Pacific Northwest National Laboratory

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TANK VAPOR CHARACTERIZATION PROJECT

Tank 241-C-107 Fourth Temporal Study: Headspace Gas and Vapor Characterization Results from Samples Collected on December 17, 1996

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September 1997

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Prepared for Lockheed Martin Hanford
under a Related Services Agreement
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Contract DE-AC06-76RLO 1830

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PACIFIC NORTHWEST NATIONAL LABORATORY
operated by
BATTELLE MEMORIAL INSTITUTE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC06-76RLO 1830

Printed in the United States of America

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Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831;
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Available to the public from the National Technical Information Service,
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Summary

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-C-107 (Tank C-107) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Service Corporation (SESC) and 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 SESC.

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 C-107 headspace, determined to be present at approximately 2.825% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <2.935% 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 C-107 Sampled on 12/17/96

<u>Category</u>	<u>Sample Medium</u>	<u>Analyte</u>	<u>Concentration^(a)</u>	<u>Units</u>
Inorganic Vapors	Sorbent Traps	Ammonia	56.7	ppmv
		Nitrogen Dioxide (NO ₂)	<0.16	ppmv
		Nitric Oxide (NO)	0.46	ppmv
		Water	53.8	mg/L
Permanent Gases	SUMMA™ Canisters	Hydrogen	1130	ppmv
		Methane	<25	ppmv
		Carbon Dioxide	874	ppmv
		Carbon Monoxide	<17	ppmv
		Nitrous Oxide (N ₂ O)	253	ppmv
Total Non-Methane Organic Compounds	SUMMA™ Canisters	Non-Methane Organic Compounds	3.75	mg/m ³
Volatile Organic Vapors	SUMMA™ Canisters	Acetone	1.347	mg/m ³
		Acetonitrile	1.185	mg/m ³
		Methanol	1.057	mg/m ³
Volatile Organic Vapors	Sorbent Traps	Methanol	2.893	mg/m ³
		Acetone	1.159	mg/m ³
		Acetonitrile	0.856	mg/m ³
Flammables	SUMMA™ Canisters and Sorbent Traps	Flammables	<2.935	% LFL

(a) Concentrations were determined using sample-volume data provided by SGN Eurisys Service Corporation 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, 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
SESC	SGN Eurisys Service Corporation
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 SESC on December 17, 1996 from the headspace of waste storage tank 241-C-107 (Tank C-107) 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 SESC on November 18, 1996 and were returned to PNNL on January 2, 1997. SESC 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 SESC 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 SESC 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 SESC 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- $\mu\text{g}/\text{mL}$ ammonia stock standard solution from dried reagent-grade NH_4Cl and DIW, 2) preparing 0.1-, 0.5-, 1.0-, 10-, and 100- $\mu\text{g}/\text{mL}$ 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)</u> <u>(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

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

2.2.1 SUMMATM Canister Preparation

All SUMMATM 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 and humidified 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 SUMMATM 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 SUMMATM canister into a 5-mL gas-tight syringe and injected into a

(a) Pacific Northwest Laboratory. 8/94. *Cleaning SUMMATM 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 volume of sample air from the SUMMA™ canister, cryogenically concentrate the condensible organic

^(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.

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- μ m 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 CarbotrapTM 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 CarbotrapTM C, 200 mg of CarbotrapTM B, and 125 mg of CarbosieveTM S-III. The first two sorbents are deactivated graphite with limited sorption power for less volatile compounds. The final trapping stage, the CarbosieveTM 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

^(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.

collected on a 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- d_5 , 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 C-107 on December 17, 1996 (Sample Job S7010) 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 nitrogen dioxide and nitric oxide (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 C-107 during sample job S7010. 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 $<5\%$, which is within the 25% specified by the SAP.

3.1.1 Ammonia

Ammonia analyses were performed on January 10, 1997, 24 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 4.49 to 4.94 μmol in front sections; blank corrected back sorbent section ammonia concentrations were $<0.01 \mu\text{mol}$. Blank corrections of 0.074 μmol in front and 0.058 μmol in the back sections, were about 1.6% of collected quantities. The analysis of one sample was a duplicate and indicated a reproducibility of $\pm 11\%$. One blank sorbent trap was spiked with 17 ppm of ammonia and yielded a percentage recovery of 99%. One sample leachate was spiked after initial analysis with approximately the quantity of ammonia in the sample and yielded a percentage recovery of 95%. The initial and continuing calibration verification (ICV, CCV) standards, using NIST-traceable material, yielded percentage recoveries of 95% (ICV) and 96% and 99% (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 dioxide analyses were performed on January 10 and 14, 1997, 24 and 28 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 NO_2 sorbent traps were all $<0.013 \mu\text{mol}$. Nitrite blank levels used to correct data were $0.0122 \mu\text{mol}$ in front (four of four blanks analyzed) and $0.0071 \mu\text{mol}$ in back (two of four blanks analyzed) sorbent sections. Blank corrected NO_2^- quantities in the NO sorbent traps averaged $0.020 \mu\text{mol}$. The analyses of two samples were duplicated and yielded repeatabilities of $\pm 1.4\%$ and $\pm 0\%$. Two sample leachates were spiked with 0.25 and $0.50 \text{ ppm } \text{NO}_2^-$ and yielded percentage recoveries of 99% and 88% , respectively. A 4-point calibration was performed over a concentration range of 0 to $0.5 \mu\text{g/mL } \text{NO}_2^-$ in the desorbing matrix.

3.1.3 Water

Analyses for water vapor were performed on January 7, 1997, 21 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 53.8 mg of water per L of dry air at STP. The result was determined from an average mass gain of 100.2 mg from all four multi-trap trains. The blank correction applied to the results was -0.3 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 37.4°C and relative humidity at 76% at the time of sampling.

3.2 Permanent Gases

Hydrogen analyses were performed on February 1, 1997, and analyses for other permanent gases were performed on January 31, 1997. 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 nitrous oxide are provided in Table 3.2. Results were based on three samples for each compound. Hydrogen at 1130 ppmv , carbon dioxide at 874 ppmv , and nitrous oxide at 253 ppmv were detected in Tank C-107. The relative percent difference (RPD) between duplicate analyses of a single SUMMA™ canister was $<1\%$ for all three compounds detected.

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 initially performed on February 3, 1997. Analyses were conducted within the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). The samples were reanalyzed on April 10, 1997 due to a question related to the dilution of the canisters. This data was used for reporting. 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 EPA TO-12 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 $3.75 \text{ mg}/\text{m}^3$ or 1.56 ppmv of carbon. The $3.75 \text{ mg}/\text{m}^3$ value compares to $4.60 \text{ mg}/\text{m}^3$ for the sum of all target compounds identified in the analysis of the SUMMA™ canisters. The $4.60 \text{ mg}/\text{m}^3$ value should be considered a minimum value since TICs were not reported in this temporal study. 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 $<1\%$.

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 C-107 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 February 13, 1997. 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 analytes are presented in Table 3.4; because this is part of a temporal study, TICs are not reported. Forty-two target analytes above the instrument detection limit (IDL) were detected in the tank headspace samples. Of these, 37 target analytes were identified in two or more tank headspace samples. Acetone at $1.347 \text{ mg}/\text{m}^3$, acetonitrile at $1.185 \text{ mg}/\text{m}^3$, and methanol at $1.057 \text{ mg}/\text{m}^3$ were the three most abundant compounds identified in the tank headspace samples. The total average concentration was $4.60 \text{ mg}/\text{m}^3$ for the target analytes. This compares to a total concentration of $3.75 \text{ mg}/\text{m}^3$ identified in the TO-12 analysis of the three tank headspace samples.

SUMMA™ canister S7010-A04.246 was analyzed in replicate for target analytes 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. Twenty-six of 31 target analytes had RPDs of less than 10%.

Results of analyses of target analytes in ambient air and ambient air through the VSS samples are provided in Table 3.6. Twenty-nine 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 cis-1,3-dichloropropene which was observed at 0.003 mg/m³.

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 complete listings 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. The SUMMA™ canister samples were analyzed in one batch.

(File Identifier # 27021302.b) - S7010-A01.071, S7010-A02.085, S7010-A04.246, S7010-A04.246 REP, S7010-A05.254, and S7010-A06.256.

The volume analyzed for ambient and tank samples was 100 mL. No dilution of the canisters was performed.

All target compounds met the 30% RSD in the initial calibration. The percent difference (% D) for the initial calibration verification was less than 25% for all target compounds, with the exception of tetradecane (80.4 %). All target compounds met the 25% D criterion in the CCV except bromomethane (84.6%D), undecane (34.7 %D) and tetradecane (33.1 %D). Bromomethane and tetradecane were not detected in any of the tank samples. Undecane was not detected above the EQL in any of the tank samples. One target compound (cis-1,3-dichloropropene) was present in the continuing calibration blank (CCB) above the EQL. Compounds found in the CCB at concentrations (in ng) greater than 5% of the sample concentration are flagged with a "B" in the tables.

Instrument detection limits, precision, and accuracy have not been experimentally evaluated for 1,3-butadiene. Sample results are flagged with a "<" when the absolute number of nanograms calculated in the sample is less than the lowest concentration standard used in the initial calibration. The 1,3-butadiene results falling within the calibration range are quantitative results as evidenced by a valid calibration for these compounds.

3.4.2 Triple Sorbent Trap Sample Results

Analyses of TSTs were performed on April 14 and 15, 1997. All analyses exceeded the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC

1994). All samples were successfully analyzed. Procedural deviations, observations, and anomalies are presented in Section 3.4.2.1.

Measured concentrations of target analytes are presented in Table 3.7; because this is part of a temporal study, TICs are not reported. Results are based on three samples for each compound. Twenty-five target analytes above the IDL were detected in the tank headspace samples. Of these, 22 were identified in two or more tank headspace samples. Methanol at 2.893 mg/m³, acetone at 1.159 mg/m³, and acetonitrile at 0.856 mg/m³ were the three most abundant compounds identified in the tank headspace sample. The total concentration of the target analytes was 7.31 mg/m³.

Triple sorbent trap sample S7010-A12.1274 was analyzed in replicate for target analytes 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. Fifteen of 21 target analytes had RPDs of less than 10%.

Results of analyses of target analytes in the field and trip blanks are provided in Table 3.9. Six target analytes were identified in one or more of the blank samples. Trichlorofluoromethane and toluene were above the EQL in several blank sample. Toluene exceeded the upper quantitation limit (UQL) in Trip Blank #1, which suggests an interim source of contamination between sample receipt at the laboratory and return to the laboratory.

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 April 8, 1997 and quantitated against a CCV run at the beginning of the batch.

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

Batch #1 (file identifier 47041401.b) - S7010-A17.1277, S7010-A18.1278, S7010-A19.1288, S7010-A20.1280;

Batch #2 (file identifier 47041501.b) - S7010-A11.1273, S7010-A12.1274, S7010-A12.1274 REP, S7010-A13.1275.

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 with the exceptions of chloromethane (42.2%), methanol (42.1%), chloroethane

(31.1%), ethanol (28.5%), acetonitrile (29.3%), tridecane (39.6%), and tetradecane (63.2%). The CCB was clean of all target and TIC compounds with the exception of tetradecane which was below the EQL. There was no tetradecane noted in the samples.

Batch #2:

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

The CCV was within nominal limits for all compounds with the exceptions of chloromethane (41.5%), methanol (32.2%), chloroethane (28.1%) and tetradecane (32.0%). All of these compounds were found in the samples and due to the CCV performance, the results for these compounds have a greater uncertainty. The CCB was clean of all target, compounds except for methylene chloride, 1,1-dichloroethane and tetradecane which were below the EQL. These compounds found in the samples are flagged with a "B" in the tables.

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.

Information common to both batches:

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 0.80 ppbv (based on a 200-mL sample) was possible. Tributyl phosphate was not detected in the samples.

3.5 Flammability

The analytical results presented above can be used to estimate the tank C-107 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 C-107 headspace, determined to be present at approximately 2.825% of its LFL. Total headspace flammability was estimated to be <2.935% of the LFL.

Table 3.1 Inorganic Vapor Concentrations from Tank C-107 Sampled on 12/17/96

Analyte	CAS Number	S7010-A07-04R	S7010-A08-05R	S7010-A09-06R	S7010-A10-07R	Average	Standard Deviation
Ammonia (ppmv)	7664-41-7	59.5	54.0	58.3	54.8	56.7	2.6
Nitric Oxide (ppmv)		0.45	0.48	0.46	0.46	0.46	0.01
Nitrogen Dioxide (ppmv)		<0.16	<0.16	<0.16	<0.16	<0.16	
Water ^(a) (mg/L)		53.1	53.4	54.3	54.2	53.8	0.5
Water ^(b) (mg/L)		43.5	43.9	44.5	44.4	44.1	0.4

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 C-107 Sampled on 12/17/96

Permanent Gas Analyte	Ambient Air Upwind	Ambient Air Through VSS	Tank Samples				RPD (%)	Average Concentration Tank Samples (ppmv)
	S7010-A01.071 ^(a) PNL 071 ^(b)	S7010-A02.085 ^(a) PNL 085 ^(b)	S7010-A04.246 ^(a) PNL 246 ^(b)	S7010-A05.254 ^(a) PNL 254 ^(b)	S7010-A06.256 ^(a) PNL 256 ^(b)	S7010-A05.254 ^(a) PNL 254 ^{(b)(c)}		
	Concentration (ppmv)	Concentration (ppmv)	Concentration (ppmv)	Concentration (ppmv)	Concentration (ppmv)	Concentration (ppmv)		
Hydrogen	<17	<17	1128	1130	1132	1128	0.4	1130
Methane	<25	<25	<25	<25	<25	<25		<25
Carbon Dioxide	460	459	872	878	872	875	0.3	874
Carbon Monoxid	<17	<17	<17	<17	<17	<17		<17
Nitrous Oxide	<17	<17	253	255	251	252	0.4	253

(a) WHC sample identification number.

(b) PNL canister number.

(c) Replicate analysis for PNL 254; results are not included in the calculation of average concentrations.

Table 3.3 Total Non-Methane Organic Compound Analysis Results from Tank C-107 Sampled on 12/17/96

	Ambient Air Upwind	Ambient Air Through VSS	Tank Samples				RPD ^(c) (%)	Mean	St.Dev.
	S7010-A01.071 ^(a) Concentration	S7010-A02.085 ^(a) Concentration	S7010-A04.246 ^(a) Concentration	S7010-A06.256 ^(a) Concentration	S7010-A05.254 ^(a) Concentration	S7010-A05.254 ^{(a)(b)} Concentration			
TO-12 (mg/m ³)	< 0.59	< 0.59	3.75	3.73	3.78	3.74	0.9	3.75	0.02
Total Carbon (ppmv)								1.56	

Footnotes

- (a) WHC sample identification number.
- (b) Replicate analysis for S7010-A05.254; results are not included in the calculation of average concentrations.
- (c) Relative percent difference (RPD) based on replicate analysis.

Table 3.4 Target Organic Compound Concentrations in SUMMA™ Canisters from Tank C-107 Sampled on 12/17/96

Target Analytes ^(a)	CAS	MW	Ret Time	S7010-A04.246 ^{(b)(c)} VSS			S7010-A05.254 ^(b) VSS			S7010-A06.256 ^(b) VSS			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	4.1	0.006	1.1	J	0.006	1.0	J	0.006	1.1	J	0.006	0.000	1.1	0.029
Chloromethane	74-87-3	50	4.5	0.005	2.1	J	0.004	1.9	J	0.004	2.0	J	0.004	0.000	2.0	0.075
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	171	4.8	0.005	0.68	U	0.005	0.68	U	0.005	0.70	J	d	d	d	d
Methanol	67-56-1	32	5.0	0.901	630		1.434	1003		0.837	585		1.057	0.328	739	229
Butane	106-97-8	58	5.5	0.010	3.8	J	0.020	7.6	J	0.010	4.0	J	0.013	0.006	5.1	2.1
Ethanol	64-17-5	46	6.7	0.097	47		0.098	47		0.094	46		0.096	0.002	47	0.82
Acetonitrile	75-05-8	41	7.2	1.209	660		1.198	654		1.148	626		1.185	0.032	647	18
Acetone	67-64-1	58	7.8	1.381	533		1.349	520		1.313	506		1.347	0.034	520	13
Trichlorofluoromethane	75-69-4	137	8.2	0.108	18		0.108	18		0.106	17		0.107	0.001	17	0.11
Pentane	109-66-0	72	8.9	0.005	1.6	J	0.005	1.6	J	0.007	2.1	J	0.006	0.001	1.8	0.30
1,1-Dichloroethene	75-35-4	97	9.5	0.002	0.42	U	0.002	0.42	U	0.003	0.72	J,B	d	d	d	d
Methylene Chloride	75-09-2	85	9.7	0.009	2.3	J,B	0.009	2.3	J,B	0.010	2.5	J,B	0.009	0.001	2.3	0.14
1,1,2-trichloro-2,2,2-trifluoroethane	76-13-1	187	10.2	0.003	0.36	J	0.002	0.26	U	0.002	0.26	U	d	d	d	d
Propanenitrile	107-12-0	55	11.1	0.390	159		0.390	158		0.375	153		0.385	0.008	157	3.4
Propanol	71-23-8	60	11.1	0.025	9.3		0.025	9.4		0.024	8.8		0.025	0.001	9.2	0.29
2-Butanone	78-93-3	72	12.7	0.105	33	B	0.109	34	B	0.103	32	B	0.106	0.003	33	0.92
Hexane	110-54-3	86	14.0	0.006	1.5	J,B	0.006	1.5	J,B	0.007	1.9	J,B	0.006	0.001	1.6	0.23
Chloroform	67-66-3	119	14.1	0.004	0.72	J,B	0.004	0.71	J,B	0.005	0.87	J,B	0.004	0.000	0.77	0.090
Tetrahydrofuran	109-99-9	72	14.9	0.003	0.88	J	0.003	0.89	J	0.001	0.40	U	0.003	d	0.89	d
1,1,1-Trichloroethane	71-55-6	133	16.1	0.004	0.64	J,B	0.003	0.57	J,B	0.005	0.85	J,B	0.004	0.001	0.69	0.15
Butanenitrile	109-74-0	69	16.1	0.149	48		0.154	50		0.157	51		0.153	0.004	50	1.3
1-Butanol	71-36-3	74	16.7	0.010	2.9	J,B	0.011	3.2	J,B	0.010	3.1	J,B	0.010	0.000	3.1	0.14
Benzene	71-43-2	78	17.0	0.002	0.60	J,B	0.001	0.23	U	0.003	0.83	J,B	0.003	d	0.72	d
Carbon Tetrachloride	56-23-5	154	17.3	0.003	0.42	J,B	0.001	0.19	U	0.005	0.65	J,B	0.004	d	0.54	d
Trichloroethene	79-01-6	131	19.1	0.003	0.51	J,B	0.003	0.49	J,B	0.004	0.65	J,B	0.003	0.000	0.55	0.087
Heptane	142-82-5	100	19.6	0.005	1.1	J,B	0.006	1.2	J,B	0.006	1.4	J,B	0.006	0.001	1.3	0.15
cis-1,3-Dichloropropene	10061-01-5	111	20.8	0.003	0.50	B	0.003	0.51	B	0.003	0.63	B	0.003	0.000	0.55	0.072
4-Methyl-2-Pentanone	108-10-1	100	20.8	0.005	1.1	J,B	0.005	1.2	J,B	0.006	1.4	J,B	0.005	0.001	1.2	0.16
Pyridine	110-86-1	79	21.0	0.004	1.1	U	0.004	1.1	J	0.004	1.1	U	d	d	d	d
Pentanenitrile	110-59-8	83	21.9	0.024	6.5	B	0.025	6.7	B	0.026	7.0	B	0.025	0.001	6.7	0.26
1,1,2-Trichloroethane	79-00-5	133	22.3	0.003	0.57	J,B	0.004	0.60	J,B	0.004	0.73	J,B	0.004	0.000	0.63	0.085
Toluene	108-88-3	92	23.0	0.002	0.55	J,B	0.002	0.57	J,B	0.003	0.73	J,B	0.003	0.000	0.62	0.099
1,2-Dibromoethane	106-93-4	188	24.5	0.004	0.53	J,B	0.005	0.54	J,B	0.006	0.67	J,B	0.005	0.001	0.58	0.078
Octane	111-65-9	114	25.1	0.004	0.82	J	0.002	0.47	U	0.002	0.47	U	d	d	d	d

Table 3.4 (Cont'd) Target Organic Compound Concentrations in SUMMA™ Canisters from Tank C-107 Sampled on 12/17/96

Target Analytes ^(a)	CAS	MW	Ret Time	S7010-A04.246 ^{(b)(c)} VSS			S7010-A05.254 ^(b) VSS			S7010-A06.256 ^(b) VSS			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.
Tetrachloroethylene	127-18-4	166	25.5	0.003	0.45	J,B	0.003	0.45	J,B	0.004	0.59	J,B	0.004	0.001	0.50	0.081
Chlorobenzene	108-90-7	113	27.1	0.003	0.63	J,B	0.003	0.61	J,B	0.004	0.76	J,B	0.003	0.000	0.67	0.081
Hexanenitrile	628-73-9	97	27.4	0.018	4.2	J,B	0.019	4.3	J,B	0.019	4.4	J,B	0.019	0.000	4.3	0.097
Ethylbenzene	100-41-4	106	28.0	0.002	0.49	J,B	0.002	0.51	J,B	0.003	0.61	J,B	0.003	0.000	0.54	0.064
p/m-Xylene	106-42-3	106	28.4	0.004	0.89	U	0.005	0.98	J	0.006	1.2	J	0.005	d	1.1	d
Undecane	1120-21-4	156	39.1	<0.056	<8		<0.056	<8		<0.056	<8		0.018	0.001	2.6	0.18
Dodecane	112-40-3	170	43.1	<0.174	<23		<0.174	<23		<0.174	<23		0.027	0.003	3.6	0.41
Tridecane	629-50-5	184	46.9	<0.156	<19		<0.156	<19		<0.156	<19		0.030	0.005	3.7	0.61

Total Concentration of Target Analytes

4.69

Data Quality Flags

B Compound identified in associated laboratory blank.

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

U Target compound not detected at or above the IDL.

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

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

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

Table 3.5 Comparison of Target Organic Compound Concentrations from Replicate Analysis of a Single SUMMATM Canister from Tank C-107 Sampled on 12/17/96

Target Analytes ^(a)	CAS	MW	Ret Time	S7010-A04.246 ^(b) VSS						RPD ^(c) (%)
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	
Dichlorodifluoromethane	75-71-8	121	4.1	0.006	1.1	J	0.006	1.0	J	5
Chloromethane	74-87-3	50	4.5	0.005	2.1	J	0.004	1.9	J	9
Methanol	67-56-1	32	5.0	0.901	630		0.836	584		7
Butane	106-97-8	58	5.5	0.010	3.8	J	0.009	3.5	J	6
Ethanol	64-17-5	46	6.7	0.097	47		0.097	47		1
Acetonitrile	75-05-8	41	7.2	1.209	660		1.202	656		1
Acetone	67-64-1	58	7.8	1.381	533		1.380	532		0
Trichlorofluoromethane	75-69-4	137	8.2	0.108	18		0.108	18		0
Pentane	109-66-0	72	8.9	0.005	1.6	J	0.005	1.6	J	2
Methylene Chloride	75-09-2	85	9.7	0.009	2.3	J,B	0.008	2.2	J,B	2
1,1,1,2,2,2-hexafluoroethane	76-13-1	187	10.2	0.003	0.36	J	0.002	0.26	U	
Propanenitrile	107-12-0	55	11.1	0.390	159		0.393	160		1
Propanol	71-23-8	60	11.1	0.025	9.3		0.026	9.7		4
2-Butanone	78-93-3	72	12.7	0.105	33	B	0.108	34	B	3
Hexane	110-54-3	86	14.0	0.006	1.5	J,B	0.005	1.4	J,B	9
Chloroform	67-66-3	119	14.1	0.004	0.72	J,B	0.004	0.66	J,B	8
Tetrahydrofuran	109-99-9	72	14.9	0.003	0.88	J	0.001	0.40	U	
1,1,1-Trichloroethane	71-55-6	133	16.1	0.004	0.64	J,B	0.001	0.15	U	
Butanenitrile	109-74-0	69	16.1	0.149	48		0.153	50		3
1-Butanol	71-36-3	74	16.7	0.010	2.9	J,B	0.009	2.7	J,B	6
Benzene	71-43-2	78	17.0	0.002	0.60	J,B	0.001	0.23	U	
Carbon Tetrachloride	56-23-5	154	17.3	0.003	0.42	J,B	0.003	0.36	J,B	15
Trichloroethene	79-01-6	131	19.1	0.003	0.51	J,B	0.001	0.12	U	
Heptane	142-82-5	100	19.6	0.005	1.1	J,B	0.005	1.1	J,B	2
cis-1,3-Dichloropropene	10061-01-5	111	20.8	0.003	0.50	B	0.002	0.44	B	13
4-Methyl-2-Pentanone	108-10-1	100	20.8	0.005	1.1	J,B	0.004	0.99	J,B	9
Pentanenitrile	110-59-8	83	21.9	0.024	6.5	B	0.024	6.5	B	1
1,1,2-Trichloroethane	79-00-5	133	22.3	0.003	0.57	J,B	0.001	0.24	U	
Toluene	108-88-3	92	23.0	0.002	0.55	J,B	0.002	0.51	J,B	9
1,2-Dibromoethane	106-93-4	188	24.5	0.004	0.53	J,B	0.004	0.49	J,B	7
Octane	111-65-9	114	25.1	0.004	0.82	J	0.004	0.78	J	5
Tetrachloroethylene	127-18-4	166	25.5	0.003	0.45	J,B	0.003	0.40	J,B	13
Chlorobenzene	108-90-7	113	27.1	0.003	0.63	J,B	0.003	0.56	J,B	10
Hexanenitrile	628-73-9	97	27.4	0.018	4.2	J,B	0.017	4.0	J,B	5
Ethylbenzene	100-41-4	106	28.0	0.002	0.49	J,B	0.002	0.46	J,B	4
Undecane	1120-21-4	156	39.1	<0.056	<8		<0.056	<8		
Dodecane	112-40-3	170	43.1	<0.174	<23		<0.174	<23		
Tridecane	629-50-5	184	46.9	<0.156	<19		<0.156	<19		

Data Quality Flags

B Compound identified in associated laboratory blank.

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.

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

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

Table 3.6 Target Organic Compound Concentrations in Ambient Air and Ambient Air through the VSS in SUMMA™ Canisters Associated with the Sampling of Tank C-107 on 12/17/96

Target Analytes ^(a)	CAS	MW	Ret Time	S7010-A02.085 ^(b) VSS			S7010-A01.071 ^(b) VSS		
				Ambient Air Through Bundle			Ambient Air		
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	121	4.1	0.007	1.2	J	0.006	1.0	J
Chloromethane	74-87-3	50	4.5	0.003	1.5	J	0.001	0.44	U
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	171	4.8	0.006	0.73	J	0.005	0.68	U
Ethanol	64-17-5	46	6.7	0.007	3.2		0.007	3.6	
Acetonitrile	75-05-8	41	7.2	0.005	2.8	J	0.002	0.87	U
Trichlorofluoromethane	75-69-4	137	8.2	0.005	0.78	J	0.004	0.70	J
1,1-Dichloroethene	75-35-4	97	9.5	0.003	0.58	J,B	0.002	0.54	J,B
Methylene Chloride	75-09-2	85	9.7	0.009	2.4	J,B	0.009	2.4	J,B
2-Butanone	78-93-3	72	12.7	0.012	3.7	J,B	0.001	0.43	U
Hexane	110-54-3	86	14.0	0.004	1.1	J,B	0.004	1.0	J,B
Chloroform	67-66-3	119	14.1	0.003	0.54	J,B	0.003	0.47	J,B
1,1,1-Trichloroethane	71-55-6	133	16.1	0.004	0.69	J,B	0.004	0.61	J,B
1-Butanol	71-36-3	74	16.7	0.005	1.5	J,B	0.005	1.4	U
Benzene	71-43-2	78	17.0	0.003	0.74	J,B	0.001	0.23	U
Carbon Tetrachloride	56-23-5	154	17.3	0.004	0.57	J,B	0.004	0.51	J,B
Trichloroethene	79-01-6	131	19.1	0.004	0.62	J,B	0.003	0.54	J,B
Heptane	142-82-5	100	19.6	0.003	0.71	J,B	0.003	0.64	J,B
cis-1,3-Dichloropropene	10061-01-5	111	20.8	0.003	0.54	B	0.000	0.020	U
4-Methyl-2-Pentanone	108-10-1	100	20.8	0.005	1.1	J,B	0.004	0.88	J,B
Pentanenitrile	110-59-8	83	21.9	0.004	1.2	J,B	0.002	0.51	U
1,1,2-Trichloroethane	79-00-5	133	22.3	0.004	0.63	J,B	0.001	0.24	U
Toluene	108-88-3	92	23.0	0.003	0.70	J,B	0.003	0.61	J,B
1,2-Dibromoethane	106-93-4	188	24.5	0.002	0.18	U	0.004	0.49	J,B
Tetrachloroethylene	127-18-4	166	25.5	0.004	0.55	J,B	0.003	0.45	J,B
Chlorobenzene	108-90-7	113	27.1	0.004	0.69	J,B	0.003	0.55	J,B
Hexanenitrile	628-73-9	97	27.4	0.004	1.0	J,B	0.003	0.79	J,B
Ethylbenzene	100-41-4	106	28.0	0.003	0.58	J,B	0.002	0.47	J,B
Cyclohexanone	108-94-1	98	28.8	0.003	0.73	U	0.022	5.1	J
Tridecane	629-50-5	184	46.9	<0.156	<19		<0.156	<19	

Data Quality Flags

B Compound identified in associated laboratory blank.

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

U Target compound not detected at or above the IDL.

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

Table 3.7 Target Organic Compound Concentrations in Triple Sorbent Traps from Tank C-107 Sampled on 12/17/96

Target Analytes ^(a)	CAS	MW	Ret Time	S7010-A11.1273 ^(b) VSS			S7010-A12.1274 ^{(b)(c)} VSS			S7010-A13.1275 ^(b) VSS			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	2.901	2028	Y	2.561	1791	Y	3.216	2248	Y	2.893	0.327	2022	229
Chloroethane	75-00-3	65	12.1	0.130	45		0.081	28		0.087	30		0.099	0.027	34	9.3
Ethanol	64-17-5	46	12.5	0.533	259	Y	0.455	221	Y	0.397	193	Y	0.462	0.068	224	33
Acetonitrile	75-05-8	41	13.0	1.067	582		0.746	407		0.757	413		0.856	0.182	467	99
Acetone	67-64-1	58	13.7	1.014	391		1.129	435		1.335	515		1.159	0.163	447	63
Trichlorofluoromethane	75-69-4	137	14.1	0.364	59		0.148	24		0.152	25		0.221	0.124	36	20
Methylene Chloride	75-09-2	85	15.8	0.077	20	J,B	0.050	13	J,B	0.054	14	J,B	0.060	0.015	16	3.9
Propanenitrile	107-12-0	55	17.0	0.457	186		0.407	165		0.479	195		0.447	0.037	182	15
Propanol	71-23-8	60	17.1	0.116	43		0.097	36		0.118	44		0.110	0.011	41	4.2
2-Butanone	78-93-3	72	18.6	0.114	35		0.082	25		0.102	32		0.099	0.016	31	5.1
Hexane	110-54-3	86	19.9	0.012	3.0	J	0.006	1.5	J	0.005	1.3	J	0.007	0.004	1.9	0.93
Butanenitrile	109-74-0	69	21.8	0.168	54		0.143	46		0.157	51		0.156	0.013	51	4.1
1-Butanol	71-36-3	74	22.3	0.107	32		0.073	22	J	0.093	28		0.091	0.017	28	5.1
Benzene	71-43-2	78	22.8	0.003	0.73	J	0.003	0.82	J	0.003	0.82	J	0.003	0.000	0.79	0.052
Heptane	142-82-5	100	25.2	0.004	0.92	J	0.002	0.37	U	0.002	0.37	U	d	d	d	d
Pyridine	110-86-1	79	26.5	0.028	7.8	J	0.023	6.5	U	0.023	6.5	U	d	d	d	d
Pentanenitrile	110-59-8	83	27.4	0.038	10		0.033	8.8		0.034	9.2		0.035	0.003	9.4	0.75
Toluene	108-88-3	92	28.5	0.841	204		0.254	62		0.243	59		0.446	0.342	108	83
Hexanenitrile	628-73-9	97	32.8	0.023	5.2	J	0.018	4.1	J	0.018	4.2	J	0.019	0.003	4.5	0.63
Nonane	111-84-2	128	35.4	0.005	0.78	J	0.001	0.23	U	0.001	0.23	U	d	d	d	d
Decane	124-18-5	142	40.1	0.006	0.91	J	0.005	0.74	J	0.005	0.85	J	0.005	0.001	0.83	0.086
Undecane	1120-21-4	156	44.4	0.026	3.8	J	0.025	3.6	J	0.022	3.2	J	0.025	0.002	3.5	0.30
Dodecane	112-40-3	170	48.4	0.046	6.1	J	0.045	6.0	J	0.042	5.5	J	0.045	0.002	5.9	0.29
Tridecane	629-50-5	184	52.2	0.037	4.4	J	0.028	3.4	J	0.032	3.9	J	0.032	0.004	3.9	0.52
Tetradecane	629-59-4	198	55.7	0.050	5.7	J,B	0.042	4.8	J,B	0.037	4.2	J,B	0.043	0.007	4.9	0.75
Total Concentration of Target Analytes													7.31			

Data Quality Flags

B Compound identified in associated laboratory blank.

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

U Target compound not detected at or above the IDL.

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

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

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

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

Table 3.8 Comparison of Target Organic Compound Concentrations from Replicate Analysis of a Single Triple Sorbent Trap from Tank C-107 Sampled on 12/17/96

Target Analytes ^(a)	CAS	MW	Ret Time	S7010-A12.1274 ^(b) VSS						RPD ^(c) (%)
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	
Methanol	67-56-1	32	10.0	2.561	1791	Y	2.063	1442	Y	22
Chloroethane	75-00-3	65	12.1	0.081	28		0.052	18		43
Ethanol	64-17-5	46	12.5	0.455	221	Y	0.418	203	Y	9
Acetonitrile	75-05-8	41	13.0	0.746	407		0.740	404		1
Acetone	67-64-1	58	13.7	1.129	435		1.139	439		1
Trichlorofluoromethane	75-69-4	137	14.1	0.148	24		0.155	25		5
Methylene Chloride	75-09-2	85	15.8	0.050	13	J,B	0.052	14	J,B	3
Propanenitrile	107-12-0	55	17.0	0.407	165		0.409	166		0
Propanol	71-23-8	60	17.1	0.097	36		0.096	36		1
2-Butanone	78-93-3	72	18.6	0.082	25		0.075	23		8
Hexane	110-54-3	86	19.9	0.006	1.5	J	0.006	1.4	J	2
Butanenitrile	109-74-0	69	21.8	0.143	46		0.136	44		5
1-Butanol	71-36-3	74	22.3	0.073	22	J	0.040	12	J	59
Benzene	71-43-2	78	22.8	0.003	0.82	J	0.004	1.2	J	35
Heptane	142-82-5	100	25.2	0.002	0.37	U	0.003	0.60	J	
Pentanenitrile	110-59-8	83	27.4	0.033	8.8		0.030	8.2		8
Toluene	108-88-3	92	28.5	0.254	62		0.257	63		1
Hexanenitrile	628-73-9	97	32.8	0.018	4.1	J	0.016	3.7	J	8
Decane	124-18-5	142	40.1	0.005	0.74	J	0.005	0.77	J	4
Undecane	1120-21-4	156	44.4	0.025	3.6	J	0.023	3.3	J	10
Dodecane	112-40-3	170	48.4	0.045	6.0	J	0.043	5.6	J	6
Tridecane	629-50-5	184	52.2	0.028	3.4	J	0.028	3.4	U	
Tetradecane	629-59-4	198	55.7	0.042	4.8	J,B	0.034	3.9	J,B	20

Data Quality Flags

B Compound identified in associated laboratory blank.

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

U Target compound not detected at or above the IDL.

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

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

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

Table 3.9 Target Organic Compound Concentrations in Triple Sorbent Trap Blank Samples Associated with the Sampling of Tank C-107 on 12/17/96

Target Analytes ^(a)	CAS	MW	Ret Time	S7010-A17.1277 ^(b)			S7010-A18.1278 ^(b)			S7010-A19.1288 ^(b)			S7010-A20.1280 ^(b)		
				Field Blank #1			Field Blank #2			Trip Blank #1			Trip Blank #2		
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Methanol	67-56-1	32.0	10.0	<0.274	<192	Y	0.343	240	Y	<0.274	<192	Y	<0.274	<192	Y
Trichlorofluoromethane	75-69-4	137	14.1	0.151	25		0.114	19		0.061	10.0		0.164	27	
Methylene Chloride	75-09-2	85	15.8	0.035	9.3	J	0.044	12	J	0.051	13	J	0.034	9.0	J
Hexane	110-54-3	86	19.9	0.001	0.32	U	0.003	0.68	J	0.008	2.2	J	0.004	1.0	J
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.002	0.46	U	0.008	1.8	J	0.007	1.5	J	0.002	0.46	U
Toluene	108-88-3	92	28.5	0.412	100		0.523	127		4.929	1198	E	0.346	84	

Data Quality Flags

E Target compound exceeds upper quantification limit (UQL).

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

U Target compound not detected at or above the IDL.

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

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

Table 3.10 Flammability Data for Tank C-107 Sampled on 12/17/96

Analyte	CAS #	Lower Flammability Limit(LFL)	Average Measured Concentrations	% of LFL ^(a)
Ammonia (ppm)	7664-41-7	150000	56.7	0.038
Carbon Monoxide (ppm)	630-08-0	125000	<17	<0.014
Hydrogen (ppm)	1333-74-0	40000	1130	2.825
Methane (ppm)	74-82-8	50000	<25	<0.050
TNMOC (mg/m ³)		42000	3.75	0.009
Total				<2.935

(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 C-107 Sampled on 12/17/96

Figure 3.2a Typical Total Ion Chromatogram (2 - 36 min) for Triple Sorbent Trap Samples from Tank C-107 Sampled on 12/17/96

Figure 3.2b Typical Total Ion Chromatogram (36 - 70 min) for Triple Sorbent Trap Samples from Tank C-107 Sampled on 12/17/96

4.0 Conclusions

The concentrations of inorganic and organic analytes were determined from samples of the headspace of Tank C-107 on December 17, 1996 (Sample Job S7010). 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.

U.S. Department of Energy. *Hanford Analytical Services Quality Assurance Plan (HASQAP)*. DOE/RL-94-55, Rev. 2, United States Department of Energy, Richland, Washington.

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 376-0418

Company Contact

R. D. Mahon - SESC

Telephone (509) 373-7533

Page 85-9656 / FAX 373-3193

Project Designation/Sampling Locations 200 West Tank Farm

241-C-107 Tank Vapor Sample SAF S7010

Temporal #4

VSS

Collection date 12-17-96

Preparation date 11-08-96

Ice Chest No.

Field Logbook No. WHC-N-64710

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

Shipped to

PNNL

C. L. G. S. MAHON, CAPTAIN, MAST

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

	Date	Time
S7010 - A07 .04R	12/17/96	1159
S7010 - A08 .05R	12/17/96	1159
S7010 - A09 .06R	12/17/96	1159
S7010 - A10 .07R	12/17/96	1159
S7010 - A15 .08R		
S7010 - A16 .09R		

Open, close and store NH₃/NO_x/H₂O field blank #1
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	11-11-96	0950	J A Edwards	11-11-96	0950			
J A Edwards	11-11-96	1130	ES MAST	11-10-96	1130			
R D Mahon	11-22-96	0810	AD Mahon	11-22-96	0810			
ES MAST	12-20-96	1210	ES MAST	12-20-96	1210			
J A Edwards	01/02/97	1420	J A Edwards	01/02/97	1420			
J A Edwards	01/06/97	1540	K H Pool	01/06/97	1540			

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

POC

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

(Revised 05/30/96 PNNL)

Custody Form Initiator

J. A. Edwards - PNNL

Telephone (509) 373-0141

Page 85-3009 / FAX 376-2329

Company Contact

R. D. Mahon - SESC

Telephone (509) 373-7533

Page 85-3656 / FAX 373-3193

Project Designation/Sampling Locations 200 West Tank Farm

241-C-107 Tank Vapor Sample SAF S7010

Temporal #4

VSS

Collection date 12-17-96

Preparation date 11-11-96

Ice Chest No.

Field Logbook No. WHC-N-447-10

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

Shipped to

PNNL

COURTESY, MAHON, CAPLCO, WEST.

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S7010 - A01 . 071

Collect Ambient Air Sample SUMMA #1 12/17/96 1017

S7010 - A02 . 085

Collect Ambient Air Sample SUMMA #2 (through tube bundle)

S7010 - A04 . 246

Collect SUMMA #3

S7010 - A05 . 254

Collect SUMMA #4

S7010 - A06 . 256

Collect SUMMA #5

NOT GAUGED ON SUMMA 071

[] Field Transfer of Custody			[X] Chain of Possession			(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time		
JL Julia Spaulding	11-18-96	1130	ESMAST ESMAST	11-18-96	1130		
ESMAST	11-22-96	0810	RD Mahon Rick Mahon	11-22-96	0810		
RD Mahon Rick Mahon	12-20-96	1210	ESMAST S/MAST	12-20-96	1210		
ESMAST S/MAST	01/02/97	1415	JA Edwards JA Edwards	01/02/97	1415		

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	

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

POC

POC

(Revised 05/30/96 PNNL)

Custody Form Initiator

J. A. Edwards - PNNL

Telephone (509) 373-0141

Page 85-3009 / FAX 376-2329

Company Contact

R. D. Mahon - SESC

Telephone (509) 373-7533

Page 85-9656 / FAX 373-3193

Project Designation/Sampling Locations 200 West Tank Farm

241-C-107

Tank Vapor Sample SAF S7010

Temporal #4

VSS

Collection date 11-17-96

Preparation date 11-13-96

Ice Chest No.

Field Logbook No. WHC- N-44210

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

COLLECTIONS MAHON, CAPMO, MAST

Shipped to

PNNL

Sample Identification

S7010 - A11 . 1273 -

PNNL Triple Sorbent Trap (TST) Sample #1 12/17/96 1225

S7010 - A12 . 1274 -

PNNL TST Sample #2 12/17/96 1225

S7010 - A13 . 1275 -

PNNL TST Sample #3 12/17/96 1231

S7010 - A14 . 1276 -

PNNL TST Sample #4 12/17/96 1231

S7010 - A17 . 1277 -

Open, close & store TST bundle field blanks #1

S7010 - A18 . 1278 -

Open, close & store TST bundle field blanks #2

S7010 - A19 . 1288 -

Store TST trip blanks #1

S7010 - A20 . 1280 -

Store TST trip blanks #2

[] Field Transfer of Custody

[X] Chain of Possession

(Sign and Print Names)

Relinquished By	Date	Time	Received By	Date	Time
J C Hayes <i>James C Hayes</i>	11-15-96	11:45	J A Edwards <i>J A Edwards</i>	11-15-96	11:45
J A Edwards <i>J A Edwards</i>	11-18-96	11:30	ES MATT <i>ES MATT</i>	11-18-96	11:30
<i>ES MATT</i>	11-22-96	0810	RD Mahon <i>RD Mahon</i>	11-22-96	0810
<i>RD Mahon</i>	12-20-96	1210	ES MATT <i>ES MATT</i>	12/20/96	1210
<i>ES MATT</i>	01/02/97	1430	J A Edwards <i>J A Edwards</i>	01/02/97	1430

Final Sample Disposition

Comments:

PNNL (only) Checklist

- ☐ Media labeled and checked?
- ☐ Letter of instruction?
- ☐ Media in good condition?
- ☐ COC info/signatures complete?
- ☐ Sorbents shipped on ice? (<5°C)
- ☐ Hi/Lo thermometer - *Keep upright!*
- ☐ Hi/Lo thermometer
- ☐ Rad release stickers on samples?
- ☐ Activity report from 222S?
- ☐ RSR/copy? (a ≤100/B ≤400 pCi/g)
- ☐ 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
- ☒ Y/N
- ☒ Y/N

Comments:

Cooler Temperature Status	
IHI	°C/Lo °C (pick up at PNL to WHC)
IHI	°C/Lo °C (delivery at WHC from PNL)
IHI	°C/Lo °C (at return to PNL from WHC)
IHI	°C/Lo °C (at delivery from WHC to PNL)

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

(Revised 05/30/96 PNNL)

Appendix B

Listing of All Target Compounds for Organic Compound Analysis

Table B.1 SUMMA™ Analysis Results for All Target Analytes from Tank C-107 Sampled on 12/17/96

Target Analytes	CAS	MW	Ret Time	S7010-A02.085 ISVS			S7010-A01.071 ISVS			S7010-A04.246 ISVS			S7010-A04.246 ISVS Rep			S7010-A05.254 ISVS			S7010-A06.256 ISVS		
				Ambient Air Through Bundle			Ambient Air														
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	120.91	4.14	0.0067	1.24 J		0.0056	1.04 J		0.0059	1.09 J		0.0056	1.03 J		0.0056	1.04 J		0.0059	1.09 J	
Chloromethane	74-87-3	50.49	4.536	0.0033	1.45 J		0.001	0.44 U		0.0046	2.05 J		0.0042	1.87 J		0.0043	1.9 J		0.0044	1.97 J	
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	170.92	4.793	0.0056	0.73 J		0.0052	0.68 U		0.0052	0.68 U		0.0052	0.68 U		0.0052	0.68 U		0.0053	0.7 J	
Methanol	67-56-1	32.04	4.964	0.0063	4.4		0.0063	4.4		0.9006	629.65		0.8357	584.26		1.4344	1002.85		0.8369	585.1	
Vinyl Chloride	75-01-4	62.5	5.081	0.003	1.08 U		0.003	1.08 U		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	5.413	<0.083	<34 Y		<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	5.541	0.0038	1.46 U		0.0038	1.46 U		0.0097	3.75 J		0.0091	3.49 J		0.0197	7.58 J		0.0104	4.01 J	
Bromomethane	74-83-9	94.94	6.055	0.0134	3.16 U		0.0134	3.16 U		0.0134	3.16 U		0.0134	3.16 U		0.0134	3.16 U		0.0134	3.16 U	
Chloroethane	75-00-3	64.51	6.45	0.001	0.35 U		0.001	0.35 U		0.001	0.35 U		0.001	0.35 U		0.001	0.35 U		0.001	0.35 U	
Ethanol	64-17-5	46.01	6.739	0.0066	3.2		0.0074	3.6		0.0966	47.03		0.0972	47.31		0.0975	47.49		0.0943	45.89	
Acetonitrile	75-05-8	41.05	7.21	0.0052	2.84 J		0.0016	0.87 U		1.2087	659.54		1.2016	655.68		1.1982	653.83		1.1481	626.49	
Acetone	67-64-1	58.08	7.755	0.003	1.16 U		0.003	1.16 U		1.3808	532.52		1.3803	532.34		1.3486	520.13		1.3128	506.3	
Trichlorofluoromethane	75-69-4	137.37	8.151	0.0048	0.78 J		0.0043	0.7 J		0.1077	17.56		0.1076	17.54		0.1075	17.53		0.1064	17.35	
Pentane	109-66-0	72.15	8.9	0.0012	0.37 U		0.0012	0.37 U		0.0051	1.6 J		0.005	1.56 J		0.0052	1.61 J		0.0068	2.12 J	
1,1-Dichloroethene	75-35-4	96.94	9.467	0.0025	0.58 J,B		0.0023	0.54 J,B		0.0018	0.42 U		0.0018	0.42 U		0.0018	0.42 U		0.0031	0.72 J,B	
Methylene Chloride	75-09-2	84.93	9.691	0.0091	2.41 J,B		0.009	2.38 J,B		0.0086	2.27 J,B		0.0084	2.22 J,B		0.0085	2.25 J,B		0.0095	2.51 J,B	
1,1,1-Trichloro-2,2,2-trifluoroethane	76-13-1	187.38	10.237	0.0022	0.26 U		0.0022	0.26 U		0.003	0.36 J		0.0022	0.26 U		0.0022	0.26 U		0.0022	0.26 U	
Propanenitrile	107-12-0	55.08	11.05	0.0025	1.02 U		0.0025	1.02 U		0.3899	158.55		0.3928	159.73		0.3895	158.42		0.3751	152.53	
Propanol	71-23-8	60.1	11.103	0.0021	0.78 U		0.0021	0.78 U		0.025	9.3		0.0261	9.74		0.0251	9.35		0.0237	8.83	
1,1-Dichloroethane	75-34-3	98.96	11.97	0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U	
2-Butanone	78-93-3	72.11	12.675	0.0119	3.7 J,B		0.0014	0.43 U		0.1051	32.65 B		0.108	33.55 B		0.1091	33.88 B		0.1033	32.08 B	
cis-1,2-Dichloroethene	156-59-2	96.94	13.574	0.0018	0.42 U		0.0018	0.42 U		0.0018	0.42 U		0.0018	0.42 U		0.0018	0.42 U		0.0018	0.42 U	
Hexane	110-54-3	86.18	13.98	0.0042	1.08 J,B		0.004	1.03 J,B		0.0058	1.5 J,B		0.0053	1.37 J,B		0.0058	1.51 J,B		0.0073	1.9 J,B	
Chloroform	67-66-3	119.38	14.141	0.0029	0.54 J,B		0.0025	0.47 J,B		0.0038	0.72 J,B		0.0035	0.66 J,B		0.0038	0.71 J,B		0.0046	0.87 J,B	
Tetrahydrofuran	109-99-9	72.11	14.9	0.0013	0.4 U		0.0013	0.4 U		0.0028	0.88 J		0.0013	0.4 U		0.0029	0.89 J		0.0013	0.4 U	
1,2-Dichloroethane	107-06-2	98.96	15.584	0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U	
1,1,1-Trichloroethane	71-55-6	133.4	16.098	0.0041	0.69 J,B		0.0036	0.61 J,B		0.0038	0.64 J,B		0.0009	0.15 U		0.0034	0.57 J,B		0.0051	0.85 J,B	
Butanenitrile	109-74-0	69.11	16.13	0.0025	0.81 U		0.0025	0.81 U		0.1486	48.16		0.1528	49.52		0.1543	50.01		0.1566	50.76	
1-Butanol	71-36-3	74.12	16.686	0.0048	1.45 J,B		0.0045	1.36 U		0.0096	2.9 J,B		0.009	2.72 J,B		0.0105	3.16 J,B		0.0103	3.1 J,B	
Benzene	71-43-2	78.11	17.007	0.0026	0.74 J,B		0.0008	0.23 U		0.0021	0.6 J,B		0.0008	0.23 U		0.0008	0.23 U		0.0029	0.83 J,B	
Carbon Tetrachloride	56-23-5	153.82	17.296	0.0039	0.57 J,B		0.0035	0.51 J,B		0.0029	0.42 J,B		0.0025	0.36 J,B		0.0013	0.19 U		0.0045	0.65 J,B	
Cyclohexane	110-82-7	84.16	17.563	0.0025	0.67 U		0.0025	0.67 U		0.0025	0.67 U		0.0025	0.67 U		0.0025	0.67 U		0.0025	0.67 U	
1,2-Dichloropropane	78-87-5	112.99	18.622	0.0013	0.26 U		0.0013	0.26 U		0.0013	0.26 U		0.0013	0.26 U		0.0013	0.26 U		0.0013	0.26 U	
Trichloroethene	79-01-6	131.39	19.082	0.0036	0.62 J,B		0.0032	0.54 J,B		0.003	0.51 J,B		0.0007	0.12 U		0.0029	0.49 J,B		0.0038	0.65 J,B	
Heptane	142-82-5	100.2	19.627	0.0032	0.71 J,B		0.0029	0.64 J,B		0.005	1.12 J,B		0.0049	1.09 J,B		0.0055	1.22 J,B		0.0063	1.42 J,B	
cis-1,3-Dichloropropene	10061-01-5	110.97	20.804	0.0027	0.54 B		0.0001	0.02 U		0.0025	0.5 B		0.0022	0.44 B		0.0025	0.51 B		0.0031	0.63 B	
4-Methyl-2-Pentanone	108-10-1	100.16	20.836	0.005	1.12 J,B		0.0039	0.88 J,B		0.0048	1.08 J,B		0.0044	0.99 J,B		0.0052	1.16 J,B		0.0062	1.39 J,B	
Pyridine	110-86-1	79.1	20.954	0.0038	1.08 U		0.0038	1.08 U		0.0038	1.08 U		0.0038	1.08 U		0.0039	1.09 J		0.0038	1.08 U	
trans-1,3-Dichloropropene	10061-02-6	110.97	21.895	0.0014	0.28 U		0.0014	0.28 U		0.0014	0.28 U		0.0014	0.28 U		0.0014	0.28 U		0.0014	0.28 U	
Pentanenitrile	110-59-8	83.13	21.938	0.0043	1.15 J,B		0.0019	0.51 U		0.0239	6.45 B		0.0241	6.5 B		0.0248	6.68 B		0.0259	6.97 B	
1,1,2-Trichloroethane	79-00-5	133.4	22.312	0.0037	0.63 J,B		0.0014	0.24 U		0.0034	0.57 J,B		0.0014	0.24 U		0.0036	0.6 J,B		0.0043	0.73 J,B	
Toluene	108-88-3	92.14	22.954	0.0029	0.7 J,B		0.0025	0.61 J,B		0.0023	0.55 J,B		0.0021	0.51 J,B		0.0023	0.57 J,B		0.003	0.73 J,B	
1,2-Dibromoethane	106-93-4	187.86	24.462	0.0015	0.18 U		0.0041	0.49 J,B		0.0044	0.53 J,B		0.0041	0.49 J,B		0.0045	0.54 J,B		0.0056	0.67 J,B	
Octane	111-65-9	114.23	25.082	0.0024	0.47 U		0.0024	0.47 U		0.0042	0.82 J		0.004	0.78 J		0.0024	0.47 U		0.0024	0.47 U	
Tetrachloroethylene	127-18-4	165.83	25.51	0.0041	0.55 J,B		0.0033	0.45 J,B		0.0033	0.45 J,B		0.0029	0.4 J,B		0.0033	0.45 J,B		0.0044	0.59 J,B	

Table B.1 (Cont'd) SUMMA™ Analysis Results for All Target Analytes from Tank C-107 Sampled on 12/17/96

Target Analytes	CAS	NIW	Time	Ret			Ambient Air Through Bundle			Ambient Air			S7010-A04.246 ISVS			S7010-A04.246 ISVS Rep			S7010-A05.254 ISVS			S7010-A06.256 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	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Chlorobenzene	108-90-7	112.56	27.114	0.0035	0.69 J,B		0.0034	0.55 J,B		0.0031	0.63 J,B		0.0028	0.56 J,B		0.0031	0.61 J,B		0.0032	0.73 J		0.0032	0.76 J,B	
Hexamethylnitile	628-73-9	97.13	27.425	0.0043	1 J,B		0.0034	0.79 J,B		0.0181	4.17 J,B		0.0173	4 J,B		0.0186	4.3 J,B		0.0189	4.36 J,B		0.0189	4.36 J,B	
Ethylbenzene	100-41-4	106.17	28.002	0.0028	0.58 J,B		0.0022	0.47 J,B		0.0023	0.49 J,B		0.0022	0.46 J,B		0.0024	0.51 J,B		0.0029	0.61 J,B		0.0029	0.61 J,B	
p/m-Xylene	106-42-3	106.17	28.441	0.0042	0.89 U		0.0042	0.89 U		0.0042	0.89 U		0.0042	0.89 U		0.0047	0.98 J		0.0055	1.17 J		0.0055	1.17 J	
Cyclohexanone	108-94-1	98.14	28.836	0.0032	0.73 U		0.0022	5.07 J		0.0032	0.73 U		0.0032	0.73 U		0.0032	0.73 U		0.0032	0.73 U		0.0032	0.73 U	
Styrene	100-42-5	104.15	29.35	0.0052	1.12 U		0.0052	1.12 U		0.0052	1.12 U		0.0052	1.12 U		0.0052	1.12 U		0.0052	1.12 U		0.0052	1.12 U	
1,1,2,2-Tetrachloroethane	79-34-5	167.85	29.574	0.0076	1.01 U		0.0076	1.01 U		0.0076	1.01 U		0.0076	1.01 U		0.0076	1.01 U		0.0076	1.01 U		0.0076	1.01 U	
o-Xylene	95-47-6	106.17	29.639	0.0058	1.22 U		0.0058	1.22 U		0.0058	1.22 U		0.0058	1.22 U		0.0058	1.22 U		0.0058	1.22 U		0.0058	1.22 U	
Nonane	111-84-2	128.26	30.141	0.0051	0.89 U		0.0051	0.89 U		0.0051	0.89 U		0.0051	0.89 U		0.0051	0.89 U		0.0051	0.89 U		0.0051	0.89 U	
1-Ethyl-2-Methyl-Benzene	611-14-3	120.19	33.04	0.0108	2.01 U		0.0108	2.01 U		0.0108	2.01 U		0.0108	2.01 U		0.0108	2.01 U		0.0108	2.01 U		0.0108	2.01 U	
1,3,5-Trimethylbenzene	108-67-8	120.19	33.265	0.0086	1.6 U		0.0086	1.6 U		0.0086	1.6 U		0.0086	1.6 U		0.0086	1.6 U		0.0086	1.6 U		0.0086	1.6 U	
1,2,4-Trimethylbenzene	95-63-6	120.19	34.516	0.0098	1.83 U		0.0098	1.83 U		0.0098	1.83 U		0.0098	1.83 U		0.0098	1.83 U		0.0098	1.83 U		0.0098	1.83 U	
Decane	124-18-5	142.28	34.805	0.0072	1.13 U		0.0072	1.13 U		0.0072	1.13 U		0.0072	1.13 U		0.0072	1.13 U		0.0072	1.13 U		0.0072	1.13 U	
1,3-Dichlorobenzene	541-73-1	147	34.997	0.0066	1.01 U		0.0066	1.01 U		0.0066	1.01 U		0.0066	1.01 U		0.0066	1.01 U		0.0066	1.01 U		0.0066	1.01 U	
1,4-Dichlorobenzene	106-46-7	147	35.211	<0.066	<10		<0.066	<10		<0.066	<10		<0.066	<10		<0.066	<10		<0.066	<10		<0.066	<10	
1,2-Dichlorobenzene	95-50-1	147	36.324	<0.066	<10		<0.066	<10		<0.066	<10		<0.066	<10		<0.066	<10		<0.066	<10		<0.066	<10	
Undecane	1120-21-4	156.31	39.115	<0.056	<8		<0.056	<8		<0.056	<8		<0.056	<8		<0.056	<8		<0.056	<8		<0.056	<8	
1,2,4-Trichlorobenzene	120-82-1	181.45	42.517	<0.243	<30		<0.243	<30		<0.243	<30		<0.243	<30		<0.243	<30		<0.243	<30		<0.243	<30	
Dodecane	112-40-3	170.34	43.126	<0.174	<23		<0.174	<23		<0.174	<23		<0.174	<23		<0.174	<23		<0.174	<23		<0.174	<23	
Hexachloro-1,3-butadiene	87-68-3	260.76	44.367	0.0116	1 U		0.0116	1 U		0.0116	1 U		0.0116	1 U		0.0116	1 U		0.0116	1 U		0.0116	1 U	
Tridecane	629-50-5	184.36	46.859	<0.156	<19		<0.156	<19		<0.156	<19		<0.156	<19		<0.156	<19		<0.156	<19		<0.156	<19	
Tetradecane	629-59-4	198.34	50.357	<0.114	<13		<0.114	<13		<0.114	<13		<0.114	<13		<0.114	<13		<0.114	<13		<0.114	<13	

U Target compound not detected at or above the IDL

J Target compound detected above the IDL but below the FQL

B Compound identified in associated laboratory blank

Table B.2 Triple Sorbent Trap Analysis Results for All Target Analytes from Tank C-107 Sampled on 12/17/96

Target Analytes	CAS	MW	Ret Time	S7010-A11.1273 VSS			S7010-A12.1274 VSS			S7010-A12.1274 VSS REP			S7010-A13.1275 VSS		
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	120.9	7.8	0.0046	0.85	U	0.0046	0.85	U	0.0046	0.85	U	0.0046	0.85	U
Chloromethane	74-87-3	50.5	8.8	0.0034	1.5	U	0.0034	1.5	U	0.0034	1.5	U	0.0034	1.5	U
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	170.9	9.5	0.0034	0.44	U	0.0034	0.44	U	0.0034	0.44	U	0.0034	0.44	U
Methanol	67-56-1	32.0	10.0	2.9011	2028.26	Y	2.5614	1790.74	Y	2.0626	1442.03	Y	3.216	2248.39	Y
Vinyl Chloride	75-01-4	62.5	9.9	0.0032	1.15	U	0.0032	1.15	U	0.0032	1.15	U	0.0032	1.15	U
1,3-Butadiene	106-99-0	54.0	10.6	<0.208	<86	Y	<0.208	<86	Y	<0.208	<86	Y	<0.208	<86	Y
Butane	106-97-8	58.1	10.8	0.0039	1.49	U	0.0039	1.49	U	0.0039	1.49	U	0.0039	1.49	U
Chloroethane	75-00-3	64.5	12.1	0.1299	45.11		0.0807	28.02		0.0522	18.14		0.0866	30.07	
Ethanol	64-17-5	46.1	12.5	0.5328	259.07	Y	0.4549	221.19	Y	0.4177	203.08	Y	0.3971	193.09	Y
Acetonitrile	75-05-8	41.1	13.0	1.0668	582.11		0.7459	407.03		0.7398	403.7		0.7567	412.92	
Acetone	67-64-1	58.1	13.7	1.0136	390.92		1.129	435.42		1.1393	439.4		1.3354	515.02	
Trichlorofluoromethane	75-69-4	137.4	14.1	0.3638	59.32		0.1478	24.11		0.1548	25.25		0.1515	24.71	
Pentane	109-66-0	72.0	14.9	0.0031	0.95	U	0.0031	0.95	U	0.0031	0.95	U	0.0031	0.95	U
1,1-Dichloroethene	75-35-4	96.9	15.5	0.0022	0.51	U	0.0022	0.51	U	0.0022	0.51	U	0.0022	0.51	U
Methylene Chloride	75-09-2	84.9	15.8	0.0773	20.38	J,B	0.0503	13.28	J,B	0.0517	13.63	J,B	0.0538	14.18	J,B
1,1,2-trichloro-1,1,2,2-trifluoroethane	76-13-1	187.4	16.3	0.0032	0.38	U	0.0032	0.38	U	0.0032	0.38	U	0.0032	0.38	U
Propanenitrile	107-12-0	55.1	17.0	0.4568	185.78		0.4069	165.48		0.4089	166.31		0.4785	194.62	
Propanol	71-23-8	60.1	17.1	0.1157	43.11		0.0971	36.21		0.0958	35.72		0.1176	43.84	
1,1-Dichloroethane	75-34-3	99.0	18.0	0.0015	0.34	U	0.0015	0.34	U	0.0015	0.34	U	0.0015	0.34	U
2-Butanone	78-93-3	72.1	18.6	0.1137	35.33		0.0815	25.32		0.0749	23.27		0.1017	31.59	
cis-1,2-Dichloroethene	156-59-2	96.9	19.5	0.0027	0.62	U	0.0027	0.62	U	0.0027	0.62	U	0.0027	0.62	U
Hexane	110-54-3	86.2	19.9	0.0115	2.99	J	0.0056	1.46	J	0.0055	1.42	J	0.005	1.31	J
Chloroform	67-66-3	119.4	20.0	0.0031	0.57	U	0.0031	0.57	U	0.0031	0.57	U	0.0031	0.57	U
Tetrahydrofuran	109-99-9	72.1	20.7	0.0037	1.15	U	0.0037	1.15	U	0.0037	1.15	U	0.0037	1.15	U
1,2-Dichloroethane	107-06-2	99.0	21.4	0.0012	0.27	U	0.0012	0.27	U	0.0012	0.27	U	0.0012	0.27	U
Butanenitrile	109-74-0	69.1	21.8	0.1681	54.49		0.1427	46.25		0.1363	44.19		0.1572	50.97	
1,1,1-Trichloroethane	71-55-6	133.4	21.9	0.0029	0.48	U	0.0029	0.48	U	0.0029	0.48	U	0.0029	0.48	U
1-Butanol	71-36-3	74.0	22.3	0.1066	32.26		0.0729	22.08	J	0.0398	12.05	J	0.0933	28.24	
Benzene	71-43-2	78.1	22.8	0.0025	0.73	J	0.0028	0.82	J	0.004	1.15	J	0.0029	0.82	J
Carbon Tetrachloride	56-23-5	153.8	23.1	0.0015	0.22	U	0.0015	0.22	U	0.0015	0.22	U	0.0015	0.22	U
Cyclohexane	110-82-7	84.2	23.3	0.0044	1.17	U	0.0044	1.17	U	0.0044	1.17	U	0.0044	1.17	U
1,2-Dichloropropane	78-87-5	113.0	24.3	0.002	0.4	U	0.002	0.4	U	0.002	0.4	U	0.002	0.4	U
Trichloroethene	79-01-6	131.4	24.7	0.0039	0.66	U	0.0039	0.66	U	0.0039	0.66	U	0.0039	0.66	U
Heptane	142-82-5	100.2	25.2	0.0041	0.92	J	0.0017	0.37	U	0.0027	0.6	J	0.0017	0.37	U
4-Methyl-2-Pentanone	108-10-1	100.2	26.3	0.0022	0.49	U	0.0022	0.49	U	0.0022	0.49	U	0.0022	0.49	U
cis-1,3-Dichloropropene	10061-01-5	111.0	26.4	0.0013	0.27	U	0.0013	0.27	U	0.0013	0.27	U	0.0013	0.27	U

Table B.2 (Cont'd) Triple Sorbent Trap Analysis Results for All Target Analytes from Tank C-107 Sampled on 12/17/96

Target Analytes	CAS	MW	Ret Time	S7010-A11.1273 VSS			S7010-A12.1274 VSS			S7010-A12.1274 VSS REP			S7010-A13.1275 VSS		
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Pyridine	110-86-1	79.1	26.5	0.0276	7.82 J		0.023	6.51 U		0.023	6.51 U		0.023	6.51 U	
trans-1,3-Dichloropropene	10061-02-6	111.0	27.4	0.0029	0.58 U		0.0029	0.58 U		0.0029	0.58 U		0.0029	0.58 U	
Pentanenitrile	110-59-8	83.2	27.4	0.038	10.25		0.0327	8.8		0.0302	8.15		0.0342	9.2	
1,1,2-Trichloroethane	79-00-5	133.4	27.8	0.0017	0.28 U		0.0017	0.28 U		0.0017	0.28 U		0.0017	0.28 U	
Toluene	108-88-3	92.1	28.5	0.8405	204.33		0.2544	61.85		0.2572	62.52		0.2429	59.04	
1,2-Dibromoethane	106-93-4	187.9	30.0	0.0025	0.3 U		0.0025	0.3 U		0.0025	0.3 U		0.0025	0.3 U	
Octane	111-65-9	114.0	30.4	0.0029	0.56 U		0.0029	0.56 U		0.0029	0.56 U		0.0029	0.56 U	
Tetrachloroethylene	127-18-4	165.8	31.0	0.0027	0.36 U		0.0027	0.36 U		0.0027	0.36 U		0.0027	0.36 U	
Chlorobenzene	108-90-7	112.6	32.6	0.0012	0.23 U		0.0012	0.23 U		0.0012	0.23 U		0.0012	0.23 U	
Hexanenitrile	628-73-9	97.0	32.8	0.0226	5.22 J		0.0176	4.07 J		0.0162	3.73 J		0.0181	4.18 J	
Ethylbenzene	100-41-4	106.2	33.4	0.0015	0.32 U		0.0015	0.32 U		0.0015	0.32 U		0.0015	0.32 U	
p/m-Xylene	106-42-3	106.2	33.9	0.0032	0.68 U		0.0032	0.68 U		0.0032	0.68 U		0.0032	0.68 U	
Cyclohexanone	108-94-1	98.1	34.3	0.0134	3.06 U		0.0134	3.06 U		0.0134	3.06 U		0.0134	3.06 U	
Styrene	100-42-5	104.2	34.8	0.0017	0.36 U		0.0017	0.36 U		0.0017	0.36 U		0.0017	0.36 U	
1,1,2,2-Tetrachloroethane	79-34-5	167.9	35.0	0.0062	0.83 U		0.0062	0.83 U		0.0062	0.83 U		0.0062	0.83 U	
o-Xylene	95-47-6	106.2	35.1	0.002	0.43 U		0.002	0.43 U		0.002	0.43 U		0.002	0.43 U	
Nonane	111-84-2	128.0	35.4	0.0045	0.78 J		0.0013	0.23 U		0.0013	0.23 U		0.0013	0.23 U	
1-Ethyl-2-methyl benzene	611-14-3	120.2	38.4	0.0025	0.47 U		0.0025	0.47 U		0.0025	0.47 U		0.0025	0.47 U	
1,3,5-Trimethylbenzene	108-67-8	120.2	38.6	0.0025	0.47 U		0.0025	0.47 U		0.0025	0.47 U		0.0025	0.47 U	
1,2,4-Trimethylbenzene	95-63-6	120.2	39.9	0.0027	0.5 U		0.0027	0.5 U		0.0027	0.5 U		0.0027	0.5 U	
Decane	124-18-5	142.3	40.1	0.0058	0.91 J		0.0047	0.74 J		0.0049	0.77 J		0.0054	0.85 J	
1,3-Dichlorobenzene	541-73-1	147.0	40.5	0.0034	0.52 U		0.0034	0.52 U		0.0034	0.52 U		0.0034	0.52 U	
1,4-Dichlorobenzene	106-46-7	147.0	40.7	0.0031	0.47 U		0.0031	0.47 U		0.0031	0.47 U		0.0031	0.47 U	
1,2-Dichlorobenzene	95-50-1	147.0	41.8	0.0051	0.77 U		0.0051	0.77 U		0.0051	0.77 U		0.0051	0.77 U	
Undecane	1120-21-4	156.0	44.4	0.0263	3.78 J		0.0252	3.62 J		0.0229	3.28 J		0.0223	3.2 J	
1,2,4-Trichlorobenzene	120-82-1	181.5	48.0	0.0167	2.06 U		0.0167	2.06 U		0.0167	2.06 U		0.0167	2.06 U	
Dodecane	112-40-3	170.0	48.4	0.0462	6.08 J		0.0454	5.99 J		0.0428	5.64 J		0.042	5.54 J	
Hexachloro-1,3-butadiene	87-68-3	260.8	49.9	0.022	1.89 U		0.022	1.89 U		0.022	1.89 U		0.022	1.89 U	
Tridecane	629-50-5	184.0	52.2	0.0365	4.44 J		0.028	3.41 J		0.0279	3.4 U		0.0323	3.93 J	
Tetradecane	629-59-4	198.0	55.7	0.05	5.66 J,B		0.042	4.75 J,B		0.0342	3.87 J,B		0.0368	4.17 J,B	
Tributyl Phosphate	126-73-8	266.0	63.1	<0.0106	<0.89 Z		<0.0106	<0.89 Z		<0.0106	<0.89 Z		<0.0106	<0.89 Z	

B Compound identified in associated laboratory blank

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

U Target compound not detected at or above the IDL.

Y Initial calibration and CCV were 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 C-107 on 12/17/96

Target Analytes	CAS	MW	Ret Time	S7010-A17.1277 FB #1			S7010-A18.1278 FB #2			S7010-A19.1288 TB #1			S7010-A20.1280 TB #2		
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	120.9	7.8	0.0043	0.79 U		0.0043	0.79 U		0.0043	0.79 U		0.0043	0.79 U	
Chloromethane	74-87-3	50.5	8.8	0.0032	1.4 U		0.0032	1.4 U		0.0032	1.4 U		0.0032	1.4 U	
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	170.9	9.5	0.0032	0.41 U		0.0032	0.41 U		0.0032	0.41 U		0.0032	0.41 U	
Methanol	67-56-1	32.0	10.0	<0.274	<192 Y		0.343	239.8		<0.274	<192 Y		<0.274	<192 Y	
Vinyl Chloride	75-01-4	62.5	9.9	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	54.0	10.6	<0.208	<86 Y		<0.208	<86 Y		<0.208	<86 Y		<0.208	<86 Y	
Butane	106-97-8	58.1	10.8	0.0036	1.39 U		0.0036	1.39 U		0.0036	1.39 U		0.0036	1.39 U	
Chloroethane	75-00-3	64.5	12.1	0.0041	1.42 U		0.0041	1.42 U		0.0041	1.42 U		0.0041	1.42 U	
Ethanol	64-17-5	46.1	12.5	<0.275	<133 Y		<0.275	<133 Y		<0.275	<133 Y		<0.275	<133 Y	
Acetonitrile	75-05-8	41.1	13.0	0.0033	1.8 U		0.0033	1.8 U		0.0033	1.8 U		0.0033	1.8 U	
Acetone	67-64-1	58.1	13.7	0.0072	2.78 U		0.0072	2.78 U		0.0072	2.78 U		0.0072	2.78 U	
Trichlorofluoromethane	75-69-4	137.4	14.1	0.1505	24.54		0.114	18.59		0.061	9.95		0.1639	26.73	
Pentane	109-66-0	72.0	14.9	0.0029	0.89 U		0.0029	0.89 U		0.0029	0.89 U		0.0029	0.89 U	
1,1-Dichloroethene	75-35-4	96.9	15.5	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	84.9	15.8	0.0352	9.29 J		0.0439	11.58 J		0.051	13.44 J		0.034	8.97 J	
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	187.4	16.3	0.003	0.36 U		0.003	0.36 U		0.003	0.36 U		0.003	0.36 U	
Propanenitrile	107-12-0	55.1	17.0	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	17.1	0.0053	1.99 U		0.0053	1.99 U		0.0053	1.99 U		0.0053	1.99 U	
1,1-Dichloroethane	75-34-3	99.0	18.0	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	72.1	18.6	0.0022	0.68 U		0.0022	0.68 U		0.0022	0.68 U		0.0022	0.68 U	
cis-1,2-Dichloroethene	156-59-2	96.9	19.5	0.0025	0.58 U		0.0025	0.58 U		0.0025	0.58 U		0.0025	0.58 U	
Hexane	110-54-3	86.2	19.9	0.0013	0.32 U		0.0026	0.68 J		0.0083	2.16 J		0.0039	1.01 J	
Chloroform	67-66-3	119.4	20.0	0.0029	0.53 U		0.0029	0.53 U		0.0029	0.53 U		0.0029	0.53 U	
Tetrahydrofuran	109-99-9	72.1	20.7	0.0035	1.07 U		0.0035	1.07 U		0.0035	1.07 U		0.0035	1.07 U	
1,2-Dichloroethane	107-06-2	99.0	21.4	0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U		0.0011	0.25 U	
Butanenitrile	109-74-0	69.1	21.8	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	21.9	0.0027	0.44 U		0.0027	0.44 U		0.0027	0.44 U		0.0027	0.44 U	
1-Butanol	71-36-3	74.0	22.3	0.0075	2.29 U		0.0075	2.29 U		0.0075	2.29 U		0.0075	2.29 U	
Benzene	71-43-2	78.1	22.8	0.0014	0.4 U		0.0014	0.4 U		0.0014	0.4 U		0.0014	0.4 U	
Carbon Tetrachloride	56-23-5	153.8	23.1	0.0014	0.2 U		0.0014	0.2 U		0.0014	0.2 U		0.0014	0.2 U	
Cyclohexane	110-82-7	84.2	23.3	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	113.0	24.3	0.0019	0.38 U		0.0019	0.38 U		0.0019	0.38 U		0.0019	0.38 U	
Trichloroethene	79-01-6	131.4	24.7	0.0036	0.61 U		0.0036	0.61 U		0.0036	0.61 U		0.0036	0.61 U	
Heptane	142-82-5	100.2	25.2	0.0015	0.35 U		0.0015	0.35 U		0.0015	0.35 U		0.0015	0.35 U	
4-Methyl-2-Pentanone	108-10-1	100.2	26.3	0.0021	0.46 U		0.0081	1.81 J		0.0066	1.47 J		0.0021	0.46 U	
cis-1,3-Dichloropropene	10061-01-5	111.0	26.4	0.0013	0.25 U		0.0013	0.25 U		0.0013	0.25 U		0.0013	0.25 U	

Table B.3 (Cont'd) Triple Sorbent Trap Analysis Results for All Target Analytes from Blank Samples Associated with the Sampling of Tank C-107 on 12/17/96

Target Analytes	CAS	MW	Ret Time	S7010-A17.1277 FB #1			S7010-A18.1278 FB #2			S7010-A19.1288 TB #1			S7010-A20.1280 TB #2		
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Pyridine	110-86-1	79.1	26.5	0.0214	6.06	U	0.0214	6.06	U	0.0214	6.06	U	0.0214	6.06	U
trans-1,3-Dichloropropene	10061-02-6	111.0	27.4	0.0027	0.53	U	0.0027	0.53	U	0.0027	0.53	U	0.0027	0.53	U
Pentanenitrile	110-59-8	83.2	27.4	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	27.8	0.0015	0.26	U	0.0015	0.26	U	0.0015	0.26	U	0.0015	0.26	U
Toluene	108-88-3	92.1	28.5	0.4118	100.12		0.5226	127.05		4.9288	1198.22	E	0.3456	84.02	
1,2-Dibromoethane	106-93-4	187.9	30.0	0.0024	0.28	U	0.0024	0.28	U	0.0024	0.28	U	0.0024	0.28	U
Octane	111-65-9	114.0	30.4	0.0027	0.52	U	0.0027	0.52	U	0.0027	0.52	U	0.0027	0.52	U
Tetrachloroethylene	127-18-4	165.8	31.0	0.0025	0.34	U	0.0025	0.34	U	0.0025	0.34	U	0.0025	0.34	U
Chlorobenzene	108-90-7	112.6	32.6	0.0011	0.22	U	0.0011	0.22	U	0.0011	0.22	U	0.0011	0.22	U
Hexanenitrile	628-73-9	97.0	32.8	0.0029	0.66	U	0.0029	0.66	U	0.0029	0.66	U	0.0029	0.66	U
Ethylbenzene	100-41-4	106.2	33.4	0.0014	0.3	U	0.0014	0.3	U	0.0014	0.3	U	0.0014	0.3	U
p/m-Xylene	106-42-3	106.2	33.9	0.003	0.63	U	0.003	0.63	U	0.003	0.63	U	0.003	0.63	U
Cyclohexanone	108-94-1	98.1	34.3	0.0125	2.85	U	0.0125	2.85	U	0.0125	2.85	U	0.0125	2.85	U
Styrene	100-42-5	104.2	34.8	0.0015	0.33	U	0.0015	0.33	U	0.0015	0.33	U	0.0015	0.33	U
1,1,2,2-Tetrachloroethane	79-34-5	167.9	35.0	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	106.2	35.1	0.0019	0.4	U	0.0019	0.4	U	0.0019	0.4	U	0.0019	0.4	U
Nonane	111-84-2	128.0	35.4	0.0013	0.22	U	0.0013	0.22	U	0.0013	0.22	U	0.0013	0.22	U
1-Ethyl-2-methyl benzene	611-14-3	120.2	38.4	0.0024	0.44	U	0.0024	0.44	U	0.0024	0.44	U	0.0024	0.44	U
1,3,5-Trimethylbenzene	108-67-8	120.2	38.6	0.0024	0.44	U	0.0024	0.44	U	0.0024	0.44	U	0.0024	0.44	U
1,2,4-Trimethylbenzene	95-63-6	120.2	39.9	0.0025	0.47	U	0.0025	0.47	U	0.0025	0.47	U	0.0025	0.47	U
Decane	124-18-5	142.3	40.1	0.003	0.47	U	0.003	0.47	U	0.003	0.47	U	0.003	0.47	U
1,3-Dichlorobenzene	541-73-1	147.0	40.5	0.0032	0.48	U	0.0032	0.48	U	0.0032	0.48	U	0.0032	0.48	U
1,4-Dichlorobenzene	106-46-7	147.0	40.7	0.0029	0.43	U	0.0029	0.43	U	0.0029	0.43	U	0.0029	0.43	U
1,2-Dichlorobenzene	95-50-1	147.0	41.8	0.0047	0.72	U	0.0047	0.72	U	0.0047	0.72	U	0.0047	0.72	U
Undecane	1120-21-4	156.0	44.4	0.0044	0.63	U	0.0044	0.63	U	0.0044	0.63	U	0.0044	0.63	U
1,2,4-Trichlorobenzene	120-82-1	181.5	48.0	0.0155	1.91	U	0.0155	1.91	U	0.0155	1.91	U	0.0155	1.91	U
Dodecane	112-40-3	170.0	48.4	0.0255	3.36	U	0.0255	3.36	U	0.0255	3.36	U	0.0255	3.36	U
Hexachloro-1,3-butadiene	87-68-3	260.8	49.9	0.0205	1.76	U	0.0205	1.76	U	0.0205	1.76	U	0.0205	1.76	U
Tridecane	629-50-5	184.0	52.2	0.026	3.17	U	0.026	3.17	U	0.026	3.17	U	0.026	3.17	U
Tetradecane	629-59-4	198.0	55.7	0.019	2.15	U	0.019	2.15	U	0.019	2.15	U	0.019	2.15	U
Tributyl Phosphate	126-73-8	266.0	63.1	<0.0099	<0.83	Z	<0.0099	<0.83	Z	<0.0099	<0.83	Z	<0.0099	<0.83	Z

E Target compound exceeds upper quantification limit (UQL).

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

U Target compound not detected at or above the IDL.

Y Initial calibration and CCV were 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.

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