 2.2 summarizes information regarding sample media, handling, and storage procedures.

Table 2.1. Sampling and Analysis Methods Summary

<u>Analyte</u>	<u>Sampling Media</u>	<u>Extraction Method</u>	<u>Analysis Method</u>	<u>Procedure</u>
Ammonia	Acidified carbon bead sorbent trap	Aqueous extraction	ISE analysis	PNL-ALO-226
Nitric Oxide and Nitrogen Dioxide	Triethanolamine impregnated sorbent traps	Aqueous extraction	IC	PNL-ALO-212
Water Vapor	Other inorganic sorbent traps + silica gel sorbent trap	None	Gravimetric analysis (sample weight gain)	PNL-TVP-09
Carbon Monoxide, Carbon Dioxide, Hydrogen, Methane, and Nitrous Oxide	SUMMA™ canisters	Analysis of SUMMA™ canister subsample	GC/TCD	PNL-TVP-05
Organic Vapors	Triple sorbent traps	Thermal desorption	GC/MS	PNL-TVP-10
Organic Vapors	SUMMA™ canisters	Cryo-focusing of SUMMA™ canister subsample	GC/MS	PNL-TVP-03
Total Non-Methane Organic Compounds	SUMMA™ canisters	Cryo-focusing of SUMMA™ canister subsample	GC/FID	PNL-TVP-08

Table 2.2. Sample Media Preparation, Handling, and Storage

<u>Sampling Media</u>	<u>Supplier and Catalog Number</u>	<u>Preparation Procedure</u>	<u>Handling and Storage Procedure</u>
Inorganic vapor sorbent traps	SKC No. 226-29 SKC No. 226-40-02 SKC No. 226-10-04	PNL-TVP-09	PNL-TVP-07
SUMMA™ canisters	Scientific Instrumentation Specialist	PNL-TVP-02	PNL-TVP-07
Triple sorbent traps	Supelco CarboTrap 300	PNL-TVP-10	PNL-TVP-07

2.1 Inorganic Vapors

Solid sorbent traps, prepared in multi-trap sampling trains, were supplied to WHC for sampling the tank headspace. Blanks and exposed samples were returned to PNNL for analyses. Analyses were performed to provide information on the tank-headspace concentration of the following analytes: ammonia, nitrogen dioxide (NO₂), nitric oxide (NO), and water. Samples were prepared, handled, and disassembled as described in Technical Procedure PNL-TVP-09^(a).

2.1.1 Sampling Methodology

Standard glass tubes containing sorbent materials to trap ammonia, NO, NO₂, and water vapors were obtained, prepared, and submitted for vapor sampling. The sorbent traps were selected based on their use by the Occupational Safety and Health Administration (OSHA) to perform workplace monitoring and because of available procedures and verification results associated with that particular application. Each sorbent trap contained two sorbent sections separated by a glass wool plug. Sorbent media in the two sections were segregated and analyzed separately (except for analysis for water). Analyses of the second sorbent (breakthrough) sections were performed to demonstrate complete collection of the target analyte by the first sorbent section.

The ammonia sorbent traps contained carbon beads impregnated with sulfuric acid; nominally, 500 mg were contained in the primary and 250 mg in the breakthrough sections. The ammonia was chemisorbed as ammonium sulfate [(NH₄)₂SO₄]. The NO₂ traps contained a zeolite impregnated with triethanolamine (TEA), with 400 mg in the primary and 200 mg in the breakthrough sections. The NO₂ was absorbed and disproportionated to equi-molar quantities of nitrite ions (NO₂⁻) and nitrate ions (NO₃⁻). Glass tubes containing 800 mg of an oxidant were used to convert NO to NO₂. The converted NO was then collected as nitrite and nitrate in an NO₂ trap. The water traps contained a total of 450 mg of silica gel. All sorbent traps for a given analyte were from a single manufacturer's batch.

After sample preparation, sorbent trains were stored at ≤ 10°C because of handling recommendations for the oxidizer tubes attached to some samples. After receipt of exposed and

^(a) Pacific Northwest Laboratory. 12/95. *Sorbent Trap Preparation for Sampling and Analysis: Waste Tank Inorganic Vapor Samples*, PNL-TVP-09 (Rev. 2), PNL Technical Procedure, Richland, Washington.

radiologically cleared samples from WHC and disassembly of the sorbent trains, samples were provided to the analytical laboratory at ambient temperature.

The sorbent traps were prepared in multi-trap trains configured so sample air flow passed in order through the ammonia, nitrogen dioxide, oxidizer, nitric oxide, and desiccant traps. Traps were weighed and then connected to each other using uniform lengths of 3/8-in. perfluoroalkoxy-grade (PFA) Teflon® tubing. The perfluoroalkoxy-grade tubing was heated in hot air and forced over the open ends of the traps to form a tight seal. The inlets of the sorbent trains each consist of a short section of tubing having a 3/8-in. stainless steel Swagelok® nut, and sealed using a Swagelok® cap. The trailing ends of the sorbent trains were each sealed with red plastic caps provided by the manufacturer.

2.1.1.1 Concentration Calculations. Concentration, in parts per million by volume (ppmv), was determined by dividing the amount of analyte, in μmol , by the moles of the dried tank air sampled. For example, the concentration of a 3.00-L sample containing 75.0 μg of ammonia equals

$$\frac{(75.0 \mu\text{g})(22.4 \text{ L/mol})}{(17.0 \mu\text{g}/\mu\text{mol})(3.00 \text{ L})} = 32.9 \text{ ppmv} \quad (2.1)$$

Measured sample volumes were specified by WHC at standard temperature and pressure (STP; 0°C, 1.013 bar). Because water vapor is removed as an analyte before the sample air stream passes through the mass flow meters, sample volumes exclude water vapor.

2.1.2 Analytical Procedures

2.1.2.1 Ammonia Analysis. The sorbent material from the ammonia traps was placed into labeled 20-mL glass scintillation vials. Vials containing front-section sorbent material were treated with 10.0 mL of deionized water (DIW), and vials containing breakthrough-section sorbent material were treated with 5.0 mL of DIW. Ammonia present was measured using the ion selective electrode (ISE) procedure PNL-ALO-226^(a). Briefly, the method includes 1) preparing a 1000- $\mu\text{g/mL}$ ammonia stock standard solution from dried reagent-grade NH_4Cl and DIW, 2) preparing 0.1-, 0.5-, 1.0-, 10-, and 100- $\mu\text{g/mL}$ ammonia working calibration standards by serial dilution of the freshly made stock standard, 3) generating an initial calibration curve from the measured electromotive force signal versus ammonia concentration data obtained for the set of working standards, 4) performing a calibration-verification check, using a mid-range dilution of a certified National Institute for Standards and Technology (NIST)-traceable 0.1 M NH_4Cl standard from an independent source, at a minimum of once per batch, 5) continuing this sequence until all samples of the batch have been measured, including duplicates and spiked samples, and 6) remeasuring the complete set of calibration standards (at the end of the session). Electromotive force signal measurements obtained for samples are compared to those for standards to determine ammonia concentration in the samples.

2.1.2.2 Nitrite Analysis. The sorbent material for NO_2 and NO traps were desorbed in an aqueous TEA and n-butanol solution and analyzed by suppressed-conductivity ion chromatography

^(a) Procedure entitled "Ammonia (Nitrogen) in Aqueous Samples," PNL-ALO-226 Rev. 0, in the *Analytical Chemistry Laboratory (ACL) Procedure Compendium*, Vol. 3: Inorganic Instrumental Methods. Pacific Northwest National Laboratory, Richland, Washington.

(SCIC) for nitrite according to PNL-ALO-212, Rev. 1^(a) modified to obviate interferences by concentrations of non-target analytes. Specifically, the modifications used were 1) eluent 1.44 mM Na_2CO_3 + 1.8 mM NaHCO_3 at 2.0 mL/min, 2) one guard column (AG4A) and two separator columns (AS4A) in series instead of just one separator column, and 3) all standards, samples, and blanks injected into the sample loop through 0.45- μm syringe filters.

Primary and breakthrough section materials were analyzed separately using identical procedures. Each analytical session was conducted as follows. Working nitrite standards were prepared by diluting a stock nitrite standard with desorbing solution. An initial calibration curve was prepared from the instrument response versus nitrite standard concentration data for the set of working standards. A calibration verification check using one of the midrange standards was performed at a minimum of once per batch. If the instrument response indicated that sample nitrite concentration was outside the calibration range, the sample was diluted with desorbing solution and reanalyzed. After all samples of a batch were analyzed, the complete set of calibration standards was remeasured to verify consistent instrument response. Instrument responses observed for samples were compared to those for standards to determine the nitrite concentration of the samples. Because the analytes were collected on the sorbent as equal quantities of nitrite and nitrate, and the analysis was specific for nitrite, the moles of NO_2 and NO were determined by doubling the analytically determined moles of nitrite.

2.1.2.3 Water Analysis. All sorbent traps used to make each multi-trap train were weighed using a semi-micro mass balance, after labeling and breaking the glass tube ends, without plastic end caps. After receipt of exposed samples, the sorbent traps were again weighed to determine the change in mass. Mass gain was assumed to be entirely due to collection of water vapor. Field blanks were used to correct results.

2.1.3 Quality Assurance/Quality Control

Analytical work was performed according to quality levels identified in PNL-ALO-212, PNL-ALO-226, and Quality Assurance Plan ETD-002. Estimated quantitation limits (EQLs) for the inorganic vapors are given in Table 2.3.

The accuracy of concentration measurements depends on errors associated with both sampling and analysis. Ammonia results were estimated to be within 5% of their true values. The uncertainty includes preparation of standards, purity of the ammonium salt used to prepare standards, potential operator bias, ambient temperature variations, etc. Working standards are traceable to NIST standard reference material (SRM) by using an independent calibration verification standard certified to be NIST-traceable. Nitrite analyses (for NO_2 and NO) are performed using certified but not NIST-traceable SRM; this is because NIST does not make a nitrite SRM. Based on experience in comparing nitrite working standards prepared from several different sources and factors mentioned for ammonia above, the estimated maximum bias for NO_2 results is $\pm 10\%$, and for NO results it is $\pm 5\%$.

^(a) Procedure entitled "Determination of Inorganic Anions by Ion Chromatography," PNL-ALO-212, in the *Analytical Chemistry Laboratory (ACL) Procedure Compendium*, Vol. 3: Inorganic Instrumental Methods. Pacific Northwest National Laboratory, Richland, Washington.

**Table 2.3 Quantitation Limits for Selected
Inorganic Analytes**

<u>Analyte</u>	<u>Formula</u>	<u>EQL^(a) (ppmv)</u>
Ammonia	NH ₃	0.71
Nitrogen Dioxide	NO ₂	0.16
Nitric oxide	NO	0.16
Mass (water) ^(b)	n/a	0.3 mg/L

(a) The lowest calibration standard is defined as the EQL.

(b) The vapor-mass concentration, thought to be largely water vapor, is determined gravimetrically.

n/a = not applicable.

The accuracy of measurements of sample mass is typically ± 0.1 mg, or less than 1% of the mass changes of most samples. The analytical accuracy of measurements of the change in mass of sorbent trains, based on the variability in mass change of field blank multi-trap trains, is determined for each sample job and is typically about ± 1 mg per five-trap sorbent train.

2.2 Permanent Gases

SUMMA™ canister samples were analyzed for carbon dioxide, carbon monoxide, hydrogen, methane, and nitrous oxide (N₂O).

2.2.1 SUMMA™ Canister Preparation

All SUMMA™ canisters are cleaned and verified contaminant-free according to PNNL Technical Procedure PNL-TVP-02^(a) before use. The cleaning procedure uses an EnTech 3000 cleaning system that alternately fills the canisters with purified humid air and evacuates them for several cycles while the canister is heated. If the canister is verified as clean, the canister is evacuated to 5 mtorr and tagged. Before sending the canisters to the field for sampling, the canister vacuum is measured to determine if any leakage has occurred. If the vacuum has remained constant during storage, the canisters are prehumidified with 100 μ L of distilled water and labeled. Canisters stored more than 30 but less than 60 days are re-evacuated and rehumidified before use. If stored more than 60 days, the canisters are recleaned and validated before use. All canisters are stored at room temperature.

2.2.2 Analytical Procedure

The SUMMA™ canister samples were analyzed for five permanent gases by gas chromatography/thermal conductivity detection (GC/TCD). Aliquots of sampled air (undiluted) are drawn directly from each SUMMA™ canister into a 5-mL gas-tight syringe and injected into a

^(a) Pacific Northwest Laboratory. 8/94. *Cleaning SUMMA™ Canisters and the Validation of the Cleaning Process*, PNL-TVP-02 (Rev. 0), PNL Technical Procedure, Pacific Northwest Laboratory, Richland, Washington.

Hewlett-Packard 5890 GC/TCD fitted with a loop injector valve and a column switching valve. An aliquot of 5 mL is used so that the 1.0-mL injection loop is completely purged with sample air, ensuring that no dilution of the sample takes place within the injection loop. One set of GC conditions is used to analyze for carbon monoxide, carbon dioxide, N₂O, and methane using helium as the carrier gas. A second GC/TCD analysis is performed for hydrogen using nitrogen as the carrier gas to enhance the signal sensitivity and lower the detection limit for this analyte. The permanent gases and the derived EQLs are listed in Table 2.4.

Table 2.4 Quantitation Limits for Permanent Gases

<u>Analyte</u>	<u>Formula</u>	<u>EQL (ppmv)</u>
Carbon Dioxide	CO ₂	17
Carbon Monoxide	CO	17
Methane	CH ₄	25
Hydrogen	H ₂	17
Nitrous Oxide	N ₂ O	17

2.2.3 Quality Assurance/Quality Control

Standards for the permanent gas analyses were blended from commercially prepared and certified standards. The instrument was calibrated at five different concentrations for methane over a range of 25 to 2100 ppmv, calibrated for carbon monoxide, carbon dioxide, and N₂O over a range of 17 to 2100 ppmv, and calibrated for hydrogen over a range of 17 to 2120 ppmv. An average response factor from the calibration was used for quantification.

Each analyte was quantitated by comparison of sample analyte peak area to the calibration plot generated for the compound. The EQL for the method has been established as the low level calibration standard. Before and after each sample analysis set, a gas standard was run to evaluate system performance and to measure system accuracy. The calculated concentration of the individual gases in the standards fell within $\pm 25\%$ of the expected concentrations.

2.3 Total Non-Methane Organic Compounds

2.3.1 Analytical Procedure

SUMMATM canister samples were analyzed for total non-methane organic compounds (TNMOCs) according to PNNL Technical Procedure PNL-TVP-08^(a), which is similar to U.S. Environmental Protection Agency (EPA) Task Order 12 (TO-12). Twenty-four hours before analysis, SUMMATM canister samples are pressurized with purified air (Aadco Instruments, Inc., 1920 Sherwood St., Clearwater, Florida 34625). The original pressure is first measured using a calibrated diaphragm gauge (Cole Parmer), then pressurized to a level exactly twice the original pressure.

^(a) Pacific Northwest Laboratory. 12/95. *Determination of TO-12 Total Nonmethane Organic Compounds in Hanford Waste Tank Headspace Samples Using SUMMATM Passivated Canister Sampling and Flame Ionization Detection*, PNL-TVP-08 (Rev. 1), PNL Technical Procedure, Richland, Washington.

The method uses an EnTech 7000 cryoconcentration system interfaced with a Hewlett-Packard 5890 gas chromatograph/flame ionization detector (GC/FID). The EnTech concentrator is used to pull a metered volume of 50 to 100 mL of sample air from the SUMMA™ canister mounted on an EnTech 7016CA 16-canister autosampler. The sample is cryogenically concentrated, and constituents are trapped in a stainless steel tube containing glass beads and Tenax. The glass bead/Tenax trap is heated to 180°C and purged with ultra high purity (UHP) helium into the GC/FID. The GC oven is programmed to run at a 150°C isothermal temperature. Chromatographic separation is not needed in this method since quantitation is from the entire FID response over the run time.

Concentration in mg/m³ was derived from the 10-point multilevel calibration curve from the propane standard using the following equation:

$$\text{mg/m}^3 = \frac{(\text{ng TNMOC}) \times (\text{dilution factor})}{\text{mL sampled volume}} \quad (2.2)$$

2.3.2 Quality Assurance/Quality Control

The TNMOC is calibrated by using propane as the calibration standard. The instrument calibration mixture for the TNMOC analysis consists of NIST 99.999% propane analyzed using a 10-point, multilevel, linear regression curve.

Immediately before running the analysis sequence, a leak-check procedure, which includes evacuating the transfer lines and monitoring the pressure, must be performed on the sample manifold tower. The control limits on this test require that the change in pressure is <1.5 psi, and the absolute pressure after evacuation is <3 psi for each manifold position specified in the sequence table. If either criterion is not met, it must be corrected before the samples are analyzed.

Before the tank samples were analyzed, a diagnostic check was performed on the GC/FID instrument by running a system cleanliness procedure and an instrument continuing calibration as described in PNL-TVP-08. First, two blank volumes of Aadco purified air were analyzed to check the cleanliness of the system. This demonstrates through the analysis of a zero-air blank that the level of interference is acceptable in the analytical system. The analysis of purified air must be below 0.1 mg/m³. Second, an instrument continuing calibration is run using 100-mL UHP propane followed by one blank volume of Aadco air.

2.4 SUMMA™ Canister Sample Analyses

2.4.1 Analytical Procedure

SUMMA™ canister samples were analyzed according to PNNL Technical Procedure PNL-TVP-03^(a), which is a modified version of EPA Task Order 14 (TO-14). The method uses an EnTech 7000 cryoconcentration system interfaced with a 5972 Hewlett-Packard benchtop gas chromatograph/mass spectrometer (GC/MS). The EnTech concentrator is used to pull a metered

(a) Pacific Northwest National Laboratory. 8/96. *Determination of TO-14 Volatile Organic Compounds in Hanford Tank Headspace Samples Using SUMMA™ Passivated Canister Sampling and Gas Chromatographic-Mass Spectrometric Analysis*, PNL-TVP-03 (Rev. 2), PNNL Technical Procedure, Richland, Washington.

volume of sample air from the SUMMA™ canister, cryogenically concentrate the condensible organic vapors, then transfer the vapors to the GC/MS for analysis. A 100-mL volume of sample is measured and analyzed from the tank headspace. The organic components in the sampled air are separated on a J&W Scientific DB-1 phase, 60-m by 0.32-mm internal diameter with 3-μm film thickness column. The GC oven is programmed to run a temperature gradient beginning at 40°C, hold for 5 min, and ramp at 4°C per min to a final temperature of 260°C, with a 5-min hold.

The instrument calibration mixture for the PNL-TVP-03 analysis consists of organic analytes listed in Appendix B, Table B.1. These target analytes are quantitated in this analysis. The calibration mixture was prepared by blending a commercially prepared TO-14 calibration mixture with a mixture created using a Kin-Tek® permeation-tube standard generation system. The operation of the permeation-tube system follows the method detailed in PNNL Technical Procedure PNL-TVP-06^(a). The standard calibration mix was analyzed using six different concentrations, and a response factor for each compound was calculated. The GC/MS response for these compounds has been determined previously to be linearly related to concentration. Instrument detection limits and EQLs have been determined.

Quantitative concentrations for the target analytes were calculated using the average response factors generated using the internal standard (IS) method described in procedure PNL-TVP-03. The conversion from ppbv to mg/m³ assumes STP conditions (0°C and 1.013 bar) and was calculated using the gross molecular weight (MW) of the compound from the following equation:

$$\text{concentration in mg/m}^3 = \frac{(\text{concentration in ppbv})(\text{MW})}{(1000)(22.4 \text{ L/mol})} \quad (2.3)$$

The tentatively identified compounds (TICs) are determined by mass-spectral interpretation and comparison of the spectra with the EPA/NIST and WILEY electronic mass spectra libraries. Chromatographic peaks with an area count greater than, or equal to, one-tenth of the total area count of the nearest eluting IS are tentatively identified and their concentrations are estimated. The quality of the mass spectra match was then reviewed by the principal investigators before the identification was assigned to each chromatographic peak.

The concentration of each TIC was estimated using a relative response factor calculated using the total peak area for the nearest eluting IS. The IS peak area was used to calculate a response factor using the IS concentration in mg/m³:

$$\text{Response Factor} = \frac{\text{IS conc. (mg/m}^3\text{)}}{\text{IS peak area}} \quad (2.4)$$

The calculated response factor was then multiplied by the TIC peak area to give an estimated concentration for that compound. All calculated sample concentrations were multiplied by a factor of 2 to account for the dilution step described in Section 2.3.1.

(a) Pacific Northwest Laboratory. 11/94. *Preparation of TO-14 Volatile Organic Compounds Gas Standards*, PNL-TVP-06 (Rev. 0). PNL Technical Procedure, Richland, Washington.

2.4.2 Quality Assurance/Quality Control

Before the tank sample was analyzed, a diagnostic check was performed on the GC/MS instrument by running an instrument "high-sensitivity tune", as described in PNL-TVP-03. Upon satisfactory completion of the instrument diagnostic check, a blank volume of purified nitrogen was analyzed to check the cleanliness of the system. The instrument was then calibrated using a standard gas mixture containing the organic compounds listed in Table B.1. A gas mixture containing bromochloromethane, 1,4-difluorobenzene, chlorobenzene- d_5 , and bromofluorobenzene was used as an IS for all blank, calibration standard, and sample analyses. Analyte responses from sample components, ISs, and standards were obtained from the extracted ion plot from their selected mass ion. The calibration was generated by calculating the relative response ratios of the IS to calibration standard responses and plotting the ratios against the ratio of the calibration-standard concentration (in ppbv) to the IS concentration. Once it was determined that the relative response was linear with increasing concentration, an average response factor was calculated for each target analyte and used to determine the concentration of target compounds in each sample. Method blanks were analyzed before and after calibration verification standards.

2.5 Triple Sorbent Trap Sample Analyses

2.5.1 Sampling Methodology

Samples are collected on Supelco 300 graphite-based TSTs. Before field deployment, each trap is heated to 380°C under inert gas flow for a minimum of 60 min. Traps are prepared in batches with each tank sampling job constituting one batch. One trap is selected from each batch and run immediately to verify cleanliness. All remaining traps in the batch receive equal amounts of three surrogate compounds (hexafluorobenzene, toluene- d_8 , and bromobenzene- d_5). One trap per batch is run immediately to verify successful addition of surrogate spikes to that batch. Traps are then placed in individually labeled plastic shipping tubes (Supelco TD³), which are sealed with gasketed end caps. This provides a rugged, headspace-free shipping and storage method. As a precautionary measure, sample tubes are kept in refrigerated storage before and after sampling.

2.5.2 Analytical Procedure

The Supelco 300 tubes were analyzed according to PNNL Technical Procedure PNL-TVP-10^(a), with the exceptions noted in Section 3.4.1. The method employs Supelco Carbotrap™ 300 traps for sample collection and preconcentration. The traps are ground-glass tubes (11.5 cm long X 6 mm OD, 4 mm ID) containing a series of sorbents arranged in order of increasing retentivity. Each trap contains 300 mg of Carbotrap™ C, 200 mg of Carbotrap™ B, and 125 mg of Carbosieve™ S-III. The first two sorbents are deactivated graphite with limited sorption power for less volatile compounds. The final trapping stage, the Carbosieve™ S-III, is a graphitized molecular sieve used to retain the most volatile components, including some permanent gases such as Freon-12. Following sample collection and addition of IS, the traps are transferred to a Dynatherm ACEM 900 thermal desorber unit for analysis. The trap on the ACEM 900 is then desorbed by ballistic heating to 350°C with the sample then transferred to a smaller focusing trap. A 10:1 split is used during the transfer with 10% of the sample analyzed and the rest retained for reanalysis. The split sample collected on a

(a) Pacific Northwest National Laboratory. 2/96. *Determination of Volatile Organic Compounds in Hanford Waste Tank Headspace Samples Using Triple Sorbent Trap Sampling and Gas Chromatograph-Mass Spectrometer Analysis*, PNL-TVP-10 (Rev. 2), PNNL Technical Procedure, Richland, Washington.

second identical Carbotrap™ 300 trap is used for repeat analysis on at least one sample per batch. Since the IS also follows the same path, quantitation may be performed directly on the repeat run without changing the calibration. Following desorption from the Carbotrap™ 300 trap, the analyte is transferred to a long, thin focusing trap filled with the same type of trapping materials as the Carbotrap™ 300 traps and in approximately the same ratios. The purpose of the focusing trap is to provide an interface to a capillary GC column, which may be thermally desorbed using helium at a flow rate compatible with the column and MS interface (1.2 mL/min). The focusing trap is ballistically heated to thermally desorb components onto a capillary GC column. The column is subsequently temperature programmed to separate the method analytes, which are then detected by the MS.

The instrument calibration mixture for the TST analysis consists of the compounds listed in Appendix B, Table B.2. These compounds that are directly quantified in this analysis make up the target analyte list (these compounds will be referred to as target analytes). The calibration mixture is prepared in common with the mixture used for the SUMMA™ analysis (see Section 2.4.2). The standard calibration mix was analyzed using six different concentrations, and a response factor for each compound was calculated. Volumes of standard added to the traps are measured by pressure difference on a SUMMA™ canister of known volume. The GC/MS response for these compounds has been determined previously to be linearly related to concentration.

Quantitative concentrations for the target analytes were calculated directly from the calibration curve generated using the IS method described in procedure PNL-TVP-10. The conversion from ppbv to mg/m³ assumes STP conditions (0°C and 1.013 bar) and was calculated directly from the following equation:

$$\text{mg/m}^3 = \frac{(\text{ppbv}/1000) \times \text{g mol wt of compound}}{22.4 \text{ L/mol}} \quad (2.5)$$

The TICs are determined by mass-spectral interpretation and comparison of the spectra with the EPA/NIST and WILEY Libraries, which are a part of the Hewlett-Packard 5971/5972 instrument operating system. Chromatographic peaks with an area count greater than, or equal to, one-tenth of the total area count of the nearest eluting IS are tentatively identified and quantitatively estimated. The quality of the mass-spectral searches was then reviewed by the principal investigators before the identification was assigned to each chromatographic peak.

The concentration of each TIC was estimated using a relative response factor calculated using the total peak area for the nearest eluting IS. The IS peak area was used to calculate a response factor using the IS concentration in mg/m³:

$$\text{Response Factor} = \frac{\text{IS conc. (mg/m}^3\text{)}}{\text{IS peak area}} \quad (2.6)$$

The calculated response factor was then multiplied by the TIC peak area to give an estimated concentration for that compound.

2.5.3 Quality Assurance/Quality Control

Before tank samples were analyzed, a diagnostic check was performed on the GC/MS instrument by running a full auto tune, as described in PNL-TVP-10. Upon satisfactory completion of the instrument diagnostic check, a blank trap was analyzed to check the cleanliness of the system. The instrument was then calibrated using six different concentrations of standard gas mixture containing the compounds listed in Table B.2. A gas mixture containing difluorobenzene, chlorobenzene-d₅, and 1,4 bromofluorobenzene was used as an IS for all calibration standard and sample analyses. Analyte responses from sample components, ISs, and standards were obtained from the extracted ion plot from their selected mass ion. A continuing calibration was generated by calculating the relative response ratios of the IS to calibration standard responses and plotting the ratios against the ratio of the calibration-standard concentration (in ppbv) to the IS concentration. Once it was determined that the relative response was linear with increasing concentration, an average response factor was calculated for each target analyte and used to determine the concentration of target compounds in each sample.

3.0 Analysis Results

Results from the sampling of the headspace of Tank BX-103 on August 1, 1996 (Sample Job S6081) are provided below.

3.1 Inorganic Vapors

Measured vapor concentrations of ammonia, nitric oxide (NO), nitrogen dioxide (NO₂), and water are given in Table 3.1. The vapor concentration results were based on four samples for each compound. The four inorganic vapors were collected at the same time using sorbent traps connected in series. Sample air was drawn first through an ammonia trap, then through a three-tube system that collected NO₂ and NO (described below), and then through a desiccant trap to remove any remaining water vapor.

Two field blank multi-trap trains, identical to sample multi-trap trains discussed in Section 2.1, were included in the tube bundle lowered into the headspace of Tank BX-103 during sample job S6081. No air was pulled through these field blank multi-trap trains. Any analyte found in the field blank multi-trap trains over and above levels in unexposed tubes was attributed to passive sampling. Data in Table 3.1 have been corrected for these minor effects of passive sampling.

Results provided in Table 3.1 are estimated to be accurate to within $\pm 10\%$ and within the $\pm 30\%$ specified by the SAP. Percent relative standard deviations of the measured concentrations were $<8\%$, which is within the 25% specified by the SAP.

3.1.1 Ammonia

Ammonia analyses were performed on August 30, 1996, 29 days after sample collection and within established holding times (Ligotke et al. 1995). All samples (100%) were successfully analyzed, and no deviations from the procedure were noted.

The blank-corrected ammonia quantities in the sorbent traps ranged from 7.08 to 7.99 μmol in front sections; blank corrected back sorbent section ammonia concentrations were $<0.01 \mu\text{mol}$. Blank corrections of 0.17 μmol in front and 0.07 μmol in the back sections, were about 2.2% of collected quantities. The analysis of one sample was duplicated and indicated a reproducibility of $\pm 0.8\%$. One blank sorbent trap was spiked with 17 ppm of ammonia and yielded a percentage recovery of 97%. One sample leachate was spiked after initial analysis with approximately the quantity of ammonia in the sample and yielded a percentage recovery of 97%. The initial and continuing calibration verification (ICV, CCV) standards, using NIST-traceable material, yielded percentage recoveries of 97% (ICV) and 101% and 105% (CCV) during the analytical session. A five-point calibration was performed over an ammonia range of 0.1 to 100 $\mu\text{g/ml}$.

3.1.2 Nitric Oxide and Nitrogen Dioxide

Nitric oxide and nitrogen oxide analyses were performed on September 5 and 6, 1996, 35 and 36 days after sample collection, and within established holding times (Ligotke et al. 1995). All samples (100%) were successfully analyzed. No deviations from the procedure were noted.

Blank-corrected NO_2^- quantities in the sorbent traps were all $<0.013 \mu\text{mol}$. Nitrite blank levels used to correct data were $0.0058 \mu\text{mol}$ in front (four of four blanks analyzed) and $0.0038 \mu\text{mol}$ in back (two of four blanks analyzed) sorbent sections. The analyses of two samples were duplicated and yielded repeatabilities of $\pm 2.6\%$ and $\pm 0.7\%$. Two sample leachates were spiked with 0.125 and 0.25 ppm NO_2^- and yielded percentage recoveries of 76% and 106% , respectively. A 4-point calibration was performed over a concentration range of 0 to $0.5 \mu\text{g/mL NO}_2^-$ in the desorbing matrix.

3.1.3 Water

Analyses for water vapor were performed on August 27, 1996, 26 days after sample collection and within established holding times (Ligotke et al. 1995). All samples (100%) were successfully analyzed.

All multi-trap sample mass gain is assumed to be due to adsorption of water. This is justified because the total mass concentration of other vapors in the headspace of Hanford waste tanks are typically two to three orders of magnitude less than the mass concentration of the water vapor found in even relatively dry tanks. Water vapor concentrations are given in Table 3.1 for both moist air at tank conditions and for dry air at STP (0°C and 1.013 bar). Because the sample volumes were measured after all water vapor was removed by the sorbent traps, the measured sample volumes are for dry air. The average water vapor concentration was 15.8 mg of water per L of dry air at STP. The result was determined from an average mass gain of 34.5 mg from all of four multi-trap trains. The blank correction applied to the results was -5.1 mg per multi-trap train. A control mass was measured and indicated a measurement accuracy of $\pm 0.1 \text{ mg}$. The average water vapor concentration corresponds to a tank headspace dew point at 16.6°C and relative humidity at 85% at the time of sampling.

3.2 Permanent Gases

Hydrogen analyses were performed on August 23, 1996, and analyses for other permanent gases were performed on August 27, 1996. All analyses were conducted within the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). All samples (100%) were successfully analyzed and used in the averages. No deviations from standard procedures were noted.

Measured concentrations of carbon monoxide, carbon dioxide, hydrogen, methane, and N_2O are provided in Table 3.2. Results were based on three samples for each compound. Carbon dioxide at an average concentration of 750 ppmv , hydrogen at 154 ppmv , and N_2O at 80 ppmv were detected in Tank BX-103. All three compounds were present at a higher concentration in the tank headspace than in ambient air. The relative percent difference (RPD) between duplicate analyses of a single SUMMATM canister was 11% for N_2O , and 1% for carbon dioxide and hydrogen.

Results provided in Table 3.2 are estimated to be accurate to within $\pm 30\%$ as specified by the SAP.

3.3 Total Non-Methane Organic Compounds

Analyses for TNMOCs were performed on September 23, 1996, which is within the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). All three tank samples and the two ambient samples (100%) were successfully analyzed and used in the averages. No deviations from standard procedures were noted.

Table 3.3 lists results of the analysis of SUMMA™ canister samples for TNMOCs. Results in Table 3.3 are reported in two different units; in the upper row the mass concentration (mg/m^3) of non-methane organic compounds is given at STP (0°C and 1.013 bar), and in the lower row, by EPA TO-12 convention, as ppmv of carbon based on propane as the standard. The average concentration in the three tank headspace samples was $51.61 \text{ mg}/\text{m}^3$ or 21.54 ppmv of carbon. The $51.61 \text{ mg}/\text{m}^3$ value compares to $54.94 \text{ mg}/\text{m}^3$ for the sum of all compounds identified in the target and TIC analysis of the SUMMA™ canisters. Results provided in Table 3.3 are estimated to be accurate to within $\pm 30\%$ as specified by the SAP. The RPD for duplicate analysis of a single SUMMA™ canister was 0.1%.

3.3.1 Procedural Deviations, Observations, and Anomalies.

The calibration method described in Section 2.3.2 reflects a deviation from procedure PNL-TVP-08. Refer to Deviation Report JAE082996 for further details.

3.4 Organic Compound Characterization

Organic vapors in the Tank BX-103 headspace were sampled with SUMMA™ canisters and TSTs. These sampling methods are fundamentally different, but provide comparable results for many of the target analytes.

3.4.1 SUMMA™ Canister Results

Analyses of SUMMA™ canisters for organic vapors were performed on September 26 and 27, 1996. All analyses were conducted within the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). All samples (100%) were successfully analyzed. Procedural deviations, observations, and anomalies are presented in Section 3.4.1.1.

Measured concentrations of target and TICs are presented in Table 3.4. Thirty-six target analytes and 22 TICs above the instrument detection limit (IDL) were detected in the tank headspace samples. Of these, 35 target analytes and 20 TICs were identified in two or more tank headspace samples. Tridecane at $10.02 \text{ mg}/\text{m}^3$, dodecane at $8.08 \text{ mg}/\text{m}^3$, and undecane at $4.11 \text{ mg}/\text{m}^3$ were the three most abundant compounds identified in the tank headspace samples. The total average concentration was $46.22 \text{ mg}/\text{m}^3$ for the target analytes, $8.72 \text{ mg}/\text{m}^3$ for the TICs, and $54.94 \text{ mg}/\text{m}^3$ combined. This compares to a total concentration of $51.61 \text{ mg}/\text{m}^3$ identified in the TO-12 analysis of the three tank headspace samples.

SUMMA™ canister S6081-A05.035 was analyzed in replicate for target analytes and TICs to determine analytical precision. The RPD results are presented in Table 3.5. The RPDs were calculated for analytes detected above the IDL and found in both replicates. Thirty-three of 36 target analytes and 15 of 21 TICs had RPDs of less than 10%.

Results of analyses of target analytes and TICs in ambient air and ambient air through the ISVS samples are provided in Table 3.6. No TICs were observed in the ambient samples. Thirty-seven target compounds were observed in one or both of the ambient air samples. All target compounds were observed below the EQL with the exception of 1,1,2-trichloro-1,2,2-trifluoroethane, 1,2,4-trichlorobenzene, tridecane, and tetradecane which were observed at 12, 5.1, 9.8, and 7.8 ppbv, respectively.

A representative total ion chromatogram showing the major constituents identified in the SUMMA™ analysis is provided in Figure 3.1.

Appendix B, Table B.1 contains a complete listing of target analyte results from the SUMMA™ analyses. These data originate directly from the evaluated instrument data and have not been rounded. The intent of the data is to list the analytes that were analyzed and to present the detection limit values associated with analytes that were not detected.

3.4.1.1 Procedural Deviations, Observations, and Anomalies.

Batch #1 (file identifier 16092602.b):

This analytical sequence was run using 100-ml volumes to quantify target compounds in each tank sample.

One target compound (tetradecane at 51.16%) surpassed the 30% relative standard deviation (%RSD) and 0.05 response factor acceptance criteria for the initial calibration.

Two target compounds (1,2-dichloro-1,1,2,2-tetrafluoroethane at 30.1% and tetradecane at 58.6%) were outside the 25% difference (% D) acceptance criteria for the CCV sample. However, the CCV passed the procedural criterion requiring $\pm 25\%$ D passage for 85% of all target compounds.

Tetradecane was found in all tank samples at a concentration between the EQL and the upper quantitation limit (UQL), except ambient air sample S6081-A02.020, where it was not found at a concentration above the IDL and tank samples S6081-A04.028 and S6081-A05.035 REP, where it was found at concentrations above the UQL.

The compound 1,2-dichloro-1,1,2,2-tetrafluoroethane was not found tank samples at concentrations above its IDL.

Target compound 1,2,4-trichlorobenzene was found in the continuing calibration blank (CCB) above the EQL, but the concentration was less than 1.25 ppbv. Two target compounds (1,2,4-trichlorobenzene and 1,2-dichlorobenzene) were found in the initial calibration blank (ICB) above the EQLs, but the concentrations were less than 2.1 ppbv. The compound 1,2,4-trichlorobenzene was also found in the ambient air sample S6081-A01.003 at a concentration between the EQL and the UQL.

Batch #2 (file identifier 16092702.b):

This analytical sequence was run using 20-ml volumes to quantify target compounds in each tank sample.

One target compound (tetradecane- 51.16%) surpassed the 30% RSD acceptance criteria for the initial calibration.

Six target compounds (vinyl chloride at 29.9%, bromomethane at 48.9%, cyclohexane at 30.2%, decane at 34.3%, tridecane at 69.7%, and tetradecane at 146.8%) were outside the 25% D acceptance criteria for the continuing calibration verification (CCV) sample. However, the CCV passed the procedural criterion requiring $\pm 25\%$ D passage for 85% of all target compounds.

Tetradecane was found in all tank samples at concentrations between the EQL and the UQL.

Vinyl chloride and bromomethane were not found in the tank samples at concentrations above the IDL. Cyclohexane, decane and tridecane were found in all tank samples at concentration between the EQL and the UQL.

Target compound 1,2,4-trichlorobenzene was found in the CCB above the EQL, but the concentration was less than 2.5 ppbv. Two target compounds (1,2,4-trichlorobenzene and 1,2-dichlorobenzene) were found in the ICB above the EQLs, but the concentrations were less than 2.1 ppbv. The compound 1,2,4-trichlorobenzene was also found in tank sample S6081-A04.028 at a concentration between the EQL and the UQL and in tank sample S6081-A05.035 at a concentration between the the IDL and the EQL.

Information common to both batches:

The compounds methanol, ethanol, and 1,3-butadiene are not currently included in the method performance section of the procedure for System 1; however, these analytes were analyzed by this method. The low level standard is used as the EQL for these compounds. Sample results are flagged with a less-than symbol (<) when less than the EQL value.

3.4.2 Triple Sorbent Trap Sample Results

Analyses of TSTs were performed on August 25 and 26, 1996. All analyses were conducted within the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). All samples (100%) were successfully analyzed. Procedural deviations, observations, and anomalies are presented in Section 3.4.2.1.

Measured concentrations of target analytes and TICs are presented in Table 3.7. Results are based on three samples for each compound. Forty-four target analytes above the IDL and 43 TICs were detected in the tank headspace samples. Of these, 44 target analytes and 37 TICs were identified in two or more tank headspace samples. Five of the 43 TICs were identified as unknowns. Toluene at 4.76 mg/m^3 , 1-butanol at 2.63 mg/m^3 , and 2-methylbutane at 1.88 mg/m^3 were the three most abundant compounds identified in the tank headspace sample. The total concentration of the target analytes was 31.45 mg/m^3 and the total concentration of the TICs was 9.43 mg/m^3 . The total concentration of all compounds found was 40.88 mg/m^3 .

Triple sorbent trap sample S6081-A12.1129 was analyzed in replicate for target analytes and TICs to determine analytical precision. The RPD results are presented in Table 3.8. The RPDs were calculated for analytes detected above the detection limit and found in both replicates. Forty-one of 44 target analytes and 26 of 37 TICs had RPDs of less than 10%.

Results of analyses of target analytes and TICs in the field and trip blanks are provided in Table 3.9. Thirty-five target analytes and nine TICs were identified in one or more of the blank samples. Most of the compounds were found in the field blank samples. Fourteen of the compounds observed were above the EQL in at least one sample.

A representative total ion chromatogram showing the major constituents identified in the triple sorbent trap analysis is provided in Figure 3.2.

Appendix B, Tables B.2 and B.3 contain complete listings of target analyte results from the TST analyses. These data originate directly from the evaluated instrument data and have not been rounded. The intent of the data is to list the analytes that were analyzed and to present the detection limit values associated with analytes that were not detected.

3.4.2.1 Procedural Deviations, Observations, and Anomalies. Samples were run under the protocols of TVP-10, Rev. 2 with the initial calibration performed on September 9, 1996 and quantitated against a CCV run at beginning of the batch.

The TST samples were analyzed in two batches. The sample analytical sequence runs were as follows:

Batch #1 (file identifier 46092501.d) - S6081-A17.1132, S6081-A18.1133, S6081-A19.1134, S6081-A20.1135

Batch #2 (file identifier 46092601.d) - S6081-A11.1128, S6081-A12.1129, S6081-A12.1129 REP, S6081-A13.1130

Batch #1:

Samples included in this batch consisted of the two field blanks and two trip blanks.

The CCV showed acceptable performance as specified in the procedure for all target compounds except tridecane (29%) and tetradecane (62%). Tetradecane was found in the field blanks at a concentration between the IDL and the EQL. Due to the CCV failure for this compound, the results have greater uncertainty.

Target compounds observed in at least one field blank at levels in excess of the EQL included: butane, acetone, pentane, 2-butanone, hexane, 1-1-1-trichloroethane, heptane, 4-methyl-2-pentanone, toluene (E), ethylbenzene, p/m-xylene, styrene, o-xylene, and nonane. Trip blanks had no target compounds in excess of the EQL. Environmental contamination problems apparently associated in past work with field bundle preparation were evident in this sampling job.

Batch #2:

Samples included in this batch consisted of the three tanks samples and one repeat analysis of a tank sample.

All IS relative responses were within nominal method limits except for the third IS on the analysis of sample S6081-A11.1128. Variations in IS response with this method are associated with minor differences in tube packing density which can result in a decrease in split ratio and an increased sensitivity. In this method performance studies including detection limits were run at the highest split ratio (i.e., lowest sensitivity) and data quality is not impacted provided the IS responses for individual samples are not anomalously low in absolute as opposed to relative intensity. For runs with high absolute response, an increase in sensitivity is obtained, however, no effect on the data was evident in this case. Rerun of the samples is not an option.

Sample volumes for all ISVS tank samples have been corrected to STP from the 21°C calibration used on the sampling cart flowmeters. The correction was included in the reported data to provide seamless compatibility with past VSS data which were collected using a 0°C calibration.

Information common to both batches:

Field blanks, trip blanks, and all samples contained 1-chloro-1,1-difluoroethane. This compound has appeared persistently in most samples sent to the field in the past including blanks. It is believed to be a fugitive refrigerant. This material is never present in tubes archived for a similar amount of time in the 326 Vapor Lab or 329 Building temporary storage. The origin of the material is unclear but since it has shown up in trip blanks as well as field blanks, the most likely candidate is one of the refrigerators used for interim storage.

The siloxane compounds are believed to be originating from the C-Flex tubing used in the ISVS sample bundle.

Very narrow air spikes (mass 32) occasionally are present in chromatograms from this period. This problem has been traced to high frequency air bursts from the surface of MS vacuum system o-rings. Attempts at permanently eliminating this problems have been unsuccessful to date and the matter has been referred to HP for further investigation. It has no known impact on data quality but the spikes do appear as features on the total ion chromatogram.

Methanol, ethanol, and 1,3-butadiene are not currently included in the method performance section of the procedure; however, these analytes were analyzed by this method. The low level standard is used as the EQL for these compounds. Sample results are flagged with a less-than symbol (<) when less than the EQL.

Tributyl phosphate (TBP) is included in the target list based on a calibration performed on January 5 and 9, 1996. The TBP was introduced onto a series of double sorbent traps as a methanolic solution standard rather than a vapor standard. This served to determine the retention time and verify the mass spectral characteristics of the compound. However, verification of the calibration acceptability was not performed because the compound is not

present in the CCV. At present, it is not possible to prepare a gas standard from this material. The calibration information on TBP demonstrated that detectability at 0.08 ppbv (based on a 200-mL sample) was possible. Tributyl phosphate was not quantitated according to the current analytical method and QA program because of non-confirmation of calibration acceptability. The compound, however, was positively identified by mass spectral data.

3.5 Flammability

The analytical results presented above can be used to estimate the Tank BX-103 headspace flammability at the time of sampling. Flammability is calculated using the ammonia concentration from the inorganic analysis, carbon monoxide, hydrogen, and methane concentrations measured from the permanent gas analysis, and the total nonmethane organic concentration determined from the TO-12 analysis. Table 3.10 summarizes the calculated flammability data. Hydrogen was the principal flammable constituent of the Tank BX-103 headspace, determined to be present at approximately 0.385% of its LFL. Total headspace flammability was estimated to be <0.633% of the LFL.

Table 3.1 Inorganic Vapor Concentrations from Tank BX-103 Sampled on 8/1/96

Analyte	CAS Number	S6081-A07-64R	S6081-A08-65R	S6081-A09-66R	S6081-A10-67R	Average	Standard Deviation
Ammonia (ppmv)	7664-41-7	85	88	94	96	91	5
Nitric Oxide (ppmv)		<0.16	<0.16	<0.16	<0.16	<0.16	
Nitrogen Dioxide (ppmv)		<0.16	<0.16	<0.16	<0.16	<0.16	
Water ^(a) (mg/L)		14.2	16.1	15.9	17.0	15.8	1.1
Water ^(b) (mg/L)		12.7	14.3	14.2	15.1	14.1	1.0

Footnotes

(a) Dry air at 0°C and 1.013 bar.

(b) Moist air at tank temperature and pressure.

Table 3.2 Permanent Gas Analysis Results from Tank BX-103 Sampled on 8/01/96

Permanent Gas Analyte	Ambient Air Upwind S6081-A01.003 ^(a)	Ambient Air Through Bundle S6081-A02.020 ^(a)	Tank Samples				RPD ^(c) (%)	Mean (ppmv)	St.Dev. ^(d)
	Concentration (ppmv)	Concentration (ppmv)	S6081-A04.028 ^(a) Concentration (ppmv)	S6081-A06.060 ^(a) Concentration (ppmv)	S6081-A05.035 ^(a) Concentration (ppmv)	S6081-A05.035 ^{(a)(b)} Concentration (ppmv)			
Hydrogen	<17	<17	156	151	155	153	1	154	3
Methane	<25	<25	<25	<25	<25	<25	na	<25	
Carbon Dioxide	374	378	748	749	753	758	1	750	3
Carbon Monoxide	<17	<17	<17	<17	<17	<17	na	<17	
Nitrous Oxide	<17	<17	75	81	83	90	11	80	4

(a) WHC sample identification number.

(b) Replicate analysis for S6081-A05.035; results are not included in the calculation of average concentrations.

(c) Relative percent differences (RPDs) for replicate analysis

(d) Standard deviation

Table 3.3 Total Non-Methane Organic Compound Analysis Results from Tank BX-103 Sampled on 8/1/96

	Ambient Air Upwind S6081-A01.003 ^(a)	Ambient Air Through Bundle S6081-A02.020 ^(a)	Tank Samples				RPD ^(c) (%)	Mean	Std. Dev.
	Concentration	Concentration	S6081-A04.028 ^(a) Concentration	S6081-A06.060 ^(a) Concentration	S6081-A05.035 ^(a) Concentration	S6081-A05.035 ^{(a) (b)} Concentration			
TO-12 (mg/m ³)	<0.59	<0.59	51.52	51.03	52.28	52.33	0.1	51.61	0.63
Total Carbon (ppmv)								21.54	

(a) WHC sample identification number.

(b) Replicate analysis for S6081-A05.035; results are not included in the calculation of average concentrations.

(c) Relative percent difference (RPD) for replicate samples

Table 3.4. Organic Compound Concentrations in SUMMA™ Canisters from Tank BX-103 Sampled on 8/1/96

Target Analytes ^(a)	CAS	MW	Ret Time	S6081-A04.028 ^(c) ISVS			S6081-A05.035 ^{(c)(d)} ISV			S6081-A06.060 ^(c) ISVS			Mean and Standard Deviation			
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	St. Dev.	(ppbv)	St. Dev.
Dichlorodifluoromethane	75-71-8	121	4.6	0.004	0.65	J	0.004	0.67	J	0.003	0.61	J	0.003	0.000	0.64	0.031
Methanol	67-56-1	32	5.2	0.903	632	Y	0.902	630	Y	0.869	608	Y	0.892	0.019	623	13
Butane	106-97-8	58	5.9	1.824	703		1.824	703		1.806	696		1.818	0.011	701	4.1
Ethanol	64-17-5	46	6.8	0.589	287	Y	0.579	282	Y	0.541	263	Y	0.569	0.025	277	12
Acetonitrile	75-05-8	41	7.3	1.496	816		1.475	805		1.503	820		1.491	0.015	814	7.9
Acetone	67-64-1	58	7.8	1.440	555		1.391	537		1.457	562		1.429	0.034	551	13
Trichlorofluoromethane	75-69-4	137	8.3	0.531	87		0.552	90		0.545	89		0.543	0.011	88	1.7
Pentane	109-66-0	72	8.9	0.695	216		0.707	219		0.691	215		0.698	0.008	217	2.5
Methylene Chloride	75-09-2	85	9.7	0.018	4.6	J	0.018	4.7	J	0.018	4.7	J	0.018	0.000	4.7	0.049
1,1,2-trichloro-2,2,2-trifluoroethane	76-13-1	187	10.2	0.026	3.1	J	0.026	3.1	J	0.023	2.7	J	0.025	0.002	3.0	0.19
Propanol	71-23-8	60	10.9	0.588	219		0.584	218		0.562	209		0.578	0.014	215	5.3
Propanenitrile	107-12-0	55	10.9	1.255	511		1.245	506		1.229	500		1.243	0.013	506	5.4
2-Butanone	78-93-3	72	12.5	1.124	349		1.147	356		1.121	348		1.131	0.014	351	4.3
Hexane	110-54-3	86	13.7	0.464	121		0.470	122		0.465	121		0.466	0.003	121	0.90
Tetrahydrofuran	109-99-9	72	14.6	0.107	33		0.111	35		0.112	35		0.110	0.003	34	0.84
Butanenitrile	109-74-0	69	15.8	2.128	690		2.091	678		1.918	622		2.046	0.112	663	36
1-Butanol	71-36-3	74	16.3	3.043	919		3.022	913		2.830	855		2.965	0.117	896	35
Benzene	71-43-2	78	16.7	0.006	1.7	J	0.006	1.7	J	0.006	1.6	J	0.006	0.000	1.6	0.049
Cyclohexane	110-82-7	84	17.3	0.387	103		0.412	110		0.352	94		0.384	0.030	102	8.0
Heptane	142-82-5	100	19.2	0.307	69		0.304	68		0.283	63		0.298	0.013	67	2.9
4-Methyl-2-Pentanone	108-10-1	100	20.5	0.056	13		0.053	12		0.054	12		0.054	0.002	12	0.36
trans-1,3-Dichloropropene	10061-02-6	111	21.5	0.010	2.0	J	0.010	2.1	J	0.009	1.9	J	0.010	0.001	2.0	0.11
Pentanenitrile	110-59-8	83	21.6	0.933	251		0.926	250		0.854	230		0.904	0.044	244	12
Toluene	108-88-3	92	22.6	0.015	3.6	J	0.015	3.6	J	0.014	3.4	J	0.015	0.000	3.5	0.11
Octane	111-65-9	114	24.7	0.222	44		0.224	44		0.211	41		0.219	0.007	43	1.4
Tetrachloroethylene	127-18-4	166	25.2	0.009	1.2	J	0.009	1.2	J	0.008	1.1	J	0.009	0.000	1.2	0.035
Hexanenitrile	628-73-9	97	27.1	1.231	284		1.262	291		1.216	280		1.236	0.024	285	5.4
Ethylbenzene	100-41-4	106	27.7	0.003	0.59	U	0.003	0.60	J	0.003	0.59	U	e	e	e	e
Cyclohexanone	108-94-1	98	28.5	0.060	14		0.059	13		0.057	13	J	0.058	0.002	13	0.35
o-Xylene	95-47-6	106	29.3	0.009	1.9	J	0.009	1.9	J	0.009	1.8	J	0.009	0.000	1.9	0.059
Nonane	111-84-2	128	29.8	0.190	33		0.196	34		0.184	32		0.190	0.006	33	1.1
Decane	124-18-5	142	34.4	1.041	164		1.042	164		0.993	156		1.025	0.028	161	4.4
Undecane	1120-21-4	156	38.8	4.018	576		4.204	602		4.112	589		4.111	0.093	589	13
Dodecane	112-40-3	170	42.8	9.614	1264	*	7.778	1023	*	6.846	900	*	8.079	1.409	1062	185
Tridecane	629-50-5	184	46.5	12.301	1495	*	9.619	1169	*	8.124	987	*	10.015	2.117	1217	257
Tetradecane	629-59-4	198	50.0	3.539	400	*	3.773	426		3.426	387		3.579	0.177	404	20
Total Concentration of Target Analytes													46.224			

Table 3.4. Organic Compound Concentrations in SUMMA™ Canisters from Tank BX-103 Sampled on 8/1/96

Tentatively Identified Compounds ^(b)	CAS	MW	Ret Time	S6081-A04.028 ^(c) ISVS			S6081-A05.035 ^{(c)(d)} ISV			S6081-A06.060 ^(c) ISVS			Mean and Standard Deviation			
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	St. Dev.	(ppbv)	St. Dev.
Propane	74-98-6	44	4.5	1.481	754		1.414	720		1.433	730		1.443	0.034	735	17
Propanal	123-38-6	58	8.0	0.599	231		0.561	217		0.522	202		0.561	0.038	217	15
Methane, fluorotrinitro-	1840-42-2	169	9.6	0.112	15		0.114	15		nd	nd		0.113	e	15	e
Butanal	123-72-8	72	12.2	0.937	291		0.893	278		0.854	266		0.894	0.041	278	13
2-Butanol	78-92-2	74	13.0	0.149	45		0.151	46		0.153	46		0.151	0.002	46	0.6
Nitric acid, ethyl ester	625-58-1	91	13.9	0.460	113		0.446	110		0.439	108		0.448	0.011	110	2.7
2-Pentanone	107-87-9	86	17.4	0.643	168		0.655	171		0.545	142		0.614	0.061	160	16
Pentanal	110-62-3	86	17.9	0.548	143		0.537	140		0.473	123		0.519	0.041	135	11
1-Pentanol	71-41-0	88	21.9	0.153	39		0.147	37		0.134	34		0.144	0.010	37	2.5
3-Hexanone	589-38-8	100	22.8	0.164	37		0.149	33		0.154	35		0.156	0.007	35	1.7
2-Hexanone	591-78-6	100	23.0	0.477	107		0.472	106		0.465	104		0.471	0.006	106	1.3
Hexanal	66-25-1	100	23.5	0.411	92		0.399	89		0.373	84		0.395	0.019	88	4.3
Nitric acid, hexyl ester	20633-11-8	147	24.7	0.631	96		0.618	94		nd	nd		0.625	e	95	e
1-Hexanol	111-27-3	102	27.2	nd	nd		0.206	45		0.206	45		0.206	e	45	e
Unknown		0	27.2	0.218	f		nd	nd		nd	nd		e	e	e	e
2-Heptanone	110-43-0	114	28.2	0.289	57		0.299	59		0.288	57		0.292	0.006	57	1.1
Heptanal	111-71-7	114	28.8	0.443	87		0.435	85		0.412	81		0.430	0.016	84	3.2
1-Butanol, 3-methyl-, nitrate	543-87-3	133	29.9	0.254	43		0.255	43		0.242	41		0.250	0.007	42	1.2
Heptanenitrile	629-08-3	111	32.1	0.569	115		0.577	116		0.566	114		0.570	0.006	115	1.2
2-Octanone	111-13-7	128	33.1	nd	nd		0.180	32		nd	nd		e	e	e	e
Octanal	124-13-0	128	33.7	0.196	34		0.216	38		0.209	37		0.207	0.010	36	1.8
Octanenitrile	124-12-9	125	36.8	0.224	40		0.229	41		0.224	40		0.226	0.003	40	0.46
Total Concentration of TICs													8.716			

Data Quality Flags

Y Initial calibration and CCV was performed; however, the analyte was not part of the current operating procedure.

J Target compound detected above the IDL, but below the EQL.

U Target compound not detected at or above the IDL

* Denotes diluted value was reported for target compound in table.

(a) Detected target analytes.

(b) Semi-quantitative estimate calculated using concentration of closest eluting IS.

(c) WHC sample identification number.

(d) Replicates of this sample are found in Table 3.5.

(e) Mean and/or standard deviation are not meaningful for this analyte.

(f) No molecular weight available for calculation.

nd Not detected

Table 3.5. Comparison of Organic Compound Concentrations from Replicate Analysis of a Single SUMMA™ Canister from Tank BX-103 Sampled on 8/1/96

Target Analytes ^(a)	CAS	MW	Ret Time	S6081-A05.035 ^(c) ISVS			S6081-A05.035 ISVS REP			RPD ^(d) (%)
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	
Dichlorodifluoromethane	75-71-8	121	4.6	0.004	0.67	J	0.003	0.63	J	6
Methanol	67-56-1	32	5.2	0.902	630	Y	0.946	661	Y	5
Butane	106-97-8	58	5.9	1.824	703		1.846	711		1
Ethanol	64-17-5	46	6.8	0.579	282	Y	0.570	278	Y	1
Acetonitrile	75-05-8	41	7.3	1.475	805		1.540	841		4
Acetone	67-64-1	58	7.8	1.391	537		1.564	603		12
Trichlorofluoromethane	75-69-4	137	8.3	0.552	90		0.554	90		0
Pentane	109-66-0	72	8.9	0.707	219		0.705	219		0
Methylene Chloride	75-09-2	85	9.7	0.018	4.7	J	0.018	4.6	J	2
1,1,2-trichloro-2,2,2-trifluoroethane	76-13-1	187	10.2	0.026	3.1	J	0.025	3.0	J	2
Propanol	71-23-8	60	10.9	0.584	218		0.580	216		1
Propanenitrile	107-12-0	55	10.9	1.245	506		1.272	517		2
2-Butanone	78-93-3	72	12.5	1.147	356		1.144	355		0
Hexane	110-54-3	86	13.7	0.470	122		0.475	123		1
Tetrahydrofuran	109-99-9	72	14.6	0.111	35		0.117	36		5
Butanenitrile	109-74-0	69	15.8	2.091	678		2.109	683		1
1-Butanol	71-36-3	74	16.3	3.022	913		3.012	910		0
Benzene	71-43-2	78	16.7	0.006	1.7	J	0.006	1.7	J	3
Cyclohexane	110-82-7	84	17.3	0.412	110		0.353	94		15
Heptane	142-82-5	100	19.2	0.304	68		0.304	68		0
4-Methyl-2-Pentanone	108-10-1	100	20.5	0.053	12		0.058	13		9
trans-1,3-Dichloropropene	10061-02-6	111	21.5	0.010	2.1	J	0.010	2.1	J	2
Pentanenitrile	110-59-8	83	21.6	0.926	250		0.925	249		0
Toluene	108-88-3	92	22.6	0.015	3.6	J	0.015	3.7	J	4
Octane	111-65-9	114	24.7	0.224	44		0.231	45		3
Tetrachloroethylene	127-18-4	166	25.2	0.009	1.2	J	0.010	1.3	J	5
Hexanenitrile	628-73-9	97	27.1	1.262	291		1.360	314		8
Ethylbenzene	100-41-4	106	27.7	0.003	0.60	J	0.003	0.64	J	7
Cyclohexanone	108-94-1	98	28.5	0.059	13		0.063	14		7
o-Xylene	95-47-6	106	29.3	0.009	1.9	J	0.009	2.0	J	3
Nonane	111-84-2	128	29.8	0.196	34		0.208	36		6
Decane	124-18-5	142	34.4	1.042	164		1.138	179		9
Undecane	1120-21-4	156	38.8	4.204	602		3.947	566	*	6
Dodecane	112-40-3	170	42.8	7.778	1023	*	7.383	971	*	5
Tridecane	629-50-5	184	46.5	9.619	1169	*	9.130	1109	*	5
Tetradecane	629-59-4	198	50.0	3.773	426		2.618	296	*	36

Table 3.5. Comparison of Organic Compound Concentrations from Replicate Analysis of a Single SUMMA™ Canister from Tank BX-103 Sampled on 8/1/96

Tentatively Identified Compounds ^(b)	CAS	MW	Ret Time	S6081-A05.035 ^(c) ISVS			S6081-A05.035 ISVS			RPD ^(d) (%)
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	
Propane	74-98-6	44	4.5	1.414	720		1.471	749		4
Propanal	123-38-6	58	8.0	0.561	217		0.546	211		3
Methane, fluorotrinitro-	1840-42-2	169	9.6	0.114	15		nd	nd		
Butanal	123-72-8	72	12.2	0.893	278		0.863	269		3
2-Butanol	78-92-2	74	13.0	0.151	46		0.152	46		1
Nitric acid, ethyl ester	625-58-1	91	13.9	0.446	110		0.461	114		3
2-Pentanone	107-87-9	86	17.4	0.655	171		0.729	190		11
Pentanal	110-62-3	86	17.9	0.537	140		0.537	140		0
1-Pentanol	71-41-0	88	21.9	0.147	37		0.150	38		2
3-Hexanone	589-38-8	100	22.8	0.149	33		0.170	38		13
2-Hexanone	591-78-6	100	23.0	0.472	106		0.520	116		10
Hexanal	66-25-1	100	23.5	0.399	89		0.420	94		5
Nitric acid, hexyl ester	20633-11-8	147	24.7	0.618	94		0.653	99		5
1-Hexanol	111-27-3	102	27.2	0.206	45		0.231	51		11
2-Heptanone	110-43-0	114	28.2	0.299	59		0.318	63		6
Heptanal	111-71-7	114	28.8	0.435	85		0.442	87		2
1-Butanol, 3-methyl-, nitrate	543-87-3	133	29.9	0.255	43		0.275	46		7
Heptanenitrile	629-08-3	111	32.1	0.577	116		0.640	129		10
2-Octanone	111-13-7	128	33.1	0.180	32		0.184	32		2
Octanal	124-13-0	128	33.7	0.216	38		0.236	41		9
Nitric acid, heptyl ester	20633-12-9	161	34.7	nd	nd		0.179	25		
Octanenitrile	124-12-9	125	36.8	0.229	41		0.258	46		12

Data Quality Flags

Y Initial calibration and CCV was performed; however, the analyte was not part of the current operating procedure.

J Target compound detected above theIDL, but below the EQL

* Denotes diluted value was reported for target compound in table

(a) Detected target analytes.

(b) Semi-quantitative estimate calculated using concentration of closest eluting IS.

(c) WHC sample identification number.

(d) Relative percent differences (RPDs) based on mg/m³ values.

nd Not detected

Table 3.6. Organic Compound Concentrations in Ambient Air and Ambient Air through the ISVS in SUMMA™ Canisters Associated with the Sampling of Tank BX-103 on 8/1/96

Target Analytes ^(a)	CAS	MW	Ret Time	S6081-A01.003 ^(b)			S6081-A02.020 ^(b)		
				Ambient Air (mg/m ³)	Flag	(ppbv)	Ambient Air through ISVS (mg/m ³)	Flag	(ppbv)
Dichlorodifluoromethane	75-71-8	121	4.6	0.004	J	0.80	0.004	J	0.65
Chloromethane	74-87-3	50	4.9	0.003	J	1.2	0.002	J	1.1
Acetonitrile	75-05-8	41	7.3	0.008	J	4.2	0.004	J	2.2
Acetone	67-64-1	58	7.8	0.023	J	8.7	0.023	J	8.7
Methylene Chloride	75-09-2	85	9.7	0.015	J	4.1	0.015	J	4.0
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	187	10.2	0.038	J	4.6	0.100	J	12
Propanol	71-23-8	60	10.9	0.006	J	2.2	0.003	J	1.0
2-Butanone	78-93-3	72	12.5	0.013	J	4.2	0.007	J	2.2
1,2-Dichloroethane	107-06-2	99	15.3	0.004	J	0.87	0.003	J	0.59
1-Butanol	71-36-3	74	16.3	0.010	J	2.9	0.003	J	0.97
Benzene	71-43-2	78	16.7	0.004	J	1.2	0.002	J	0.46
Trichloroethene	79-01-6	131	18.7	0.004	J	0.63	0.002	J	0.41
cis-1,3-Dichloropropene	10061-01-5	111	20.4	0.003	J	0.62	0.002	J	0.48
trans-1,3-Dichloropropene	10061-02-6	111	21.5	0.004	J	0.77	0.002	J	0.36
1,1,2-Trichloroethane	79-00-5	133	22.0	0.005	J	0.79	0.003	J	0.47
Toluene	108-88-3	92	22.6	0.011	J	2.7	0.004	J	0.86
1,2-Dibromomethane	106-93-4	188	24.1	0.007	J	0.83	0.005	J	0.62
Chlorobenzene	108-90-7	113	26.8	0.006	J	1.2	0.003	J	0.52
Ethylbenzene	100-41-4	106	27.7	0.007	J	1.5	0.003	J	0.59
p-m-Xylene	106-42-3	106	28.1	0.014	J	2.9	0.013	J	2.7
Cyclohexanone	108-94-1	98	28.5	0.011	J	2.4	0.006	J	1.3
Styrene	100-42-5	104	29.0	0.007	J	1.5	0.002	J	0.47
1,1,2,2-Tetrachloroethane	79-34-5	168	29.2	0.007	J	0.97	0.004	J	0.56
o-Xylene	95-47-6	106	29.3	0.009	J	1.8	0.003	J	0.59
Nonane	111-84-2	128	29.8	0.002	J	0.33	0.002	J	0.31
1-Ethyl-2-Methyl-Benzene	611-14-3	120	32.9	0.003	J	0.62	0.002	J	0.34
1,3,5-Trimethylbenzene	108-67-8	120	32.7	0.008	J	1.5	0.002	J	0.34
1,2,4-Trimethylbenzene	95-63-6	120	34.2	0.009	J	1.7	0.003	J	0.48
Decane	124-18-5	142	34.4	0.008	J	1.3	0.003	J	0.47
1,3-Dichlorobenzene	541-73-1	147	34.7	0.008	J	1.3	0.002	J	0.27
1,4-Dichlorobenzene	106-46-7	147	34.9	0.009	J	1.3	0.002	J	0.27
1,2-Dichlorobenzene	95-50-1	147	36.1	0.013	J	1.9	0.002	J	0.27
Undecane	1120-21-4	156	38.8	0.006	J	0.87	0.003	J	0.37
1,2,4-Trichlorobenzene	120-82-1	181	42.3	0.042	B	5.1	0.003	U,B	0.35
Hexachloro-1,3-butadiene	87-68-3	261	44.1	0.026	J	2.2	0.005	J	0.40
Tridecane	629-50-5	184	46.5	0.080	J	9.8	0.006	J	0.73
Tetradecane	629-59-4	198	50.0	0.069	J	7.8	0.004	J	0.47

Data Quality Flags
 B Compound found in associated laboratory blank
 U Target compound detected above the MDL, but below the EGL
 J Target compound not detected at or above the MDL
 (a) Detected target analytes.
 (b) WHC sample identification number.

Table 3.7. Organic Compound Concentrations in Triple Sorbent Traps from Tank BX-103 Collected on 8/1/96

Target Analytes ^(a)	CAS	MW	Ret Time	S6081-A11.1128 ^(c) ISVS			S6081-A12.1129 ^(c,d) ISVS			S6081-A13.1130 ^(c) ISVS			Mean and Standard Deviation			
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	St. Dev.	(ppbv)	St. Dev.
Methanol	67-56-1	32	10.0	0.854	597	Y	0.790	553	Y	0.753	526	Y	0.799	0.051	559	36
Butane	106-97-8	58	10.7	2.008	774		1.732	667		1.817	700		1.852	0.141	714	54
Ethanol	64-17-5	46	12.5	1.005	489	Y	0.770	374	Y	0.863	420	Y	0.879	0.119	427	58
Acetonitrile	75-05-8	41	13.0	1.395	761		1.183	646		1.274	695		1.284	0.106	701	58
Acetone	67-64-1	58	13.6	1.833	707		1.983	765		1.774	684		1.863	0.108	719	42
Trichlorofluoromethane	75-69-4	137	14.1	0.445	73		0.483	79		0.451	73		0.460	0.020	75	3.3
Pentane	109-66-0	72	14.9	1.270	395		1.106	344		1.186	369		1.187	0.082	369	26
Methylene Chloride	75-09-2	85	15.7	0.073	19	J	0.088	23	J	0.078	21	J	0.080	0.008	21	2.0
Propanenitrile	107-12-0	55	17.0	1.153	469		1.067	434		1.069	435		1.096	0.049	446	20
Propanol	71-23-8	60	17.0	0.646	241		0.586	218		0.594	221		0.609	0.032	227	12
2-Butanone	78-93-3	72	18.6	1.303	405		1.512	470		1.309	407		1.375	0.119	427	37
Hexane	110-54-3	86	19.8	0.891	232		0.780	203		0.851	221		0.841	0.057	218	15
Chloroform	67-66-3	119	20.0	0.008	1.5	J	0.010	1.9	J	0.009	1.7	J	0.009	0.001	1.7	0.23
Tetrahydrofuran	109-99-9	72	20.7	0.121	38		0.118	37		0.125	39		0.121	0.004	38	1.2
Butanenitrile	109-74-0	69	21.8	1.586	514		1.344	436		1.418	459		1.449	0.124	470	40
1,1,1-Trichloroethane	71-55-6	133	21.9	0.040	6.6		0.043	7.2		0.039	6.5		0.040	0.002	6.8	0.33
1-Butanol	71-36-3	74	22.3	2.809	850		2.508	759		2.578	780		2.632	0.157	797	48
Benzene	71-43-2	78	22.7	0.013	3.7	J	0.012	3.4	J	0.013	3.8	J	0.013	0.001	3.6	0.20
Trichloroethene	79-01-6	131	24.7	0.019	3.2	J	0.018	3.0	J	0.020	3.5	J	0.019	0.001	3.2	0.24
Heptane	142-82-5	100	25.1	0.335	75		0.294	66		0.314	70		0.314	0.021	70	4.6
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.760	170		0.728	163		0.667	149		0.718	0.047	161	11
Pyridine	110-86-1	79	26.5	0.031	8.8	J	0.024	6.8	J	0.023	6.5	U	0.028	e	7.8	e
Pentanenitrile	110-59-8	83	27.3	0.619	167		0.497	134		0.536	145		0.551	0.062	148	17
Toluene	108-88-3	92	28.4	4.323	1051	E	5.009	1218	E	4.956	1205	E	4.763	0.382	1158	93
Octane	111-65-9	114	30.4	0.161	32		0.140	28		0.151	30		0.151	0.010	30	2.0
Tetrachloroethylene	127-18-4	166	31.0	0.035	4.7		0.038	5.1		0.035	4.7		0.036	0.002	4.8	0.23
Hexanenitrile	628-73-9	97	32.7	0.576	133		0.438	101		0.468	108		0.494	0.073	114	17
Ethylbenzene	100-41-4	106	33.4	0.673	142		0.635	134		0.673	142		0.660	0.022	139	4.7
p/m-Xylene	106-42-3	106	33.8	1.794	378		1.824	385		1.814	383		1.811	0.016	382	3.3
Cyclohexanone	108-94-1	98	34.2	0.158	36		0.180	41		0.118	27	J	0.152	0.031	35	7.1
Styrene	100-42-5	104	34.7	0.141	30		0.145	31		0.146	31		0.144	0.002	31	0.48
o-Xylene	95-47-6	106	35.0	0.502	106		0.408	86		0.490	103		0.466	0.051	98	11
Nonane	111-84-2	128	35.4	0.087	15		0.078	14		0.071	13		0.079	0.008	14	1.4
1-Ethyl-2-methyl benzene	611-14-3	120	38.4	0.015	2.8	J	0.023	4.2	J	0.014	2.5	J	0.017	0.005	3.2	0.89
1,3,5-Trimethylbenzene	108-67-8	120	38.6	0.013	2.4	J	0.022	4.2	J	0.011	2.1	J	0.015	0.006	2.9	1.1
1,2,4-Trimethylbenzene	95-63-6	120	39.9	0.028	5.2		0.054	10.0		0.024	4.5	J	0.035	0.016	6.6	3.0
Decane	124-18-5	142	40.0	0.179	28		0.151	24		0.123	19		0.151	0.028	24	4.4
1,3-Dichlorobenzene	541-73-1	147	40.4	0.019	2.8	J	0.018	2.7	J	0.018	2.7	J	0.018	0.001	2.7	0.087
1,4-Dichlorobenzene	106-46-7	147	40.6	0.019	2.8	J	0.018	2.7	J	0.018	2.7	J	0.018	0.001	2.7	0.087
Undecane	1120-21-4	156	44.4	0.568	82		0.371	53		0.371	53		0.437	0.114	63	16

Table 3.7. Organic Compound Concentrations in Triple Sorbent Traps from Tank BX-103 Collected on 8/1/96

Target Analytes ^(a)	CAS	MW	Ret Time	Mean and Standard Deviation												
				S6081-A11.1128 ^(c) ISVS			S6081-A12.1129 ^(c,d) ISVS			S6081-A13.1130 ^(c) ISVS			Standard Deviation			
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	St. Dev.	(ppbv)	St. Dev.
Dodecane	112-40-3	170	48.4	1.343	177		0.785	103		0.869	115		0.999	0.301	132	40
Tridecane	629-50-5	184	52.2	2.393	291		1.446	176		1.642	200		1.827	0.500	222	61
Tetradecane	629-59-4	198	55.7	1.251	141		0.744	84		0.859	97		0.951	0.265	108	30
Tributyl Phosphate	126-73-8	266	63.1	0.013	1.1	Z	0.003	<0.83	Z	0.017	1.4	Z	0.011	0.007	0.91	0.62
Total Concentration of Targets													31.453			
Tentatively Identified Compounds^(b)																
Propane	74-98-6	44	7.3	0.507	258		0.442	225		0.467	238		0.472	0.033	240	17
Ethane, 1-chloro-1,1-difluoro-	75-68-3	100	8.8	nd	nd		0.203	45		0.206	46		0.205	e	46	e
Cyclopropane	75-19-4	42	8.9	0.103	55		nd	nd		nd	nd		e	e	e	e
Isobutane	75-28-5	58	9.5	0.146	56		0.130	50		0.154	59		0.143	0.012	55	4.7
1-Propene, 2-methyl-	115-11-7	56	10.4	0.092	37		0.091	37		0.097	39		0.093	0.003	37	1.2
1-Butene	106-98-9	56	11.6	0.088	35		0.083	33		0.088	35		0.086	0.003	35	1.2
Butane, 2-methyl-	78-78-4	72	13.7	1.821	567		1.850	576		1.979	616		1.883	0.084	586	26
Isopropyl Alcohol	67-63-0	60	14.2	0.109	41		0.136	51		0.125	47		0.123	0.014	46	5.1
2-Propanol, 2-methyl-	75-65-0	74	15.5	0.128	39		0.117	36		0.132	40		0.126	0.007	38	2.2
Carbon disulfide	75-15-0	76	16.4	0.044	13		0.068	20		0.047	14		0.053	0.013	16	3.8
1-Pentene	109-67-1	70	18.1	0.127	40		0.120	39		0.134	43		0.127	0.007	41	2.1
Pentane, 2-methyl-	107-83-5	86	18.2	0.047	12		0.037	9.5		0.047	12		0.043	0.006	11	1.6
Butanal	123-72-8	72	18.4	0.105	33		0.120	37		0.087	27		0.104	0.017	32	5.2
Pentane, 3-methyl-	96-14-0	86	19.0	0.036	9.5		0.032	8.3		0.037	9.6		0.035	0.003	9.1	0.69
2-Butanol	78-92-2	74	19.1	0.066	20		0.040	12		0.067	20		0.058	0.015	17	4.6
1-Hexene	592-41-6	84	19.2	0.018	4.8		nd	nd		nd	nd		e	e	e	e
Cyclopentanol	96-41-3	86	23.9	0.127	33		0.134	35		0.112	29		0.124	0.011	32	2.9
Cyclohexane, methyl-	108-87-2	98	26.7	0.083	19		0.094	21		0.094	22		0.090	0.006	21	1.5
Hexane, 2,4-dimethyl-	589-43-5	114	27.1	0.044	8.7		0.040	7.9		0.046	9.1		0.044	0.003	8.6	0.59
1-Pentanol	71-41-0	88	27.7	0.067	17		0.058	15		0.057	15		0.061	0.005	15	1.4
3-Hexanone	589-38-8	100	28.7	0.110	25		0.086	19		0.096	21		0.097	0.012	22	2.7
2-Hexanone	591-78-6	100	28.8	0.308	69		0.281	63		0.291	65		0.293	0.014	66	3.1
Hexanal	66-25-1	100	29.3	0.111	25		0.130	29		0.110	25		0.117	0.011	26	2.5
Cyclohexane, 1,4-dimethyl-	589-90-2	112	29.7	0.082	16		0.081	16		0.091	18		0.085	0.005	17	1.1
Hexane, 2,3,5-trimethyl-	1069-53-0	128	31.4	0.305	53		0.263	46		0.318	56		0.296	0.029	52	5.0
Octane, 4-methyl-	2216-34-4	128	31.7	1.226	215		1.045	183		1.310	229		1.194	0.135	209	24
Unknown C9 Alkene/Cycloalkane (mw 126)		0	32.6	nd	nd		0.149	111		0.189	f		0.169	e	e	e
Unknown Alcohol		0	32.9	0.118	f		0.094	60		nd	nd		0.106	e	e	e
Unknown Alcohol		0	33.0	nd	nd		nd	nd		0.087	f		e	e	e	e
Heptanenitrile	629-08-3	111	37.8	0.219	44		0.126	25		0.164	33		0.169	0.046	34	9.4
Cyclotetrasiloxane, octamethyl-	556-67-2	296	39.4	0.723	55		0.725	55		0.774	59		0.741	0.029	56	2.2
Limonene	138-86-3	136	41.7	0.088	14		0.248	41		0.070	12		0.135	0.098	22	16

Table 3.7. Organic Compound Concentrations in Triple Sorbent Traps from Tank BX-103 Collected on 8/1/96

Tentatively Identified Compounds ^(b)	CAS	Ret		S6081-A11.1128 ^(c) ISVS			S6081-A12.1129 ^(c,d) ISVS			S6081-A13.1130 ^(c) ISVS			Mean and Standard Deviation			
		MW	Time	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	St. Dev.	(ppbv)	St. Dev.
Unknown C12 Alkane (mw 170)		170	42.9	1.011	f		0.839	111		0.994	f		0.948	0.095	e	e
Unknown C12 Alkane (mw 170)		0	43.1	0.482	f		0.455	60		0.491	f		0.476	0.019	e	e
5-Undecanone	33083-83-9	170	50.7	0.125	16		nd	nd		nd	nd		e	e	e	e
3-Undecanone	2216-87-7	170	51.2	0.057	7.5		nd	nd		nd	nd		e	e	e	e
2-Undecanone	112-12-9	170	51.4	0.071	9.3		nd	nd		nd	nd		e	e	e	e
4-Dodecanone	6137-26-4	184	54.4	0.288	35		0.156	19		0.190	23		0.212	0.068	26	8.3
3-Dodecanone	1534-27-6	184	54.9	0.075	9.1		0.044	5.4		0.048	5.8		0.055	0.017	6.7	2.0
2-Dodecanone	6175-49-1	184	55.0	0.101	12		0.060	7.3		0.067	8.1		0.076	0.022	9.3	2.7
6-Dodecanone	6064-27-3	184	57.8	0.193	23		0.105	13		0.129	16		0.142	0.045	17	5.5
4-Tridecanone	26215-90-7	198	57.8	0.222	25		0.144	16		0.146	17		0.171	0.045	19	5.0
3-Tridecanone	1534-26-5	198	58.3	0.096	11		0.055	6.2		nd	nd		0.075	e	8.5	e
Total Concentration of TICs													9.427			

Data Quality Flags

J Target compound detected above the IDL, but below the EQL

U Target compound not detected at or above the IDL

E Target compound exceeds the upper quantification limit (UQL)

Y Initial calibration and CCV was performed; however, the analyte was not part of the current operating procedure.

Z Retention time and mass spectral characteristics were determined and detectability possible at 0.8 ppbv;
however, this compound is not currently part of the analytical method. See Section 3.4.2.1 for more information.

(a) Detected target analytes.

(b) Semi-quantitative estimate calculated using concentration of closest eluting IS.

(c) WHC sample identification number.

(d) Replicates of this sample are found in Table 3.8.

(e) Mean and/or standard deviation are not meaningful for this analyte.

(f) No molecular weight available for calculation.

nd Not detected

Table 3.8. Comparison of Organic Compound Concentrations from Replicate Analysis of a Single Triple Sorbent Trap from Tank BX-103 Sampled on 8/1/96.

Target Analytes ^(a)	CAS	MW	Ret Time	S6081-A12.1129 ^(c) ISVS			S6081-A12.1129 ^(c) ISVS REP			RPD ^(d)	
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	%	
Methanol	67-56-1	32	10.0	0.790	553	Y	0.661	462	Y	18	
Butane	106-97-8	58	10.7	1.732	667		1.705	657		2	
Ethanol	64-17-5	46	12.5	0.770	374	Y	0.703	342	Y	9	
Acetonitrile	75-05-8	41	13.0	1.183	646		1.184	646		0	
Acetone	67-64-1	58	13.6	1.983	765		1.882	726		5	
Trichlorofluoromethane	75-69-4	137	14.1	0.483	79		0.463	75		4	
Pentane	109-66-0	72	14.9	1.106	344		1.114	347		1	
Methylene Chloride	75-09-2	85	15.7	0.088	23	J	0.091	24	J	3	
Propanenitrile	107-12-0	55	17.0	1.067	434		1.068	434		0	
Propanol	71-23-8	60	17.0	0.586	218		0.550	205		6	
2-Butanone	78-93-3	72	18.6	1.512	470		1.486	462		2	
Hexane	110-54-3	86	19.8	0.780	203		0.783	204		0	
Chloroform	67-66-3	119	20.0	0.010	1.9	J	0.010	2.0	J	2	
Tetrahydrofuran	109-99-9	72	20.7	0.118	37		0.117	36		0	
Butanenitrile	109-74-0	69	21.8	1.344	436		1.348	437		0	
1,1,1-Trichloroethane	71-55-6	133	21.9	0.043	7.2		0.043	7.3		1	
1-Butanol	71-36-3	74	22.3	2.508	759		2.356	713		6	
Benzene	71-43-2	78	22.7	0.012	3.4	J	0.013	3.9	J	14	
Trichloroethene	79-01-6	131	24.7	0.018	3.0	J	0.018	3.1	J	3	
Heptane	142-82-5	100	25.1	0.294	66		0.293	65		0	
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.728	163		0.716	160		2	
Pyridine	110-86-1	79	26.5	0.024	6.8	J	0.026	7.4	J	9	
Pentanenitrile	110-59-8	83	27.3	0.497	134		0.498	134		0	
Toluene	108-88-3	92	28.4	5.009	1218	E	5.092	1238	E	2	
Octane	111-65-9	114	30.4	0.140	28		0.139	27		1	
Tetrachloroethylene	127-18-4	166	31.0	0.038	5.1		0.040	5.3		4	
Hexanenitrile	628-73-9	97	32.7	0.438	101		0.437	101		0	
Ethylbenzene	100-41-4	106	33.4	0.635	134		0.630	133		1	
p/m-Xylene	106-42-3	106	33.8	1.824	385		1.822	384		0	
Cyclohexanone	108-94-1	98	34.2	0.180	41		0.133	30	J	30	
Styrene	100-42-5	104	34.7	0.145	31		0.143	31		2	
o-Xylene	95-47-6	106	35.0	0.408	86		0.406	86		0	
Nonane	111-84-2	128	35.4	0.078	14		0.077	14		0	
1-Ethyl-2-methyl benzene	611-14-3	120	38.4	0.023	4.2	J	0.023	4.3	J	2	
1,3,5-Trimethylbenzene	108-67-8	120	38.6	0.022	4.2	J	0.023	4.3	J	2	
1,2,4-Trimethylbenzene	95-63-6	120	39.9	0.054	10.0		0.054	10		1	
Decane	124-18-5	142	40.0	0.151	24		0.153	24		1	
1,3-Dichlorobenzene	541-73-1	147	40.4	0.018	2.7	J	0.018	2.7	J	2	
1,4-Dichlorobenzene	106-46-7	147	40.6	0.018	2.7	J	0.018	2.7	J	2	
Undecane	1120-21-4	156	44.4	0.371	53		0.360	52		3	
Dodecane	112-40-3	170	48.4	0.785	103		0.775	102		1	
Tridecane	629-50-5	184	52.2	1.446	176		1.430	174		1	
Tetradecane	629-59-4	198	55.7	0.744	84		0.737	83		1	
Tributyl Phosphate	126-73-8	266	63.1	0.003	<0.83	Z	0.003	<0.83	Z	8	
Tentatively Identified Compounds^(b)											
Propane	74-98-6	44	7.3	0.442	225		0.386	197		13	
Ethane, 1-chloro-1,1-difluoro-	75-68-3	100	8.8	0.203	45		0.196	44		3	
Isobutane	75-28-5	58	9.5	0.130	50		0.105	41		21	
1-Propene, 2-methyl-	115-11-7	56	10.4	0.091	37		0.096	38		5	
1-Butene	106-98-9	56	11.6	0.083	33		0.082	33		1	
Butane, 2-methyl-	78-78-4	72	13.7	1.850	576		1.883	586		2	
Isopropyl Alcohol	67-63-0	60	14.2	0.136	51		0.106	40		25	
2-Propanol, 2-methyl-	75-65-0	74	15.5	0.117	36		0.117	35		1	
Carbon disulfide	75-15-0	76	16.4	0.068	20		0.065	19		5	
1-Pentene	109-67-1	70	18.1	0.120	39		0.118	38		2	

Table 3.8. Comparison of Organic Compound Concentrations from Replicate Analysis of a Single Triple Sorbent Trap from Tank BX-103 Sampled on 8/1/96.

Tentatively Identified Compounds ^(b)	CAS	MW	Ret Time	S6081-A12.1129 ^(c) ISVS			S6081-A12.1129 ^(c) ISVS REP			RPD ^(d) %
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	
Pentane, 2-methyl-	107-83-5	86	18.2	0.037	9.5		0.035	9.1		4
Butanal	123-72-8	72	18.4	0.120	37		0.073	23		49
Pentane, 3-methyl-	96-14-0	86	19.0	0.032	8.3		0.030	7.9		5
2-Butanol	78-92-2	74	19.1	0.040	12		0.040	12		0
Cyclopentanol	96-41-3	86	23.9	0.134	35		0.114	30		16
Cyclohexane, methyl-	108-87-2	98	26.7	0.094	21		0.099	23		5
Hexane, 2,4-dimethyl-	589-43-5	114	27.1	0.040	7.9		0.039	7.7		3
1-Pentanol	71-41-0	88	27.7	0.058	15		0.062	16		6
3-Hexanone	589-38-8	100	28.7	0.086	19		0.097	22		13
2-Hexanone	591-78-6	100	28.8	0.281	63		0.253	57		10
Hexanal	66-25-1	100	29.3	0.130	29		0.081	18		46
Cyclohexane, 1,4-dimethyl-	589-90-2	112	29.7	0.081	16		0.085	17		5
Hexane, 2,3,5-trimethyl-	1069-53-0	128	31.4	0.263	46		0.272	48		3
Octane, 4-methyl-	2216-34-4	128	31.7	1.045	183		1.050	184		0
Unknown C9 Alkene/Cycloalkane (mw 126)		0	32.6	0.149	e		0.152	e		2
Unknown Alcohol		0	32.9	0.094	e		0.088	e		7
Heptanenitrile	629-08-3	111	37.8	0.126	25		0.232	47		59
Cyclotetrasiloxane, octamethyl-	556-67-2	296	39.4	0.725	55		0.752	57		4
Limonene	138-86-3	136	41.7	0.248	41		0.245	40		1
Unknown C12 Alkane (mw 170)		170	42.9	0.839	111		0.825	e		2
Unknown C12 Alkane (mw 170)		0	43.1	0.455	60		0.449	e		1
4-Dodecanone	6137-26-4	184	54.4	0.156	19		0.160	19		2
3-Dodecanone	1534-27-6	184	54.9	0.044	5.4		0.044	5.3		1
2-Dodecanone	6175-49-1	184	55.0	0.060	7.3		0.052	6.4		14
6-Dodecanone	6064-27-3	184	57.8	0.105	13		0.106	13		2
4-Tridecanone	26215-90-7	198	57.8	0.144	16		0.126	14		13
3-Tridecanone	1534-26-5	198	58.3	0.055	6.2		0.054	6.1		1

Data Quality Flags

J Target compound detected above the IDL, but below the EQL

U Target compound not detected at or above the IDL

E Target compound exceeds the UQL

Y Initial calibration and CCV was performed; however, the analyte was not part of the current operating procedure.

Z Retention time and mass spectral characteristics were determined and detectability possible at 0.8 ppbv; however, this compound is not currently part of the analytical method. See Section 3.4.2.1 for more information.

(a) Detected target analytes.

(b) Semi-quantitative estimate calculated using concentration of closest eluting IS.

(c) WHC sample identification number.

(d) Relative percent differences (RPDs) based on mg/m³ values.

(e) No molecular weight available for calculation.

Table 3.9. Organic Compound Concentrations in Triple Sorbent Trap Blank Samples Associated with the Sampling of Tank BX-103 on 8/1/96

Target Analytes ^(a)	CAS	MW	Ret Time	S6081-A17.1132 ^(c) ISVS FB #1			S6081-A18.1133 ^(c) ISVS FB #2			S6081-A19.1134 ^(c) ISVS TB #1			S6081-A20.1135 ^(c) ISVS TB #2		
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Butane	106-97-8	58	10.7	0.035	13	J	0.044	17		0.004	1.4	U	0.004	1.4	U
Ethanol	64-17-5	46	12.5	<0.275	<133	Y	<0.275	<133	Y	<0.275	<133	Y	<0.275	<133	Y
Acetone	67-64-1	58	13.6	0.496	191		1.154	445		0.007	2.8	U	0.007	2.8	U
Trichlorofluoromethane	75-69-4	137	14.1	0.006	0.92	J	0.007	1.1	J	0.004	0.72	U	0.004	0.72	U
Pentane	109-66-0	72	14.9	0.576	179		0.556	173		0.003	0.89	U	0.003	0.89	U
Methylene Chloride	75-09-2	85	15.7	0.143	38	J	0.096	25	J	0.070	18	J	0.129	34	J
Propanol	71-23-8	60	17.0	0.021	8.0	J	0.026	9.7	J	0.005	2.0	U	0.005	2.0	U
2-Butanone	78-93-3	72	18.6	0.075	23		0.184	57		0.002	0.68	U	0.002	0.68	U
Hexane	110-54-3	86	19.8	0.382	99		0.384	100		0.001	0.32	U	0.001	0.32	U
Chloroform	67-66-3	119	20.0	0.003	0.64	J	0.009	1.7	J	0.003	0.53	U	0.003	0.53	U
Tetrahydrofuran	109-99-9	72	20.7	0.016	5.1	J	0.016	4.9	J	0.012	3.6	J	0.011	3.5	J
1,1,1-Trichloroethane	71-55-6	133	21.9	0.028	4.8		0.029	4.9		0.003	0.44	U	0.003	0.44	U
1-Butanol	71-36-3	74	22.3	0.021	6.2	J	0.027	8.0	J	0.008	2.3	U	0.008	2.3	U
Benzene	71-43-2	78	22.7	0.006	1.6	J	0.006	1.6	J	0.001	0.40	U	0.001	0.40	U
Trichloroethene	79-01-6	131	24.7	0.015	2.5	J	0.014	2.4	J	0.004	0.61	U	0.005	0.89	J
Heptane	142-82-5	100	25.1	0.052	12		0.051	11		0.002	0.35	U	0.002	0.35	U
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.505	113		0.516	115		0.002	0.46	U	0.002	0.46	U
Toluene	108-88-3	92	28.4	3.411	829	E	3.454	840	E	0.005	1.2	J	0.002	0.40	J
Octane	111-65-9	114	30.4	0.014	2.8	J	0.014	2.8	J	0.003	0.52	U	0.003	0.52	U
Tetrachloroethylene	127-18-4	166	31.0	0.016	2.2	J	0.015	2.1	J	0.003	0.34	U	0.003	0.34	U
Ethylbenzene	100-41-4	106	33.4	0.297	63		0.322	68		0.001	0.30	U	0.001	0.30	U
p/m-Xylene	106-42-3	106	33.8	0.831	175		0.862	182		0.003	0.63	U	0.003	0.63	U
Cyclohexanone	108-94-1	98	34.2	0.055	12	J	0.071	16	J	0.013	2.9	U	0.013	2.9	U
Styrene	100-42-5	104	34.7	0.064	14		0.066	14		0.002	0.33	U	0.002	0.33	U
o-Xylene	95-47-6	106	35.0	0.172	36		0.207	44		0.002	0.40	U	0.002	0.40	U
Nonane	111-84-2	128	35.4	0.016	2.9		0.016	2.8		0.001	0.22	U	0.001	0.22	U
1-Ethyl-2-methyl benzene	611-14-3	120	38.4	0.008	1.5	J	0.007	1.2	J	0.002	0.44	U	0.002	0.44	U
1,3,5-Trimethylbenzene	108-67-8	120	38.6	0.007	1.3	J	0.005	1.0	J	0.002	0.44	U	0.002	0.44	U
1,2,4-Trimethylbenzene	95-63-6	120	39.9	0.016	3.0	J	0.013	2.4	J	0.003	0.47	U	0.003	0.47	U
Decane	124-18-5	142	40.0	0.030	4.7	J	0.028	4.4	J	0.003	0.47	U	0.003	0.47	U
1,3-Dichlorobenzene	541-73-1	147	40.4	0.008	1.2	J	0.008	1.1	J	0.003	0.48	U	0.003	0.48	U
1,4-Dichlorobenzene	106-46-7	147	40.6	0.008	1.2	J	0.008	1.1	J	0.003	0.43	U	0.003	0.43	U
Undecane	1120-21-4	156	44.4	0.021	3.0	J	0.013	1.8	J	0.004	0.63	U	0.004	0.63	U
Dodecane	112-40-3	170	48.4	0.010	1.3	J	0.005	0.69	J	0.026	3.4	U	0.026	3.4	U
Tetradecane	629-59-4	198	55.7	0.019	2.2	J	0.016	1.8	J	0.013	1.5	U	0.013	1.5	U

Table 3.9. Organic Compound Concentrations in Triple Sorbent Trap Blank Samples Associated with the Sampling of Tank BX-103 on 8/1/96

Tentatively Identified Compounds ^(b)	CAS	MW	Ret Time	S6081-A17.1132 ^(c) ISVS FB #1			S6081-A18.1133 ^(c) ISVS FB #2			S6081-A19.1134 ^(c) ISVS TB #1			S6081-A20.1135 ^(c) ISVS TB #2		
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Ethane, 1-chloro-1,1-difluoro-	75-68-3	100	8.8	1.566	351		0.350	78		nd	nd		0.576	129	
Isobutane	75-28-5	58	9.5	0.192	74		0.137	53		nd	nd		nd	nd	
Butane, 2-methyl-	78-78-4	72	13.7	2.600	809		2.470	768		nd	nd		nd	nd	
Isopropyl Alcohol	67-63-0	60	14.2	0.110	41		nd	nd		nd	nd		nd	nd	
2-Propanol, 2-methyl-	75-65-0	74	15.5	0.099	30		nd	nd		nd	nd		nd	nd	
Cyclopentane	287-92-3	70	18.1	0.135	43		0.146	47		nd	nd		nd	nd	
Hexane, 2,3,5-trimethyl-	1069-53-0	128	31.4	0.149	26		0.157	27		nd	nd		nd	nd	
Heptane, 2,4-dimethyl-	2213-23-2	128	31.7	0.624	109		0.660	116		nd	nd		nd	nd	
Cyclotetrasiloxane, octamethyl-	556-67-2	296	39.4	0.247	19	Z	nd	nd		nd	nd		nd	nd	

Data Quality Flags

J Target compound detected above the IDL, but below the EQL

U Target compound not detected at or above the IDL

E Target compound exceeds the UQL

Y Initial calibration and CCV was performed; however, the analyte was not part of the current operating procedure.

Z Retention time and mass spectral characteristics were determined and detectability possible at 0.8 ppbv;
however, this compound is not currently part of the analytical method. See Section 3.4.2.1 for more information.

(a) Detected target analytes.

(b) Semi-quantitative estimate calculated using concentration of closest eluting IS.

(c) WHC sample identification number.

nd Not detected

Table 3.10. Flammability Data for Tank BX-103 Sampled on 8/1/96

Analyte	CAS #	Lower Flammability Limit(LFL)	Average Measured Concentrations	% of LFL ^(a)
Ammonia (ppm)	7664-41-7	150000	91	0.061
Carbon Monoxide (ppm)	630-08-0	125000	<17	<0.014
Hydrogen (ppm)	1333-74-0	40000	154	0.385
Methane (ppm)	74-82-8	50000	<25	<0.050
TNMOC (mg/m ³)		42000	51.61	0.123
Total				<0.633

(a) Less than values are calculated using the average concentration less than values.
These values are summed to determine the total LFL.

Figure 3.1b Typical Total Ion Chromatogram (36 - 70 min) for SUMMA™ Canister Samples from Tank BX-103 Sampled on 8/1/96

3.28

4.0 Conclusions

The concentrations of inorganic and organic analytes were determined from samples of the headspace of Tank BX-105 on August 1, 1996 (Sample Job S6081). The vapor concentrations were based either on whole-volume samples (SUMMA™ canisters) or on sorbent traps exposed to sample flow. In the case of the canisters, the concentrations were based on analytical results and the tracking of dilution/concentration of sample volumes obtained directly from the canisters. In the case of the sorbent traps, concentrations were based on analytical results and sample volumes reported by WHC. Known sampling and analytical variances from established quality assurance requirements, where significant, were documented in this report, as required by the SAP (Buckley 1996). No immediate notifications were provided because analytical results indicated no specific analytes exceeded the notification levels; notification levels and notification procedures are described in the SAP (Buckley 1996).

5.0 References

Buckley, L. L. 1996. *Vapor Sampling and Analysis Plan*. WHC-SD-WM-TP-335, Rev. 2C, Westinghouse Hanford Company, Richland, Washington.

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Pacific Northwest National Laboratory. *Analytical Laboratory Procedure Compendium*. Procedure PNL-ALO-271. PNL-MA-599, Pacific Northwest National Laboratory, Richland, Washington.

Pacific Northwest National Laboratory. *Quality Assurance Plan for Activities Conducted by the Pacific Northwest National Laboratory Vapor Analytical Laboratory (VAL) and the Pacific Northwest National Laboratory Tank Vapor Characterization Project*. ETD-002, Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

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Westinghouse Hanford Company (WHC). 1994. *Quality Assurance Project Plan for Tank Vapor Characterization*. WHC-SD-WM-QAPP-013, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Appendix A

Chain-of-Custody Sample Control Forms

Custody Form Initiator J. A. Edwards - PNNL

Telephone (509) 373-0141
Page 85-3009 / FAX 376-2329

Company Contact R. D. Mahon - WHC

Telephone (509) 373-7437
Page 85-9656 / FAX 373-3793Project Designation/Sampling Locations 200 West Tank Farm
241-BX-103 Tank Vapor Sample SAF S6081
(ISVS Cart)Collection date 08 - 01 - 96
Preparation date 07 - 29 - 96

Ice Chest No.

Field Logbook No. WHC-N-647-8

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to PNNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S6081 - A07 . 64R Collect NH₃/NO_x/H₂O Sorbent Trap
S6081 - A08 . 65R Collect NH₃/NO_x/H₂O Sorbent Trap
S6081 - A09 . 66R Collect NH₃/NO_x/H₂O Sorbent Trap
S6081 - A10 . 67R Collect NH₃/NO_x/H₂O Sorbent Trap

S6081 - A15 . 68R Open, close and store NH₃/NO_x/H₂O field blank #1
S6081 - A16 . 69R Open, close and store NH₃/NO_x/H₂O field blank #2

[] Field Transfer of Custody		[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
G W Dennis <i>G W Dennis</i>	07-30-96	1040	J A Edwards <i>J A Edwards</i>	07-30-96	1040
J A Edwards <i>J A Edwards</i>	08-31-96	0745	ES MAST <i>ES MAST</i>	08-31-96	0745
ES MAST <i>ES MAST</i>	08-13-96	1000	GS CAPRIO <i>GS CAPRIO</i>	08-13-96	1000
GS CAPRIO <i>GS CAPRIO</i>	08-13-96	1145	J A Edwards <i>J A Edwards</i>	08-13-96	1145
J A Edwards <i>J A Edwards</i>	8-27-96	0745	G.W. Dennis <i>G.W. Dennis</i>	08-27-96	0745

Final Sample Disposition

Comments:

- PNNL (only) Checklist
- 0 Media labeled and checked?
 - 0 Letter of instruction?
 - 0 Media in good condition?
 - 0 COC info/signatures complete?
 - 0 Rad release stickers on samples?
 - 0 Activity report from 222S?
 - 0 RSR/release? (a ≤100/B ≤400 pCi/g)
 - 0 COC copy for LRB, RIDS filed?

Pick-up / Delivery

Y/N
Y/N
Y/N
Y/N
Y/N
Y/N
Y/N
Y/N

Comments:

POC

POC

Custody Form Initiator J. A. Edwards - PNNL

Telephone (509) 373-0141

Page 85-3009 / FAX 376-2329

Company Contact R. D. Mahon - WHC

Telephone (509) 373-2891

Page 85-3656 / FAX 373-3793

Project Designation/Sampling Locations 200 West Tank Farm
241-BX-103 Tank Vapor Sample SAF S6081
(ISVS Cart)

Collection date 08 - 01 - 96

Preparation date 07 - 30 - 96

Ice Chest No.

Field Logbook No. WHC-N-6428

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to PNNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S6081 - A01 . 003	Collect Ambient Air Sample SUMMA #1
S6081 - A02 . 020	Collect Ambient Air Sample SUMMA #2 (through tube bundle)
S6081 - A04 . 028	Collect SUMMA #3
S6081 - A05 . 035	Collect SUMMA #4
S6081 - A06 . 060	Collect SUMMA #5

[] Field Transfer of Custody		[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
J A Edwards <i>[Signature]</i>	07-21-96	0740	<i>[Signature]</i>	07-31-96	0740
GS WAST <i>[Signature]</i>	08-13-96	1000	GS CAPRID <i>[Signature]</i>	08-13-96	1000
GS CAPRID <i>[Signature]</i>	08-13-96	1145	JAEOWARDS <i>[Signature]</i>	08-13-96	1145

Final Sample Disposition

Comments:

PNNL (only) Checklist	Pick-up / Delivery	Comments:
Media labeled and checked?	☒ Y / ☐ N	
Letter of instruction?	☒ Y / ☐ N	
Media in good condition?	☒ Y / ☐ N	
COC info/signatures complete?	☒ Y / ☐ N	
Rad release stickers on samples?	☒ Y / ☐ N	
Activity report from 222S?	☒ Y / ☐ N	
RSR/release? (a ≤100/B ≤400 pCi/g)	☒ Y / ☐ N	
COC copy for LRB, RIDS filed?	☒ Y / ☐ N	

POC (12)POC (12)

(WHC-SD-WM-TP-335, REV. 2, Table 2b)

(Revised 05/30/96 PNNL)

**Battelle Pacific
Northwest Laboratory**

CHAIN OF CUSTODY

WHC 100269

Custody Form Initiator J. A. Edwards - PNL

Telephone (509) 373-0141
Page 85-3009 / P8-08 / FAX 376-0418

Company Contact R. D. Mahon - WHC

Telephone (509) 373-7437
Page 85-9656 / S3-27 / FAX 373-7076

Project Designation/Sampling Locations 200 West Tank Farm
241-BX-103 Tank Vapor Sample SAF S6081
(ISVS Cart)

Collection date 08.01.96
Preparation date 07-29-96

Ice Chest No.

Field Logbook No. WHC- N. 6778

Ertco Hi/Lo thermometer No. PNL-T-003

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to WHC-

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S6081 - A11 . 1128	PNL Triple Sorbent Trap (TST) Sample # 1
S6081 - A12 . 1129	PNL TST Sample # 2
S6081 - A13 . 1130	PNL TST Sample # 3
S6081 - A14 . 1131	PNL TST Sample # 4
S6081 - A17 . 1132	Open, close & store TST Field Blank # 1
S6081 - A18 . 1133	Open, close & store TST Field Blank #2
S6081 - A19 . 1134	Store TST Trip Blank #1
S6081 - A20 . 1135	Store TST Trip Blank #2

[] Field Transfer of Custody		[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
JL Julia	07-29-96	1200	JA Edwards	07-29-96	1200
JA Edwards	07-31-96	0740	ES MAST	07-31-96	0740
ES MAST	8-7-96	1015	JL Julia	8-3-96	1015

Final Sample Disposition

Comments:

- PNL (only) Checklist**
- Media labeled and checked? ☒ Y/N
 - Letter of instruction? ☒ Y/N
 - Media in good condition? ☒ Y/N
 - COC info/signatures complete? ☒ Y/N
 - Sorbents shipped on ice? (<5°C) ☒ Y/N
 - Hi/Lo thermometer - Keep upright! ☒ Y/N
 - Hi/Lo thermometer ☒ Y/N
 - Rad release stickers on samples? ☒ Y/N
 - Activity report from 222S? ☒ Y/N
 - COC copy for LRB, RIDS filed? ☒ Y/N

Pick-up / Delivery

POC JA POC JA

Comments:

Cooler Temperature Status

Hi -8 °C / Lo -8 °C (pick up at PNL to WHC)

Hi -8 °C / Lo -1 °C (delivery at WHC from PNL)

Hi 0 °C / Lo -7 °C (at return to PNL from WHC)

Hi -12 °C / Lo -13 °C (at delivery from WHC to PNL)

(Revised 06/21/95 PNL)

Appendix B

Listing of All Target Compounds for Organic Compound Analysis

Table B.1 SUMMA™ Analysis Results for All Target Analytes from Tank BX-103 Sampled on 8/1/96

Target Analytes	CAS	MW	Ret Time	S6081-A01.003 ISVS AMB.AS6081-A02.020 ISVS AMB.AI		S6081-A04.028 ISVS		S6081-A05.035 ISVS		S6081-A05.035 ISVS REP		S6081-A06.060 ISVS	
				(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag
Dichlorodifluoromethane	75-71-8	120.9	4.571	0.004	0.8 J	0.0035	0.65 J	0.0035	0.65 J	0.004	0.67 J	0.0034	0.63 J
Chloromethane	74-87-3	50.49	4.947	0.003	1.21 J	0.0024	1.06 U	0.0024	1.06 U	0.002	1.06 U	0.0024	1.06 U
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	170.9	5.163	0.013	1.7 U	0.013	1.7 U	0.013	1.7 U	0.013	1.7 U	0.013	1.7 U
Methanol	67-56-1	32.04	5.238	<0.11	<77 Y	<0.11	<77 Y	0.9034	631.58 Y	0.902	630.46 Y	0.9456	661.07 Y
Vinyl Chloride	75-01-4	62.5	5.443	0.002	0.57 U	0.0016	0.57 U	0.0016	0.57 U	0.002	0.57 U	0.0016	0.57 U
1,3-Butadiene	106-99-0	54	5.744	<0.083	<34 Y	<0.083	<34 Y	<0.083	<34 Y	<0.083	<34 Y	<0.083	<34 Y
Butane	106-97-8	58.12	5.873	0.002	0.92 U	0.0024	0.92 U	1.8235	702.8	1.824	703.05	1.8459	711.41
Bromomethane	74-83-9	94.94	6.347	0.005	1.23 U	0.0052	1.23 U	0.0052	1.23 U	0.005	1.23 U	0.0052	1.23 U
Chloroethane	75-00-3	64.51	6.702	0.005	1.88 U	0.0054	1.88 U	0.0054	1.88 U	0.005	1.88 U	0.0054	1.88 U
Ethanol	64-17-5	46.01	6.842	<0.11	<53 Y	<0.11	<53 Y	0.5887	286.59 Y	0.579	281.78 Y	0.5702	277.61 Y
Acetonitrile	75-05-8	41.05	7.338	0.008	4.21 J	0.004	2.18 U	1.4957	816.18	1.475	804.95	1.5404	840.55
Acetone	67-64-1	58.08	7.844	0.023	8.73 J	0.0227	8.74 J	1.4395	555.18	1.391	536.54	1.5643	603.32
Trichlorofluoromethane	75-69-4	137.4	8.253	0.005	0.78 U	0.0048	0.78 U	0.5311	86.61	0.552	89.99	0.5543	90.39
Pentane	109-66-0	72.15	8.931	0.004	1.18 U	0.0038	1.18 U	0.6948	215.72	0.707	219.46	0.7046	218.76
1,1-Dichloroethene	75-35-4	96.94	9.48	0.004	0.88 U	0.0038	0.88 U	0.0038	0.88 U	0.004	0.88 U	0.0038	0.88 U
Methylene Chloride	75-09-2	84.93	9.663	0.015	4.06 J	0.015	3.95 J	0.0175	4.62 J	0.018	4.71 J	0.0176	4.64 J
1,1,2-trichloro-2,2,2-trifluoroethane	76-13-1	187.4	10.169	0.038	4.55 J	0.0996	11.91	0.0257	3.08 J	0.026	3.05 J	0.0249	2.98 J
Propanol	71-23-8	60.1	10.891	0.006	2.18 J	0.0028	1.04 U	0.5877	219.05	0.584	217.67	0.5796	216.03
Propanenitrile	107-12-0	55.08	10.934	0.004	1.55 U	0.0038	1.55 U	1.2554	510.57	1.245	506.12	1.2719	517.25
1,1-Dichloroethane	75-34-3	98.96	11.816	0.002	0.45 U	0.002	0.45 U	0.002	0.45 U	0.002	0.45 U	0.002	0.45 U
2-Butanone	78-93-3	72.11	12.462	0.013	4.15 J	0.0069	2.16 J	1.1244	349.29	1.147	356.16	1.144	355.35
cis-1,2-Dichloroethene	156-59-2	96.94	13.345	0.003	0.79 U	0.0034	0.79 U	0.0034	0.79 U	0.003	0.79 U	0.0034	0.79 U
Hexane	110-54-3	86.18	13.722	0.003	0.83 U	0.0032	0.83 U	0.4638	120.56	0.47	122.23	0.4745	123.34
Chloroform	67-66-3	119.4	13.884	0.003	0.49 U	0.0026	0.49 U	0.0026	0.49 U	0.003	0.49 U	0.0026	0.49 U
Tetrahydrofuran	109-99-9	72.11	14.637	0.002	0.5 U	0.0016	0.5 U	0.1067	33.13	0.111	34.51	0.1166	36.22
1,2-Dichloroethane	107-06-2	98.96	15.305	0.004	0.87 J	0.0026	0.59 U	0.0026	0.59 U	0.003	0.59 U	0.0026	0.59 U
Butanenitrile	109-74-0	69.11	15.811	0.003	1.1 U	0.0034	1.1 U	2.1284	689.86	2.091	677.75	2.1087	683.48
1,1,1-Trichloroethane	71-55-6	133.4	15.822	0.003	0.54 U	0.0032	0.54 U	0.0032	0.54 U	0.003	0.54 U	0.0032	0.54 U
1-Butanol	71-36-3	74.12	16.295	0.01	2.92 J	0.0032	0.97 U	3.0425	919.48	3.022	913.14	3.0119	910.24
Benzene	71-43-2	78.11	16.715	0.004	1.17 J	0.0016	0.46 U	0.0059	1.68 J	0.006	1.67 J	0.006	1.73 J
Carbon Tetrachloride	56-23-5	153.8	17.006	0.003	0.5 U	0.0034	0.5 U	0.0034	0.5 U	0.003	0.5 U	0.0034	0.5 U
Cyclohexane	110-82-7	84.16	17.286	0.004	0.96 U	0.0036	0.96 U	0.3869	102.97	0.412	109.6	0.3526	93.85
1,2-Dichloropropane	78-87-5	113	18.298	0.003	0.59 U	0.003	0.59 U	0.003	0.59 U	0.003	0.59 U	0.003	0.59 U
Trichloroethene	79-01-6	131.4	18.739	0.004	0.63 J	0.0024	0.41 U	0.0024	0.41 U	0.002	0.41 U	0.0024	0.41 U
Heptane	142-82-5	100.2	19.245	0.002	0.4 U	0.0018	0.4 U	0.3068	68.59	0.304	67.86	0.3038	67.92
cis-1,3-Dichloropropene	10061-01-	111	20.43	0.003	0.62 J	0.0024	0.48 U	0.0024	0.48 U	0.002	0.48 U	0.0024	0.48 U
4-Methyl-2-Pentanone	108-10-1	100.2	20.462	0.003	0.76 U	0.0034	0.76 U	0.0562	12.56	0.053	11.87	0.0582	13
Pyridine	110-86-1	79.1	20.613	0.019	5.27 U	0.0186	5.27 U	0.0186	5.27 U	0.019	5.27 U	0.0186	5.27 U
trans-1,3-Dichloropropene	10061-02-	111	21.506	0.004	0.77 J	0.0018	0.36 U	0.0101	2.04 J	0.01	2.08 J	0.0101	2.05 J
Pentanenitrile	110-59-8	83.13	21.592	0.004	1.13 U	0.0042	1.13 U	0.9333	251.49	0.926	249.54	0.9245	249.11
1,1,2-Trichloroethane	79-00-5	133.4	21.959	0.005	0.79 J	0.0028	0.47 U	0.0028	0.47 U	0.003	0.47 U	0.0028	0.47 U
Toluene	108-88-3	92.14	22.605	0.011	2.65 J	0.0035	0.86 J	0.0149	3.62 J	0.015	3.55 J	0.0152	3.71 J
1,2-Dibromoethane	106-93-4	187.9	24.144	0.007	0.83 J	0.0052	0.62 U	0.0052	0.62 U	0.005	0.62 U	0.0052	0.62 U
Octane	111-65-9	114.2	24.682	0.002	0.47 U	0.0024	0.47 U	0.222	43.53	0.224	43.86	0.2309	45.29
Tetrachloroethylene	127-18-4	165.8	25.156	0.004	0.57 U	0.0042	0.57 U	0.0087	1.18 J	0.009	1.21 J	0.0095	1.28 J
Chlorobenzene	108-90-7	112.6	26.782	0.006	1.16 J	0.0026	0.52 U	0.0026	0.52 U	0.003	0.52 U	0.0026	0.52 U
Hexanenitrile	628-73-9	97.13	27.062	0.005	1.2 U	0.0052	1.2 U	1.2306	283.8	1.262	290.94	1.36	313.65
Ethylbenzene	100-41-4	106.2	27.654	0.007	1.53 J	0.0028	0.59 U	0.0028	0.59 U	0.003	0.6 J	0.003	0.64 J
p/m-Xylene	106-42-3	106.2	28.117	0.014	2.89 J	0.013	2.74 U	0.013	2.74 U	0.013	2.74 U	0.013	2.74 U
Cyclohexanone	108-94-1	98.14	28.515	0.011	2.44 J	0.0058	1.32 U	0.0598	13.66	0.059	13.4	0.0629	14.35
Styrene	100-42-5	104.2	29.011	0.007	1.46 J	0.0022	0.47 U	0.0022	0.47 U	0.002	0.47 U	0.0022	0.47 U

Table B.1

Target Analytes

1,1,2,2-Tetrachloroethane	
o-Xylene	
Nonane	
1-Ethyl-2-Methyl-Benzene	
1,3,5-Trimethylbenzene	
1,2,4-Trimethylbenzene	9.
Decane	124
1,3-Dichlorobenzene	541.7
1,4-Dichlorobenzene	106-46
1,2-Dichlorobenzene	95-50-1
Undecane	1120-21-4
1,2,4-Trichlorobenzene	120-82-1
Dodecane	112-40-3
Hexachloro-1,3-butadiene	87-68-3
Tridecane	629-50-5
Tetradecane	629-59-4

Data Quality Flags

B Compound found in associated laboratory blank.
Y Initial calibration and CCV were performed; however,
J Target compound detected above the IDL, but below the
U Target compound not detected at or above the IDL
* Denotes diluted value was reported for target compound in

Current operating procedure.

J081-A05.035 ISVS REP		S6081-A06.060 ISVS	
(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag
0.0042	0.56 U	0.0042	0.56 U
0.0094	1.99 J	0.0085	1.8 J
0.2083	36.37	0.1836	32.07
0.0018	0.34 U	0.0018	0.34 U
0.0018	0.34 U	0.0018	0.34 U
0.0026	0.48 U	0.0026	0.48 U
1.042	164.05	1.1382	179.19
0.002	0.27 U	0.0018	0.27 U
0.002	0.27 U	0.0018	0.27 U
0.002	0.27 U	0.0018	0.27 U
0.002	0.27 U	0.0018	0.27 U
4.204	602.44	3.9472	565.65 *
0.003	0.35 U,B	0.0028	0.35 U,B
7.778	1022.81 *	7.3832	970.9 *
0.0046	0.4 U	0.0046	0.4 U
12.301	1494.63 *	9.619	1168.78 *
3.5389	399.67 *	3.773	426.07
		2.6178	295.65 *
		3.426	386.92

Table B.2 Triple Sorbent Trap Analysis Results for All Target Analytes from Tank BX-103 Sampled on 8/1/96

Target Analytes	CAS	MW	Ret Time	S6081-A11.1128 ISVS		S6081-A12.1129 ISVS		S6081-A12.1129 ISVS REP		S6081-A13.1130 ISVS	
				(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag
Dichlorodifluoromethane	75-71-8	120.9	7.79	0.005	0.85 U	0.0046	0.84 U	0.0046	0.84 U	0.0046	0.85 U
Chloromethane	74-87-3	50.49	8.779	0.003	1.5 U	0.0034	1.5 U	0.0034	1.5 U	0.0034	1.5 U
1,2-dichloro1,1,2,2-tetrafluoro	76-14-2	170.9	9.502	0.003	0.44 U	0.0034	0.44 U	0.0034	0.44 U	0.0034	0.44 U
Methanol	67-56-1	32.04	10.033	0.854	597.31 Y	0.7903	552.5 Y	0.6611	462.2 Y	0.7529	526.39 Y
Vinyl Chloride	75-01-4	62.5	9.895	0.003	1.16 U	0.0032	1.15 U	0.0032	1.15 U	0.0032	1.16 U
1,3-Butadiene	106-99-0	54	10.511	<0.208	<86 Y	<0.208	<86 Y	<0.208	<86 Y	<0.208	<86 Y
Butane	106-97-8	58.14	10.735	2.008	773.58	1.7316	667.1	1.7047	656.77	1.817	700.03
Chloroethane	75-00-3	64.51	12.042	0.004	1.53 U	0.0044	1.52 U	0.0044	1.52 U	0.0044	1.53 U
Ethanol	64-17-5	46.07	12.51	1.005	488.59 Y	0.7695	374.1 Y	0.7027	341.66 Y	0.8631	419.68 Y
Acetonitrile	75-05-8	41.05	12.988	1.395	760.97	1.1833	645.7	1.1843	646.23	1.2741	695.27
Acetone	67-64-1	58.08	13.626	1.833	707	1.9827	764.7	1.8822	725.94	1.7737	684.05
Trichlorofluoromethane	75-69-4	137.4	14.093	0.445	72.61	0.4831	78.77	0.4626	75.43	0.4506	73.47
Pentane	109-66-0	72	14.88	1.27	395.03	1.1057	344	1.1138	346.5	1.1855	368.84
1,1-Dichloroethene	75-35-4	96.94	15.475	0.002	0.51 U	0.0022	0.51 U	0.0022	0.51 U	0.0022	0.51 U
Methylene Chloride	75-09-2	84.93	15.719	0.073	19.28 J	0.088	23.2 J	0.0909	23.97 J	0.0778	20.52 J
1,1,2-trichloro1,2,2-trifluoroeth	76-13-1	187.4	16.251	0.003	0.39 U	0.0032	0.38 U	0.0032	0.38 U	0.0032	0.39 U
Propanenitrile	107-12-0	55.08	16.984	1.153	468.7	1.0666	433.8	1.068	434.33	1.0694	434.92
Propanol	71-23-8	60.1	17.016	0.646	240.67	0.5859	218.4	0.5501	205.03	0.5942	221.48
1,1-Dichloroethane	75-34-3	98.96	17.92	0.002	0.34 U	0.0015	0.34 U	0.0015	0.34 U	0.0015	0.34 U
2-Butanone	78-93-3	72.11	18.557	1.303	404.81	1.5123	469.8	1.4861	461.62	1.3091	406.65
cis-1,2-Dichloroethene	156-59-2	96.94	19.45	0.003	0.62 U	0.0027	0.62 U	0.0027	0.62 U	0.0027	0.62 U
Hexane	110-54-3	86.18	19.812	0.891	231.68	0.7796	202.6	0.7833	203.61	0.8508	221.15
Chloroform	67-66-3	119.4	19.982	0.008	1.46 J	0.0102	1.92 J	0.0104	1.95 J	0.0088	1.66 J
Tetrahydrofuran	109-99-9	72.11	20.704	0.121	37.57	0.1178	36.58	0.1173	36.45	0.1252	38.89
1,2-Dichloroethane	107-06-2	98.96	21.353	0.001	0.27 U	0.0012	0.27 U	0.0012	0.27 U	0.0012	0.27 U
Butanenitrile	109-74-0	69.11	21.799	1.586	514	1.344	435.6	1.3482	436.97	1.4176	459.46
1,1,1-Trichloroethane	71-55-6	133.4	21.863	0.04	6.63	0.0426	7.15	0.0432	7.25	0.0389	6.53
1-Butanol	71-36-3	74	22.256	2.809	850.28	2.5083	759.3	2.3557	713.08	2.5784	780.48
Benzene	71-43-2	78.11	22.724	0.013	3.69 J	0.0117	3.37 J	0.0134	3.85 J	0.0131	3.75 J
Carbon Tetrachloride	56-23-5	153.8	23.021	0.002	0.22 U	0.0015	0.22 U	0.0015	0.22 U	0.0015	0.22 U
Cyclohexane	110-82-7	84.16	23.277	0.004	1.18 U	0.0044	1.17 U	0.0044	1.17 U	0.0044	1.18 U
1,2-Dichloropropane	78-87-5	113	24.254	0.002	0.41 U	0.002	0.4 U	0.002	0.4 U	0.0021	0.41 U
Trichloroethene	79-01-6	131.4	24.68	0.019	3.22 J	0.0177	3.01 J	0.0182	3.1 J	0.0204	3.48 J
Heptane	142-82-5	100.2	25.126	0.335	74.93	0.294	65.73	0.2928	65.45	0.3139	70.17
4-Methyl-2-Pentanone	108-10-1	100.2	26.285	0.76	170	0.7275	162.7	0.7155	160.02	0.6668	149.12
cis-1,3-Dichloropropene	10061-01-	111	26.316	0.001	0.27 U	0.0013	0.27 U	0.0013	0.27 U	0.0014	0.27 U
Pyridine	110-86-1	79.1	26.486	0.031	8.83 J	0.024	6.79 J	0.0262	7.41 J	0.023	6.51 U
trans-1,3-Dichloropropene	10061-02-	111	27.347	0.003	0.58 U	0.0028	0.57 U	0.0028	0.57 U	0.0029	0.58 U
Pentanenitrile	110-59-8	83.15	27.347	0.619	166.85	0.497	133.9	0.4979	134.13	0.5364	144.5
1,1,2-Trichloroethane	79-00-5	133.4	27.783	0.002	0.28 U	0.0017	0.28 U	0.0017	0.28 U	0.0017	0.28 U
Toluene	108-88-3	92.14	28.421	4.323	1050.9 E	5.0086	1218 E	5.0915	1237.77 E	4.9563	1204.9 E
1,2-Dibromoethane	106-93-4	187.9	29.951	0.003	0.3 U	0.0025	0.3 U	0.0025	0.3 U	0.0025	0.3 U

Table B.2 Triple Sorbent Trap Analysis Results for All Target Analytes from Tank BX-103 Sampled on 8/1/96

Target Analytes	CAS	MW	Ret Time	S6081-A11.1128 ISVS		S6081-A12.1129 ISVS		S6081-A12.1129 ISVS REP		S6081-A13.1130 ISVS	
				(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag	(mg/m ³)	(ppbv) Flag
Octane	111-65-9	114	30.398	0.161	31.54	0.1403	27.57	0.1389	27.29	0.1512	29.71
Tetrachloroethylene	127-18-4	165.8	30.961	0.035	4.74	0.0378	5.11	0.0395	5.33	0.0347	4.69
Chlorobenzene	108-90-7	112.6	32.534	0.001	0.23 U	0.0012	0.23 U	0.0012	0.23 U	0.0012	0.23 U
Hexanenitrile	628-73-9	97	32.726	0.576	133.08	0.4377	101.1	0.4366	100.82	0.468	108.08
Ethylbenzene	100-41-4	106.2	33.385	0.673	142.08	0.6346	133.9	0.63	132.91	0.6729	141.97
p/m-Xylene	106-42-3	106.2	33.81	1.794	378.44	1.8242	384.9	1.8216	384.32	1.8141	382.74
Cyclohexanone	108-94-1	98.14	34.246	0.158	36.1	0.1798	41.05	0.1333	30.42 J	0.1182	26.98 J
Styrene	100-42-5	104.2	34.724	0.141	30.42	0.145	31.19	0.1425	30.65	0.1456	31.31
1,1,2,2-Tetrachloroethane	79-34-5	167.9	34.958	0.006	0.83 U	0.0062	0.83 U	0.0062	0.83 U	0.0063	0.83 U
o-Xylene	95-47-6	106.2	35.021	0.502	105.94	0.4077	86.01	0.406	85.67	0.4896	103.31
Nonane	111-84-2	128	35.393	0.087	15.22	0.0777	13.6	0.0774	13.54	0.0714	12.5
1-Ethyl-2-methyl benzene	611-14-3	120.2	38.38	0.015	2.82 J	0.0226	4.2 J	0.023	4.28 J	0.0136	2.54 J
1,3,5-Trimethylbenzene	108-67-8	120.2	38.593	0.013	2.41 J	0.0224	4.18 J	0.0229	4.26 J	0.011	2.05 J
1,2,4-Trimethylbenzene	95-63-6	120.2	39.868	0.028	5.19	0.0536	9.99	0.0543	10.12	0.024	4.47 J
Decane	124-18-5	142.3	40.049	0.179	28.22	0.1514	23.84	0.1533	24.14	0.1231	19.38
1,3-Dichlorobenzene	541-73-1	147	40.41	0.019	2.82 J	0.0175	2.67 J	0.0179	2.72 J	0.0175	2.67 J
1,4-Dichlorobenzene	106-46-7	147	40.612	0.019	2.82 J	0.0175	2.67 J	0.0178	2.72 J	0.0175	2.67 J
1,2-Dichlorobenzene	95-50-1	147	41.749	0.005	0.77 U	0.005	0.77 U	0.005	0.77 U	0.0051	0.77 U
Undecane	1120-21-4	156	44.375	0.568	81.54	0.371	53.27	0.3601	51.71	0.371	53.27
1,2,4-Trichlorobenzene	120-82-1	181.5	47.999	0.017	2.06 U	0.0166	2.05 U	0.0166	2.05 U	0.0167	2.06 U
Dodecane	112-40-3	170	48.403	1.343	177	0.7847	103.4	0.7749	102.11	0.8694	114.56
Hexachloro-1,3-butadiene	87-68-3	260.8	49.806	0.022	1.9 U	0.022	1.89 U	0.022	1.89 U	0.0221	1.9 U
Tridecane	629-50-5	184	52.155	2.393	291.36	1.4458	176	1.4296	174.03	1.6419	199.88
Tetradecane	629-59-4	198	55.673	1.251	141.48	0.7441	84.18	0.7371	83.39	0.8593	97.21
Tributyl Phosphate	126-73-8	266	63.1	0.013	1.09 Z	0.0027	<0.83 Z	0.0025	<0.83 Z	0.0167	1.41 Z

Data Quality Flags

J Target compound detected above the IDL, but below the EQL

U Target compound not detected at or above the IDL

E Target compound exceeds the upper quantification limit (UQL)

Y Initial calibration and CCV was performed; however, the analyte was not part of the current operating procedure.

Z Retention time and mass spectral characteristics were determined and detectability possible at 0.8 ppbv;
however, this compound is not currently part of the analytical method. See Section 3.4.2.1 for more information.

Table B.3 Triple Sorbent Trap Analysis Results for All Target Analytes from Blank Samples Associated with the Sampling of Tank BX-103 on 8/1/96

Target Analytes	CAS	MW	Ret Time	S6081-A17.1132 ISVS FB #1			S6081-A18.1133 ISVS FB #2			S6081-A19.1134 ISVS TB #1			S6081-A20.1135 ISVS TB #2		
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	120.91	7.79	0.0043	0.79	U	0.0043	0.79	U	0.0043	0.79	U	0.0043	0.79	U
Chloromethane	74-87-3	50.49	8.779	0.0032	1.4	U	0.0032	1.4	U	0.0032	1.4	U	0.0032	1.4	U
1,2-dichloro1,1,2,2-tetrafluoroeth	76-14-2	170.92	9.502	0.0032	0.41	U	0.0032	0.41	U	0.0032	0.41	U	0.0032	0.41	U
Methanol	67-56-1	32.04	10.033	<0.274	<192	Y	<0.274	<192	Y	<0.274	<192	Y	<0.274	<192	Y
Vinyl Chloride	75-01-4	62.5	9.895	0.003	1.08	U	0.003	1.08	U	0.003	1.08	U	0.003	1.08	U
1,3-Butadiene	106-99-0	54	10.511	<0.208	<86	Y	<0.208	<86	Y	<0.208	<86	Y	<0.208	<86	Y
Butane	106-97-8	58.14	10.735	0.0348	13.39	J	0.0435	16.76		0.0036	1.39	U	0.0036	1.39	U
Chloroethane	75-00-3	64.51	12.042	0.0041	1.42	U	0.0041	1.42	U	0.0041	1.42	U	0.0041	1.42	U
Ethanol	64-17-5	46.07	12.51	<0.275	<133	Y	<0.275	<133	Y	<0.275	<133	Y	<0.275	<133	Y
Acetonitrile	75-05-8	41.05	12.988	0.0033	1.8	U	0.0033	1.8	U	0.0033	1.8	U	0.0033	1.8	U
Acetone	67-64-1	58.08	13.626	0.4958	191.24		1.1539	445.04		0.0072	2.78	U	0.0072	2.78	U
Trichlorofluoromethane	75-69-4	137.37	14.093	0.0056	0.92	J	0.0065	1.06	J	0.0044	0.72	U	0.0044	0.72	U
Pentane	109-66-0	72	14.88	0.5761	179.24		0.5556	172.85		0.0029	0.89	U	0.0029	0.89	U
1,1-Dichloroethene	75-35-4	96.94	15.475	0.0021	0.47	U	0.0021	0.47	U	0.0021	0.47	U	0.0021	0.47	U
Methylene Chloride	75-09-2	84.93	15.719	0.1428	37.67	J	0.0964	25.42	J	0.0701	18.49	J	0.1286	33.93	J
1,1,2-trichloro1,2,2-trifluoroethane	76-13-1	187.38	16.251	0.003	0.36	U	0.003	0.36	U	0.003	0.36	U	0.003	0.36	U
Propanenitrile	107-12-0	55.08	16.984	0.0019	0.77	U	0.0019	0.77	U	0.0019	0.77	U	0.0019	0.77	U
Propanol	71-23-8	60.1	17.016	0.0214	7.98	J	0.0261	9.73	J	0.0053	1.99	U	0.0053	1.99	U
1,1-Dichloroethane	75-34-3	98.96	17.92	0.0014	0.32	U	0.0014	0.32	U	0.0014	0.32	U	0.0014	0.32	U
2-Butanone	78-93-3	72.11	18.557	0.0748	23.23		0.1842	57.22		0.0022	0.68	U	0.0022	0.68	U
cis-1,2-Dichloroethene	156-59-2	96.94	19.45	0.0025	0.58	U	0.0025	0.58	U	0.0025	0.58	U	0.0025	0.58	U
Hexane	110-54-3	86.18	19.812	0.3819	99.28		0.3837	99.72		0.0013	0.32	U	0.0013	0.32	U
Chloroform	67-66-3	119.38	19.982	0.0034	0.64	J	0.009	1.69	J	0.0029	0.53	U	0.0029	0.53	U
Tetrahydrofuran	109-99-9	72.11	20.704	0.0164	5.08	J	0.0157	4.88	J	0.0115	3.58	J	0.0112	3.47	J
1,2-Dichloroethane	107-06-2	98.96	21.353	0.0011	0.25	U	0.0011	0.25	U	0.0011	0.25	U	0.0011	0.25	U
Butanenitrile	109-74-0	69.11	21.799	0.0014	0.45	U	0.0014	0.45	U	0.0014	0.45	U	0.0014	0.45	U
1,1,1-Trichloroethane	71-55-6	133.4	21.863	0.0284	4.78		0.0289	4.86		0.0027	0.44	U	0.0027	0.44	U
1-Butanol	71-36-3	74	22.256	0.0206	6.23	J	0.0265	8.03	J	0.0075	2.29	U	0.0075	2.29	U
Benzene	71-43-2	78.11	22.724	0.0055	1.58	J	0.0056	1.6	J	0.0014	0.4	U	0.0014	0.4	U
Carbon Tetrachloride	56-23-5	153.82	23.021	0.0014	0.2	U	0.0014	0.2	U	0.0014	0.2	U	0.0014	0.2	U
Cyclohexane	110-82-7	84.16	23.277	0.0041	1.09	U	0.0041	1.09	U	0.0041	1.09	U	0.0041	1.09	U
1,2-Dichloropropane	78-87-5	112.99	24.254	0.0019	0.38	U	0.0019	0.38	U	0.0019	0.38	U	0.0019	0.38	U
Trichloroethene	79-01-6	131.39	24.68	0.0147	2.5	J	0.014	2.39	J	0.0036	0.61	U	0.0052	0.89	J
Heptane	142-82-5	100.2	25.126	0.052	11.62		0.0507	11.34		0.0015	0.35	U	0.0015	0.35	U
4-Methyl-2-Pentanone	108-10-1	100.16	26.285	0.5046	112.85		0.5162	115.45		0.0021	0.46	U	0.0021	0.46	U
cis-1,3-Dichloropropene	10061-01	110.97	26.316	0.0013	0.25	U	0.0013	0.25	U	0.0013	0.25	U	0.0013	0.25	U
Pyridine	110-86-1	79.1	26.486	0.0214	6.06	U	0.0214	6.06	U	0.0214	6.06	U	0.0214	6.06	U
trans-1,3-Dichloropropene	10061-02	110.97	27.347	0.0027	0.53	U	0.0027	0.53	U	0.0027	0.53	U	0.0027	0.53	U
Pentanenitrile	110-59-8	83.15	27.347	0.0008	0.22	U	0.0008	0.22	U	0.0008	0.22	U	0.0008	0.22	U
1,1,2-Trichloroethane	79-00-5	133.4	27.783	0.0015	0.26	U	0.0015	0.26	U	0.0015	0.26	U	0.0015	0.26	U
Toluene	108-88-3	92.14	28.421	3.4112	829.3	E	3.454	839.7	E	0.005	1.21	J	0.0016	0.4	J
1,2-Dibromoethane	106-93-4	187.86	29.951	0.0024	0.28	U	0.0024	0.28	U	0.0024	0.28	U	0.0024	0.28	U

Table B.3 Triple Sorbent Trap Analysis Results for All Target Analytes from Blank Samples Associated with the Sampling of Tank BX-103 on 8/1/96

Target Analytes	CAS	MW	Ret	S6081-A17.1132 ISVS FB #1			S6081-A18.1133 ISVS FB #2			S6081-A19.1134 ISVS TB #1			S6081-A20.1135 ISVS TB #2		
			Time	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Octane	111-65-9	114	30.398	0.0143	2.81 J		0.014	2.76 J		0.0027	0.52 U		0.0027	0.52 U	
Tetrachloroethylene	127-18-4	165.83	30.961	0.0163	2.21 J		0.0151	2.05 J		0.0025	0.34 U		0.0025	0.34 U	
Chlorobenzene	108-90-7	112.56	32.534	0.0011	0.22 U		0.0011	0.22 U		0.0011	0.22 U		0.0011	0.22 U	
Hexanenitrile	628-73-9	97	32.726	0.0029	0.66 U		0.0029	0.66 U		0.0029	0.66 U		0.0029	0.66 U	
Ethylbenzene	100-41-4	106.17	33.385	0.2967	62.59		0.3215	67.82		0.0014	0.3 U		0.0014	0.3 U	
p/m-Xylene	106-42-3	106.17	33.81	0.8309	175.3		0.8622	181.91		0.003	0.63 U		0.003	0.63 U	
Cyclohexanone	108-94-1	98.14	34.246	0.0545	12.43 J		0.0709	16.18 J		0.0125	2.85 U		0.0125	2.85 U	
Styrene	100-42-5	104.15	34.724	0.0642	13.8		0.0656	14.1		0.0015	0.33 U		0.0015	0.33 U	
1,1,2,2-Tetrachloroethane	79-34-5	167.85	34.958	0.0058	0.77 U		0.0058	0.77 U		0.0058	0.77 U		0.0058	0.77 U	
o-Xylene	95-47-6	106.17	35.021	0.1724	36.37		0.2074	43.76		0.0019	0.4 U		0.0019	0.4 U	
Nonane	111-84-2	128	35.393	0.0164	2.87		0.0159	2.77		0.0013	0.22 U		0.0013	0.22 U	
1-Ethyl-2-methyl benzene	611-14-3	120.19	38.38	0.0078	1.45 J		0.0065	1.22 J		0.0024	0.44 U		0.0024	0.44 U	
1,3,5-Trimethylbenzene	108-67-8	120.19	38.593	0.0067	1.25 J		0.0054	1 J		0.0024	0.44 U		0.0024	0.44 U	
1,2,4-Trimethylbenzene	95-63-6	120.19	39.868	0.0161	3.01 J		0.0128	2.39 J		0.0025	0.47 U		0.0025	0.47 U	
Decane	124-18-5	142.28	40.049	0.0298	4.7 J		0.0278	4.37 J		0.003	0.47 U		0.003	0.47 U	
1,3-Dichlorobenzene	541-73-1	147	40.41	0.0076	1.16 J		0.0075	1.14 J		0.0032	0.48 U		0.0032	0.48 U	
1,4-Dichlorobenzene	106-46-7	147	40.612	0.0076	1.16 J		0.0075	1.14 J		0.0029	0.43 U		0.0029	0.43 U	
1,2-Dichlorobenzene	95-50-1	147	41.749	0.0047	0.72 U		0.0047	0.72 U		0.0047	0.72 U		0.0047	0.72 U	
Undecane	1120-21-	156	44.375	0.0207	2.97 J		0.0128	1.84 J		0.0044	0.63 U		0.0044	0.63 U	
1,2,4-Trichlorobenzene	120-82-1	181.45	47.999	0.0155	1.91 U		0.0155	1.91 U		0.0155	1.91 U		0.0155	1.91 U	
Dodecane	112-40-3	170	48.403	0.0095	1.25 J		0.0052	0.69 J		0.0255	3.36 U		0.0255	3.36 U	
Hexachloro-1,3-butadiene	87-68-3	260.76	49.806	0.0205	1.76 U		0.0205	1.76 U		0.0205	1.76 U		0.0205	1.76 U	
Tridecane	629-50-5	184	52.155	0.054	6.57 U		0.054	6.57 U		0.054	6.57 U		0.054	6.57 U	
Tetradecane	629-59-4	198	55.673	0.0194	2.2 J		0.0163	1.84 J		0.013	1.47 U		0.013	1.47 U	
Tributyl Phosphate	126-73-8	266	63.1	<0.0099	<0.83 Z		<0.0099	<0.83 Z		<0.0099	<0.83 Z		<0.0099	<0.83 Z	

Data Quality Flags

J Target compound detected above the IDL, but below the EQL

U Target compound not detected at or above the IDL

E Target compound exceeds the upper quantification limit (UQL)

Y Initial calibration and CCV was performed; however, the analyte was not part of the current operating procedure.

Z Retention time and mass spectral characteristics were determined and detectability possible at 0.8 ppbv;
however, this compound is not currently part of the analytical method. See Section 3.4.2.1 for more information.

Distribution List

PNNL-11469

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