Pacific Northwest National Laboratory

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TANK VAPOR CHARACTERIZATION PROJECT

Tank 241-S-102 Fifth Temporal Study: Headspace Gas and Vapor Characterization Results from Samples Collected on February 11, 1997

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Prepared for Lockheed Martin Hanford
under a Related Services Agreement
with the U.S. Department of Energy
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Pacific Northwest National Laboratory
Richland, Washington 99352

Summary

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-S-102 (Tank S-102) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Service Corporation (SESC) 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.

Ammonia was determined to be above the immediate notification limit of 150 ppm as specified by the sampling and analysis plan (SAP) (Buckley 1996). Hydrogen was the principal flammable constituent of the Tank S-102 headspace, determined to be present at approximately 1.150% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <1.624% 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 S-102 Sampled on 2/11/97

<u>Category</u>	<u>Sample Medium</u>	<u>Analyte</u>	<u>Concentration^(a)</u>	<u>Units</u>
Inorganic Vapors	Sorbent Traps	Ammonia	546	ppmv
		Nitrogen Dioxide (NO ₂)	<0.16	ppmv
		Nitric Oxide (NO)	<0.16	ppmv
		Water	13.2	mg/L
Permanent Gases	SUMMA™ Canisters	Hydrogen	460	ppmv
		Methane	<25	ppmv
		Carbon Dioxide	<17	ppmv
		Carbon Monoxide	<17	ppmv
		Nitrous Oxide (N ₂ O)	514	ppmv
Total Non-Methane Organic Compounds	SUMMA™ Canisters	Non-Methane Organic Compounds	19.46	mg/m ³
Volatile Organic Vapors	SUMMA™ Canisters	Ethanol	19.423	mg/m ³
		Methanol	8.780	mg/m ³
		Acetone	1.121	mg/m ³
Volatile Organic Vapors	Sorbent Traps	Ethanol	43.161	mg/m ³
		Methanol	10.229	mg/m ³
		Acetone	0.672	mg/m ³
Flammables	SUMMA™ Canisters and Sorbent Traps	Flammables	<1.624	% 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
SAP	sample and analysis plan
SCIC	suppressed-conductivity ion chromatography
SESC	SGN Eurisys Service Corporation
SRM	standard reference material
STP	standard temperature and pressure
SUMMATM	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 February 11, 1997 from the headspace of waste storage tank 241-S-102 (Tank S-102) 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 February 10, 1997 and were returned to PNNL on February 14, 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

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

2.2.1 SUMMA™ Canister Preparation

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

2.2.2 Analytical Procedure

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

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

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

Table 2.4 Quantitation Limits for Permanent Gases

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

2.2.3 Quality Assurance/Quality Control

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

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

2.3 Total Non-Methane Organic Compounds

2.3.1 Analytical Procedure

SUMMA™ 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, SUMMA™ 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 SUMMA™ Passivated Canister Sampling and Flame Ionization Detection*, PNL-TVP-08 (Rev. 1), PNL Technical Procedure. Richland, Washington.

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

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

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

2.3.2 Quality Assurance/Quality Control

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

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

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

2.4 SUMMA™ Canister Sample Analyses

2.4.1 Analytical Procedure

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

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

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

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

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

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

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

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

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

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

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

2.4.2 Quality Assurance/Quality Control

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

2.5 Triple Sorbent Trap Sample Analyses

2.5.1 Sampling Methodology

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

2.5.2 Analytical Procedure

The Supelco 300 tubes were analyzed according to PNNL Technical Procedure PNL-TVP-10^(a), with the exceptions noted in Section 3.4.1. The method employs Supelco 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 S-102 on February 11, 1997 (Sample Job V7006) 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 S-102 during Sample Job V7006. 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 $<2\%$, which is within the 25% specified by the SAP.

3.1.1 Ammonia

Ammonia analyses were performed on February 20 and 21, 1997, 9 and 10 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 44.4 to 45.6 μmol in front sections; blank corrected back sorbent section ammonia concentrations were $<0.01 \mu\text{mol}$. Blank corrections of 0.07 μmol in front and 0.04 μmol in the back sections, were about 0.2% of collected quantities. The analysis of one sample was a duplicate and indicated a reproducibility of $\pm 0.4\%$. One blank sorbent trap was spiked with 17 ppm of ammonia and yielded a percentage recovery of 97%. One sample leachate was spiked after initial analysis with approximately the quantity of ammonia in the sample and yielded a percentage recovery of 95%. The initial and continuing calibration verification (ICV, CCV) standards, using NIST-traceable material, yielded percentage recoveries of 96% and 99% (ICV) and 99%, 98% and 91% (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 February 20 and 21, 1997, 9 and 10 days after sample collection, and within established holding times (Ligotke et al. 1995). All samples (100%) were successfully analyzed. No deviations from the procedure were noted.

Blank-corrected NO_2^- quantities in the sorbent traps were all $<0.013 \mu\text{mol}$. Nitrite blank levels used to correct data were $0.0134 \mu\text{mol}$ in front (four of four blanks analyzed) and $0.0076 \mu\text{mol}$ in back (two of four blanks analyzed) sorbent sections. The analyses of two samples were duplicated and yielded repeatabilities of $\pm 0\%$ and $\pm 0\%$. Two sample leachates were spiked with 0.25 ppm NO_2^- and yielded percentage recoveries of 85% and 91%. A 4-point calibration was performed over a concentration range of 0 to $0.5 \mu\text{g/mL NO}_2^-$ in the desorbing matrix.

3.1.3 Water

Analyses for water vapor were performed on February 18, 1997, 7 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 13.2 mg of water per L of dry air at STP. The result was determined from an average mass gain of 25.2 mg from all four multi-trap trains. The blank correction applied to the results was - 0.6 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 14.2°C and relative humidity at 59% at the time of sampling.

3.2 Permanent Gases

Hydrogen analyses were performed on February 18, 1997 and analyses for other permanent gases were performed on February 14, 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 460 ppmv and nitrous oxide 514 ppmv were detected in Tank S-102 at concentrations above those in ambient air. The relative percent difference (RPD) between duplicate analyses of a single SUMMATM canister was less than 1% for hydrogen and nitrous oxide.

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

3.3 Total Non-Methane Organic Compounds

Analyses for TNMOCs were performed on June 4, 1997. All analyses exceeded the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). All three tank samples and the two ambient samples (100%) were successfully analyzed and used in the averages.

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 $19.46 \text{ mg}/\text{m}^3$ or 8.11 ppmv of carbon. The $19.46 \text{ mg}/\text{m}^3$ value compares to $32.42 \text{ mg}/\text{m}^3$ for the sum of all target compounds identified in the analysis of the SUMMA™ canisters. The $32.42 \text{ mg}/\text{m}^3$ 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%.

3.3.1 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 S-102 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 25 and May 15, 1997. All analyses were conducted within the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994) with the exception of the diluted sample analyses. 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. Thirty-one target analytes above the instrument detection limit (IDL) were detected in the tank headspace samples. Of these, 29 target analytes were identified in two or more tank headspace samples. Ethanol at $19.423 \text{ mg}/\text{m}^3$, methanol at $8.780 \text{ mg}/\text{m}^3$, and acetone at $1.121 \text{ mg}/\text{m}^3$ were the three most abundant compounds identified in the tank headspace samples. The total average concentration was $32.42 \text{ mg}/\text{m}^3$ for the target analytes. This compares to a total concentration of $19.46 \text{ mg}/\text{m}^3$ identified in the TO-12 analysis of the three tank headspace samples.

SUMMA™ sample V7006-A05.167 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 of the replicates. Eighteen of 28 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. Eleven target compounds were observed in one or both of the ambient air samples. Tridecane and tetradecane were observed in both of the ambient air samples above their EQL. Tetradecane in the upwind ambient air sample exceeded its upper quantitation limit (UQL). This suggests there may have been a contamination problem during field sampling.

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. The samples were diluted and reanalyzed in a second batch.

Batch #1 (File Identifier 17022502.b) - V7006-A01.066, V7006-A02.089, V7006-A04.142, V7006-A05.167, V7006-A05.167 REP, V7006-A06.169;

Batch #2 (File Identifier 17051502.b) - V7006-A04.142, V7006-A05.167, V7006-A05.A67 REP, V7006-A06.169.

Batch #1:

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

Two target compounds (chloroethane at 47.60% and pyridine at 53.79%) surpassed the 30% relative standard deviation acceptance criteria for initial calibration. Tetradecane surpassed the 0.05 response factor criteria for the initial calibration.

Tetradecane was found in all tank samples at concentrations between EQL and the UQL, with the exception of ambient air sample V7006-A01.066 where it was found at a concentration above the UQL. Chloroethane was not found in the tank samples at concentrations higher than its IDL. Pyridine was found in all tank samples at concentrations between its IDL and EQL, with the exceptions of ambient air samples V7006-A01.066 and V7006-A02.089 where it was not found at concentration above its IDL. Due to the initial calibration performance the uncertainty associated with the results is higher than normal.

Five target compounds (dichlorodifluoromethane at 31.2%, trichlorofluoromethane at 30.5%, 1,1-dichloroethene at 28.5%, 1,1,2-trichloro-1,2,2-trifluoromethane at 43.2%, and 4-methyl-2-pentanone at 29.9%) were outside the 25% D acceptance criteria for the CCV sample. Tetradecane surpassed the 0.05 response factor criterion for the CCV. However, the CCV passed the procedural criterion requiring $\pm 25\%$ D passage for 85% of all target compounds.

The compound 4-methyl-2-pentanone was found in all tank samples at concentrations between EQL and UQL except ambient air samples V7006-A01.066 and V7006-A02.089 where it was not found at concentrations above its IDL. Trichlorofluoromethane was found in all tank samples at concentrations between its EQL and UQL, with the exceptions of ambient air samples V7006-A01.066 and V7006-A02.089 where it was not found at a concentration above its IDL. Dichlorodifluoromethane was found in all tank samples at concentrations between its IDL and EQL. The compounds 1,1-dichloroethene and 1,1,2-trichloro-1,2,2-trifluoromethane were not found in the tank samples at concentrations above their UQL. Due to the CCV performance for these compounds a higher than normal uncertainty is associated with the results.

Two target compounds (acetone and 1,2,4-trichlorobenzene) were found in the ICB above their EQLs. One target compound (methylene chloride) was detected in the CCB above its EQL, but its concentration was less than 1.4 ppbv.

The tank samples internal standard quantitation area percent recoveries were within the acceptance criterion (50% to 200%) allowed by procedure PNL-TVP-03, Rev. 1, with the exception of D5-chlorobenzene in samples V7006-A05.167, V7006-A05.167 REP and V7006-A06.169. This problem is routinely observed with the HP5972 GC/MS system because of its poor pumping capacity and the high water and ammonia content in these samples. Target compounds found in these samples could be affected.

Batch #2:

This analytical sequence was run using 100 mL volumes of 20X diluted sample to quantify target compounds in each tank sample.

Two target compounds (chloroethane at 47.60% and pyridine at 53.79%) surpassed the 30% relative standard deviation acceptance criteria for initial calibration. Tetradecane surpassed the 0.05 response factor criteria for the initial calibration.

Tetradecane, pyridine and chloroethane were not found in the tank samples at concentrations higher than their IDLs, with the exception of tank sample V7006-A05.167, where tetradecane was found at a concentration between EQL and UQL. Due to the initial calibration performance, the uncertainty associated with the results is higher than normal.

One target compound (chloroethane at 30.4%) was outside the 25% difference (% D) acceptance criteria for the CCV sample. Tetradecane surpassed 0.05 response criteria for the CCV. However, the CCV passed the procedural criterion requiring $\pm 25\%$ D passage for 85% of all target compounds.

Two target compounds (acetone and 1,2,4-trichlorobenzene) were found in the ICB above their EQLs. No target compound was detected in the continuing calibration blank (CCB) above its EQL.

Information common to both batches:

Instrument detection limits, precision, and accuracy have not been experimentally evaluated for methanol, ethanol and 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. Methanol, 1,3-butadiene and ethanol results falling within their 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 May 3 and 5, 1997. All analyses exceeded the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). All samples (100%) were successfully analyzed. Procedural deviations, observations, and anomalies are presented in Section 3.4.2.1.

Measured concentrations of target analytes 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. Thirty-three target analytes above the IDL were detected in the tank headspace samples. Of these, 30 target analytes were identified in two or more tank headspace samples. Ethanol at 43.161 mg/m³, methanol at 10.229 mg/m³, and acetone at 0.672 mg/m³ were the three most abundant compounds identified in the tank headspace sample. The total average concentration of the target analytes was 56.29 mg/m³.

Triple sorbent trap sample V7006-A12.1116 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. Nineteen of 30 target analytes had RPDs of less than 10%.

Results from the analyses of target analytes in the field and trip blanks are provided in Table 3.9. Five target analytes were identified in one or more of the blank samples. All of the compounds observed were below their EQLs.

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 procedure PNL-TVP-10, Rev. 2 with the initial calibration performed on April 8, 1997 and quantitated against a CCV run at beginning of the batch. The TST samples were analyzed in two batches. The sample analytical sequence runs were as follows:

Batch #1 (file identifier #47050301.b) - V7006-A17.1344, V7006-A18.1345, V7006-A19.1346, V7006-A20.1347;

Batch #2 (file identifier #47050501.b) - V7006-A11.1115, V7006-A12.1116, V7006-A12.1116 REP, V7006-A13.1117.

Batch #1:

This batch contained field and trip blanks.

The CCV was satisfactory for all target compounds except chloromethane (37.0%), chloroethane (27.8%), ethanol (33.2%), pyridine (27.6%), 1,2-dibromoethane (26.2%), tridecane (35.9%), and tetradecane (57.1%). The field and trip blanks contained minor amounts of tetradecane (below EQL). Internal standard responses were acceptable for these samples. Surrogate recoveries ranged from 89% to 105%. The CCB contained trace amounts (below EQL) of methylene chloride, benzene, and tetradecane. The CCB was otherwise clean. Compounds found in the CCB at concentrations (in ng) greater than 5% of the sample concentration are flagged with a "B" in the tables.

Batch #2:

This batch consisted of tank samples.

The CCV was satisfactory for all target compounds except chloromethane (33.8%), chloroethane (28.2%), ethanol (35.3%), pyridine (27.4%), and tetradecane (30.6%). The tank samples contained quantifiable amounts of ethanol and trace levels (below the EQL) of chloromethane, pyridine and tetradecane. The uncertainty in the CCV impacts the quantitation of these compounds. Tetradecane has consistently exhibited a much higher than average uncertainty in reproducibility of standards. Internal standard responses were acceptable for these samples. Surrogate recoveries ranged from 95% to 103%. The CCB contained trace levels (below the EQL) of methylene chloride, and tetradecane. Compounds found in the CCB at concentrations (in ng) greater than 5% of the sample concentration are flagged with a "B" in the tables.

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 value.

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 0.8 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 S-102 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 S-102 headspace, determined to be present at approximately 1.150% of its LFL. Total headspace flammability was estimated to be <1.624% of the LFL.

Table 3.1 Inorganic Vapor Concentrations from Tank S-102 Sampled on 2/11/97

Analyte	CAS Number	V7006-A07-40R	V7006-A08-41R	V7006-A09-42R	V7006-A10-43R	Average	Standard Deviation
Ammonia (ppmv)	7664-41-7	536	550	550	548	546	6
Nitric Oxide (ppmv)		<0.16	<0.16	<0.16	<0.16	<0.16	
Nitrogen Dioxide (ppmv)		<0.16	<0.16	<0.16	<0.16	<0.16	
Water ^(a) (mg/L)		13.4	13.2	13.5	12.9	13.2	0.2
Water ^(b) (mg/L)		12.0	11.8	12.1	11.5	11.8	0.2

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 S-102 Sampled on 2/11/97

Permanent Gas Analyte	Upwind Ambient Air	Ambient Air Through VSS	Tank Samples				RPD ^(c) (%)	Mean	
	V7006-A01.066 ^(a) (ppmv)	V7006-A02.089 ^(a) (ppmv)	V7006-A04.142 ^(a) (ppmv)	V7006-A06.169 ^(a) (ppmv)	V7006-A05.167 ^(a) (ppmv)	V7006-A05.167 ^{(a)(b)} (ppmv)		(ppmv)	St.Dev.
Hydrogen	<17	<17	460	457	464	460	0.9	460	3.5
Methane	<25	<25	<25	<25	<25	<25		<25	
Carbon Dioxide	483	491	<17	<17	<17	<17		<17	
Carbon Monoxide	<17	<17	<17	<17	<17	<17		<17	
Nitrous Oxide	<17	<17	513	517	513	517	0.8	514	2.3

Footnotes

(a) Sample identification number.

(b) Replicate analysis for V7006-A05.167; results are not included in the calculation of average concentrations.

(c) Relative percent difference (RPD) based on replicate analysis.

Table 3.3 Total Non-Methane Organic Compound Analysis Results from Tank S-102 Sampled on 02/11/97

	Upwind Ambient Air	Ambient Air Through VSS	Tank Samples						
	V7006-A01.066 ^(a) Concentration	V7006-A02.089 ^(a) Concentration	V7006-A04.142 ^(a) Concentration	V7006-A06.169 ^(a) Concentration	V7006-A05.167 ^(a) Concentration	V7006-A05.167 ^{(a)(b)} Concentration	RPD ^(c) (%)	Mean	St.Dev.
TO-12 (mg/m ³)	<0.59	<0.59	19.12	19.81	19.46	19.71	1.3	19.46	0.35
Total Carbon (ppmv)								8.11	

Footnotes

- (a) Sample identification number.
- (b) Replicate analysis for V7006-A05.167; 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 S-102 Sampled on 2/11/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7006-A05.167 ^{(b)(c)} VSS			V7006-A06.169 ^(b) VSS			V7006-A04.142 ^(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	4.6	0.006	1.1	J	0.005	0.99	J	0.005	0.95	J	0.005	0.000	1.00	0.050
Chloromethane	74-87-3	50	5.0	0.008	3.4	J	0.007	3.2	J	0.007	3.1	J	0.007	0.000	3.2	0.16
Methanol	67-56-1	32	5.2	9.062	6335	Y,*	8.987	6283	Y,*	8.292	5797	Y,*	8.780	0.425	6139	297
Butane	106-97-8	58	5.9	0.202	78		0.198	76		0.182	70		0.194	0.011	75	4.1
Ethanol	64-17-5	46	6.8	20.122	9796	Y,*	20.445	9954	Y,*	17.701	8618	Y,*	19.423	1.500	9456	730
Acetonitrile	75-05-8	41	7.3	0.031	17	J	0.029	16	J	0.030	17	J	0.030	0.001	16	0.56
Acetone	67-64-1	58	7.8	1.152	444		1.128	435		1.083	418		1.121	0.035	432	14
Trichlorofluoromethane	75-69-4	137	8.3	0.171	28		0.164	27		0.158	26		0.164	0.006	27	1.0
Pentane	109-66-0	72	8.9	0.047	15		0.037	11	J	0.049	15		0.044	0.007	14	2.1
Methylene Chloride	75-09-2	85	9.7	0.018	4.7	J,B	0.017	4.4	J,B	0.018	4.7	J,B	0.017	0.000	4.6	0.13
Propanenitrile	107-12-0	55	10.9	0.011	4.4	J	0.011	4.3	J	0.010	4.0	J	0.010	0.001	4.2	0.23
Propanol	71-23-8	60	10.8	0.114	42		0.106	40		0.107	40		0.109	0.004	41	1.5
2-Butanone	78-93-3	72	12.4	0.184	57		0.193	60		0.194	60		0.190	0.005	59	1.7
Hexane	110-54-3	86	13.7	0.015	3.9	J	0.014	3.6	J	0.014	3.6	J	0.014	0.001	3.7	0.16
Tetrahydrofuran	109-99-9	72	14.6	0.057	18		0.055	17		0.053	16		0.055	0.002	17	0.67
Butanenitrile	109-74-0	69	15.8	0.014	4.4	J	0.012	4.0	J	0.011	3.5	J	0.012	0.002	4.0	0.50
1-Butanol	71-36-3	74	16.3	1.134	343		1.086	328		1.034	312		1.084	0.050	328	15
Benzene	71-43-2	78	16.7	0.039	11		0.037	11		0.035	10		0.037	0.002	11	0.51
Cyclohexane	110-82-7	84	17.3	0.004	0.99	J	0.003	0.81	J	0.003	0.78	J	0.003	0.000	0.86	0.11
Heptane	142-82-5	100	19.2	0.019	4.3		0.018	4.1		0.018	4.0	J	0.018	0.001	4.1	0.15
4-Methyl-2-Pentanone	108-10-1	100	20.4	0.016	3.6	J	0.017	3.7	J	0.016	3.6	J	0.016	0.000	3.7	0.074
Pyridine	110-86-1	79	20.6	0.022	6.2	J	0.021	5.8	J	0.022	6.3	J	0.021	0.001	6.1	0.24
Toluene	108-88-3	92	22.6	0.357	87		0.344	84		0.323	79		0.341	0.017	83	4.1
Octane	111-65-9	114	24.7	0.002	0.47	U	0.008	1.6	J	0.008	1.5	J	0.008	d	1.6	e
Tetrachloroethylene	127-18-4	166	25.2	0.059	7.9		0.054	7.4		0.054	7.3		0.056	0.002	7.5	0.33
Hexanenitrile	628-73-9	97	27.0	0.001	0.33	J	0.001	0.25	J	0.001	0.16	J	0.001	0.000	0.25	0.085
Nonane	111-84-2	128	29.7	0.002	0.28	U	0.004	0.76	J	0.002	0.28	U	d	d	d	e
Decane	124-18-5	142	34.4	0.006	0.98	J	0.006	0.88	J	0.006	0.90	J	0.006	0.000	0.92	0.053
Dodecane	112-40-3	170	42.8	0.010	1.3	U	0.010	1.3	U	0.026	3.5	J	d	d	d	e
Tridecane	629-50-5	184	46.5	0.117	14		0.058	7.1	J	0.522	63		0.232	0.252	28	31
Tetradecane	629-59-4	198	50.0	0.709	80		0.125	14		0.422	48		0.419	0.292	47	33
Total Concentration of Target Analytes													32.42			

Data Quality Flags

B Compound found 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.

* Denotes diluted value was reported for target compound in table

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 S-102 Sampled on 2/11/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7006-A05.167 ^(b) VSS						RPD ^(c) (%)
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	
Dichlorodifluoromethane	75-71-8	121	4.6	0.006	1.1	J	0.005	0.99	J	5
Chloromethane	74-87-3	50	5.0	0.008	3.4	J	0.007	3.1	J	10
Methanol	67-56-1	32	5.2	9.062	6335	Y,*	9.045	6324	Y,*	0
Butane	106-97-8	58	5.9	0.202	78		0.192	74		5
Ethanol	64-17-5	46	6.8	20.122	9796	Y,*	25.314	12324	Y,*	23
Acetonitrile	75-05-8	41	7.3	0.031	17	J	0.028	15	J	9
Acetone	67-64-1	58	7.8	1.152	444		1.099	424		5
Trichlorofluoromethane	75-69-4	137	8.3	0.171	28		0.162	26		5
Pentane	109-66-0	72	8.9	0.047	15		0.038	12	J	22
Methylene Chloride	75-09-2	85	9.7	0.018	4.7	J,B	0.018	4.7	J,B	1
Propanenitrile	107-12-0	55	10.9	0.011	4.4	J	0.010	4.1	J	8
Propanol	71-23-8	60	10.8	0.114	42		0.106	40		7
2-Butanone	78-93-3	72	12.4	0.184	57		0.187	58		2
Hexane	110-54-3	86	13.7	0.015	3.9	J	0.014	3.5	J	9
Tetrahydrofuran	109-99-9	72	14.6	0.057	18		0.053	16		8
Butanenitrile	109-74-0	69	15.8	0.014	4.4	J	0.010	3.4	J	27
1-Butanol	71-36-3	74	16.3	1.134	343		1.063	321		6
Benzene	71-43-2	78	16.7	0.039	11		0.036	10		7
Cyclohexane	110-82-7	84	17.3	0.004	0.99	J	0.003	0.87	J	11
Heptane	142-82-5	100	19.2	0.019	4.3		0.017	3.9	J	10
4-Methyl-2-Pentanone	108-10-1	100	20.4	0.016	3.6	J	0.016	3.6	J	1
Pyridine	110-86-1	79	20.6	0.022	6.2	J	0.020	5.6	J	10
Toluene	108-88-3	92	22.6	0.357	87		0.336	82		6
Octane	111-65-9	114	24.7	0.002	0.47	U	0.008	1.5	J	
Tetrachloroethylene	127-18-4	166	25.2	0.059	7.9		0.055	7.4		7
Hexanenitrile	628-73-9	97	27.0	0.001	0.33	J	0.001	0.19	J	55
Decane	124-18-5	142	34.4	0.006	0.98	J	0.006	0.96	J	2
Tridecane	629-50-5	184	46.5	0.117	14		0.012	1.4	J	164
Tetradecane	629-59-4	198	50.0	0.709	80		0.049	5.5		174

Data Quality Flags

B Compound found 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.

* 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 S-102 on 2/11/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7006-A01.066 ^(b)			V7006-A02.089 ^(b)		
				Ambient Air			Ambient Air Thru VSS		
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	121	4.6	0.005	0.90	J	0.005	0.94	J
Chloromethane	74-87-3	50	5.0	0.002	0.99	J	0.003	1.3	J
Butane	106-97-8	58	5.9	0.012	4.4	J	0.013	5.0	J
Acetone	67-64-1	58	7.8	0.014	5.5	J,B	0.018	6.7	J,B
Pentane	109-66-0	72	8.9	0.002	0.59	J	0.001	0.37	J
Methylene Chloride	75-09-2	85	9.7	0.019	4.9	J,B	0.017	4.6	J,B
2-Butanone	78-93-3	72	12.4	0.016	4.8	J	0.003	0.87	U
1-Butanol	71-36-3	74	16.3	0.008	2.4	J	0.003	0.97	U
Dodecane	112-40-3	170	42.8	0.042	5.6	J	0.010	1.3	U
Tridecane	629-50-5	184	46.5	1.449	176		0.376	46	
Tetradecane	629-59-4	198	50.0	4.050	457	E	0.838	95	

Data Quality Flags

B Compound found in associated laboratory blank.

E Target compound exceeds UQL.

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 Organic Compound Concentrations in Triple Sorbent Traps from Tank S-102 Sampled on 2/11/97

Target Analytes ^(a)	CAS	MW	Ret				V7006-A11.1115 ^(b) VSS				V7006-A12.1116 ^(b,c) VSS				V7006-A13.1117 ^(b) VSS				Mean and Standard Deviation			
			Time	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	St. Dev.	(ppbv)	St. Dev.						
Chloromethane	74-87-3	50	8.9	0.010	4.4	J	0.017	7.4	J	0.014	6.0	J	0.013	0.003	5.9	1.5						
Methanol	67-56-1	32	10.0	8.147	5696	E,Y	12.502	8741	E,Y	10.037	7017	E,Y	10.229	2.184	7151	1527						
Butane	106-97-8	58	10.8	0.096	37		0.090	35		0.090	35		0.092	0.003	35	1.2						
Ethanol	64-17-5	46	12.5	43.925	21357	E,Y	43.359	21082	E,Y	42.198	20518	E,Y	43.161	0.880	20985	428						
Acetonitrile	75-05-8	41	13.0	0.167	91		0.333	182		0.236	129		0.246	0.083	134	46						
Acetone	67-64-1	58	13.7	0.703	271		0.698	269		0.616	237		0.672	0.049	259	19						
Trichlorofluoromethane	75-69-4	137	14.2	0.151	25		0.145	24		0.143	23		0.146	0.004	24	0.72						
Pentane	109-66-0	72	14.9	0.026	8.1	J	0.028	8.6	J	0.027	8.3	J	0.027	0.001	8.4	0.24						
1,1-Dichloroethene	75-35-4	97	15.5	0.002	0.51	U	0.008	1.8	J	0.002	0.51	U	d	d	d	d						
Methylene Chloride	75-09-2	85	15.8	0.080	21	J,B	0.092	24	J,B	0.052	14	J,B	0.074	0.020	20	5.4						
Propanenitrile	107-12-0	55	17.0	0.014	5.8	J	0.016	6.4	J	0.015	6.0	J	0.015	0.001	6.0	0.32						
Propanol	71-23-8	60	17.1	0.113	42		0.112	42		0.111	41		0.112	0.001	42	0.44						
2-Butanone	78-93-3	72	18.6	0.148	46		0.139	43		0.135	42		0.141	0.007	44	2.1						
cis-1,2-Dichloroethene	156-59-2	97	19.5	0.003	0.62	U	0.003	0.62	U	0.003	0.73	J	d	d	d	d						
Hexane	110-54-3	86	19.9	0.020	5.3		0.020	5.2		0.020	5.3		0.020	0.000	5.3	0.067						
Tetrahydrofuran	109-99-9	72	20.8	0.060	19		0.061	19		0.061	19		0.061	0.001	19	0.18						
1-Butanol	71-36-3	74	22.3	0.680	206		0.566	171		0.767	232		0.671	0.101	203	30						
Benzene	71-43-2	78	22.8	0.035	10		0.035	10		0.035	10		0.035	0.000	10	0.064						
Heptane	142-82-5	100	25.2	0.022	5.0		0.022	4.9		0.023	5.1		0.022	0.000	5.0	0.10						
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.036	8.2		0.038	8.4		0.040	9.0		0.038	0.002	8.5	0.45						
Pyridine	110-86-1	79	26.5	0.036	10	J	0.039	11	J	0.039	11	J	0.038	0.001	11	0.43						
Pentanenitrile	110-59-8	83	27.4	0.001	0.23	U	0.001	0.23	U	0.002	0.43	J	d	d	d	d						
1,1,2-Trichloroethane	79-00-5	133	27.8	0.011	1.8	J	0.010	1.7	J	0.011	1.8	J	0.010	0.001	1.8	0.089						
Toluene	108-88-3	92	28.5	0.313	76		0.308	75		0.318	77		0.313	0.005	76	1.3						
Octane	111-65-9	114	30.4	0.013	2.6	J	0.014	2.7	J	0.015	2.9	J	0.014	0.001	2.7	0.12						
Tetrachloroethylene	127-18-4	166	31.0	0.062	8.4		0.063	8.5		0.066	8.9		0.064	0.002	8.6	0.25						
Ethylbenzene	100-41-4	106	33.4	0.004	0.85	J	0.004	0.81	J	0.003	0.68	J	0.004	0.000	0.78	0.089						
p-m-Xylene	106-42-3	106	33.9	0.011	2.4	J	0.012	2.4	J	0.009	2.0	J	0.011	0.001	2.3	0.24						
o-Xylene	95-47-6	106	35.1	0.007	1.4	J	0.007	1.5	J	0.006	1.3	J	0.007	0.000	1.4	0.080						
Nonane	111-84-2	128	35.4	0.008	1.4	J	0.008	1.3	J	0.008	1.4	J	0.008	0.000	1.4	0.040						
Decane	124-18-5	142	40.1	0.008	1.2	J	0.008	1.3	J	0.008	1.3	J	0.008	0.000	1.3	0.040						
Undecane	1120-21-4	156	44.4	0.005	0.74	J	0.005	0.68	U	0.005	0.72	J	0.005	d	0.73	d						
Tetradecane	629-59-4	198	55.7	0.039	4.4	J,B	0.040	4.6	J,B	0.033	3.7	J,B	0.037	0.004	4.2	0.44						

Total Concentration of Target Analytes

56.29

Data Quality Flags

B Compound found 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.

E Target compound exceeds the UQL.

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 Organic Compound Concentrations from Replicate Analysis of a Single Triple Sorbent Trap from Tank S-102 Sampled on 2/11/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7006-A12.1116 ^(b) VSS						RPD ^(c) (%)
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	
Chloromethane	74-87-3	50	8.9	0.017	7.4	J	0.012	5.4	J	31
Methanol	67-56-1	32	10.0	12.502	8741	E,Y	10.859	7592	E,Y	14
Butane	106-97-8	58	10.8	0.090	35		0.083	32		8
Ethanol	64-17-5	46	12.5	43.359	21082	E,Y	42.381	20606	E,Y	2
Acetonitrile	75-05-8	41	13.0	0.333	182		0.410	224		21
Acetone	67-64-1	58	13.7	0.698	269		0.578	223		19
Trichlorofluoromethane	75-69-4	137	14.2	0.145	24		0.145	24		1
Pentane	109-66-0	72	14.9	0.028	8.6	J	0.025	7.7	J	11
1,1-Dichloroethene	75-35-4	97	15.5	0.008	1.8	J	0.007	1.6	J	15
Methylene Chloride	75-09-2	85	15.8	0.092	24	J,B	0.086	23	J,B	6
Propanenitrile	107-12-0	55	17.0	0.016	6.4	J	0.016	6.4	J	1
Propanol	71-23-8	60	17.1	0.112	42		0.114	42		2
2-Butanone	78-93-3	72	18.6	0.139	43		0.113	35		21
Hexane	110-54-3	86	19.9	0.020	5.2		0.019	5.0		3
Tetrahydrofuran	109-99-9	72	20.8	0.061	19		0.058	18		4
1-Butanol	71-36-3	74	22.3	0.566	171		0.668	202		17
Benzene	71-43-2	78	22.8	0.035	10		0.035	10		1
Heptane	142-82-5	100	25.2	0.022	4.9		0.022	4.8		2
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.038	8.4		0.035	7.8		8
Pyridine	110-86-1	79	26.5	0.039	11	J	0.044	12	J	13
1,1,2-Trichloroethane	79-00-5	133	27.8	0.010	1.7	J	0.010	1.7	J	3
Toluene	108-88-3	92	28.5	0.308	75		0.307	75		0
Octane	111-65-9	114	30.4	0.014	2.7	J	0.013	2.6	J	6
Tetrachloroethylene	127-18-4	166	31.0	0.063	8.5		0.063	8.5		0
Ethylbenzene	100-41-4	106	33.4	0.004	0.81	J	0.004	0.82	J	3
p/m-Xylene	106-42-3	106	33.9	0.012	2.4	J	0.012	2.4	J	1
o-Xylene	95-47-6	106	35.1	0.007	1.5	J	0.007	1.6	J	4
Nonane	111-84-2	128	35.4	0.008	1.3	J	0.007	1.3	J	4
Decane	124-18-5	142	40.1	0.008	1.3	J	0.007	1.1	J	21
Tetradecane	629-59-4	198	55.7	0.040	4.6	J,B	0.037	4.2	J,B	10

Data Quality Flags

B Compound found in associated laboratory blank.

E Target compound exceeds the upper quantification limit (UQL).

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

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

Table 3.9 Organic Compound Concentrations in Triple Sorbent Trap Blank Samples Associated with the Sampling of Tank S-102 on 2/11/97

Target Analytes ^(a)	CAS	MW	Ret	V7006-A17.1344 ^(b)			V7006-A18.1345 ^(b)			V7006-A19.1346 ^(b)			V7006-A20.1347 ^(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
1,1-Dichloroethene	75-35-4	97	15.5	0.002	0.47	U	0.002	0.47	U	0.002	0.47	U	0.006	1.5	J
Methylene Chloride	75-09-2	85	15.8	0.026	6.8	J,B	0.031	8.3	J,B	0.024	6.4	J,B	0.051	14	J,B
1,1,2-Trichloroethane	79-00-5	133	27.8	0.010	1.6	J	0.010	1.7	J	0.010	1.7	J	0.010	1.7	J
Toluene	108-88-3	92	28.5	0.003	0.60	J	0.003	0.62	J	0.001	0.32	J	0.006	1.3	J
Tetradecane	629-59-4	198	55.7	0.031	3.5	J,B	0.024	2.8	J,B	0.024	2.8	J,B	0.021	2.3	J,B

Data Quality Flags

B Compound found 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 3.10 Flammability Data for Tank S-102 Sampled on 2/11/97

Analyte	CAS #	Lower Flammability		Average Measured Concentrations	% of LFL ^(a)
		Limit(LFL)			
Ammonia (ppm)	7664-41-7	150000		546	0.364
Carbon Monoxide (ppm)	630-08-0	125000		<17	<0.014
Hydrogen (ppm)	1333-74-0	40000		460	1.150
Methane (ppm)	74-82-8	50000		<25	<0.050
TNMOC (mg/m ³)		42000		19.46	0.046
Total					<1.624

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

Figure 3.1a Typical Total Ion Chromatogram (2 - 36 min) for SUMMA™ Canister Samples from Tank S-102 Sampled on 2/11/97

Figure 3.1b Typical Total Ion Chromatogram (36 - 70 min) for SUMMA™ Canister Samples from Tank S-102 Sampled on 2/11/97

Figure 3.2a Typical Total Ion Chromatogram (2 - 36 min) for Triple Sorbent Trap Samples from Tank S-102 Sampled on 2/11/97

Figure 3.2b Typical Total Ion Chromatogram (36 - 70 min) for Triple Sorbent Trap Samples from Tank S-102 Sampled on 2/11/97

4.0 Conclusions

The concentrations of inorganic and organic analytes were determined from samples of the headspace of Tank S-102 on February 11, 1997 (Sample Job V7006). 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 SESC. Known sampling and analytical variances from established quality assurance requirements, where significant, were documented in this report, as required by the SAP (Buckley 1996). Immediate notification was provided because the ammonia concentration exceeded the 150 ppmv notification level; 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.

Ligotke, M. W., J. S. Fruchter, J. L. Huckaby, M. B. Birn, B. D. McVeety, J. C. Evans, K. H. Pool, K. L. Silvers, and S. C. Goheen. 1995. *Waste Tank Vapor Characterization Project: Annual Status Report for FY 1995*. Pacific Northwest National Laboratory, Richland, Washington.

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 373-3193Project Designation/Sampling Locations 200 West Tank Farm
241-S-102 Tank Vapor Sample SAF V7006Temporal #5 Riser # 7 VSS
Ice Chest No.Collection date 2-11-97
Preparation date 01-23-97

Field Logbook No. WHC-11-14740

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

Collectors: MAHON / MAST

Shipped to

PNNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

V7006 - A07 . 40R Collect NH₃/NO_x/H₂O Sorbent Trap
V7006 - A08 . 41R Collect NH₃/NO_x/H₂O Sorbent Trap
V7006 - A09 . 42R Collect NH₃/NO_x/H₂O Sorbent Trap
V7006 - A10 . 43R Collect NH₃/NO_x/H₂O Sorbent Trap

Sample Date/Time

2/11/97 1102
2/11/97 1102
2/11/97 1102
2/11/97 1102

V7006 - A15 . 44R Open, close and store NH₃/NO_x/H₂O field blank #1
V7006 - A16 . 45R Open, close and store NH₃/NO_x/H₂O field blank #2

2/11/97 1116
2/11/97 1116

[] Field Transfer of Custody		[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
L M Thomas LMP Thomas	01-27-97	1015	J A Edwards J A Edwards	01-27-97	1015
J A Edwards J A Edwards	02-10-97	1019	CS McClellan CS McClellan	02-10-97	1019
CS McClellan CS McClellan	02-10-97	1430	ES MAST ES MAST	02-10-97	1430
ES MAST ES MAST	2-14-97	0940	CS McClellan CS McClellan	2-14-97	0940
CS McClellan CS McClellan	2-14-97	1020	J A Edwards J A Edwards	2-14-97	1020
J A Edwards J A Edwards	2-14-97	1100	LMP Thomas LMP Thomas	2-14-97	1100

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

(E)

POC

(E)

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

(Revised 10/01/96 PNNL)

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-S-102 Tank Vapor Sample SAF V7006

Collection date 2-11-97

Preparation date 02-06-97

Temporal #5 Riser # 1 VSS

Ice Chest No.

Field Logbook No. WHC - N - 647-10

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

Collectors: Mahon / N. A. S.

Shipped to

PNNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

V7006 - A01 . 066

Collect Ambient Air Sample SUMMA #1

Sample Date/Time

2/11/97 10859

V7006 - A02 . 089

Collect Ambient Air Sample SUMMA #2

2/11/97 10911

V7006 - A04 . 142

Collect SUMMA #3

2/11/97 1045

V7006 - A05 . 167

Collect SUMMA #4

2/11/97 1049

V7006 - A06 . 169

Collect SUMMA #5

2/11/97 1053

[] Field Transfer of Custody			[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time	
J A Edwards J A Edwards	02-10-97	1015	CS McClellan CS McClellan	02-10-97	1015	
CS McClellan CS McClellan	02-10-97	1430	ES Mast ES Mast	02-10-97	1430	
ES Mast ES Mast	02-14-97	0900	CS McClellan CS McClellan	2-14-97	0900	
CS McClellan CS McClellan	2-14-97	1015	J A Edwards J A Edwards	2-14-97	1015	
J A Edwards J A Edwards	2-20-97	0825	J L Julia J L Julia	2-20-97	0825	

Final Sample Disposition

Comments:

02/19/97 Pressurized w/ UHP N₂ (E) 02/20/97 Transported to SIGMA II for SF₆ ANALYSIS (E)

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 (E)

POC (E)

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

(Revised 10/01/96 PNNL)

A-6000-407 (12/92) WEF061

1 of 1

A.2

Custody Form Initiator

J. A. Edwards - PNL

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

Company Contact

R. D. Mahon - WHC

Telephone (509) 373-7437
Page 85-9656 / S3-27 / FAX 373-7076Project Designation/Sampling Locations 200 West Tank Farm
241-S-102 Tank Vapor Sample SAF V7006
Temporal #4 Riser # 7 (VSS Truck)
Ice Chest No.Collection date 2-11-97
Preparation date 02-06-97Field Logbook No. WHC N-CHAD
2/11/97

Ertco Hi/Lo thermometer No.

PNL-T-005

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

Shipped to

RUST-

Collector(s) MAHON / MAST

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

V7006 - A11 . 1115	PNL Triple Sorbent Trap (TST) Sample #1	2-11-97 / 1126
V7006 - A12 . 1116	PNL TST Sample #2	2-11-97 / 1126
V7006 - A13 . 1117	PNL TST Sample #3	2-11-97 / 1123
V7006 - A14 . 1118	PNL TST Sample #4	2-11-97 / 1133
V7006 - A17 . 1344	Open, close & store TST Field Blank #1	2-11-97 / 1138
V7006 - A18 . 1345	Open, close & store TST Field Blank #2	2-11-97 / 1138
V7006 - A19 . 1346	Store TST Trip Blank #1	2-11-97 /
V7006 - A20 . 1347	Store TST Trip Blank #2	2-11-97 /

[] Field Transfer of Custody			[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time	
JL Julia	02-06-97	1010	JA Edwards	02-06-97	1010	
JA Edwards	02-10-97	1016	CS McClellan	02-10-97	1016	
CS McClellan	02-10-97	1430	ES MAST	02-10-97	1430	
ES MAST	2-14-97	0900	CS McClellan	2-14-97	0900	
CS McClellan	2-14-97	1020	JA Edwards	2-14-97	1020	

Final Sample Disposition

Comments:

PNL (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?
- 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
Y/N
Y/N
Y/N

Comments:

Cooler Temperature Status
Hi -17 °C / Lo -17 °C (pick up at PNL to WHC)
Hi °C / Lo °C (delivery at WHC from PNL)
Hi °C / Lo °C (at return to PNL from WHC)
Hi -17 °C / Lo -19 °C (at delivery from WHC to PNL)

POC

POC

(Revised 06/21/95 PNL)

Appendix B

Listing of All Target Compounds for Organic Compound Analysis

Table B.1 SUMMATM Analysis Results for All Target Analytes from Tank S-102 Sampled on 2/11/97

Target Analytes	CAS	MW	Ret Time	V7006-A05.167 VSS			V7006-A06.169 VSS			V7006-A04.142 VSS			V7006-A01.066 VSS			V7006-A02.089			V7006-A05.167 VSS		
				Ambient Air			Ambient Air Thru VSS			Rep											
				(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
Dichlorodifluoromethane	75-71-8	120.9	4.6	0.0057	1.05 J		0.0054	0.99 J		0.0051	0.95 J		0.0048	0.9 J		0.0051	0.94 J		0.0054	0.99 J	
Chloromethane	74-87-3	50.5	5.0	0.0077	3.41 J		0.0073	3.23 J		0.007	3.09 J		0.0022	0.99 J		0.0029	1.3 J		0.007	3.1 J	
1,2-dichloro1,1,2,2-tetrafluoroethane	76-14-2	170.9	5.2	0.013	1.7 U		0.013	1.7 U		0.013	1.7 U		0.013	1.7 U		0.013	1.7 U		0.013	1.7 U	
Methanol	67-56-1	32.0	5.2	9.0619	6335.44 Y*		8.9874	6283.35 Y*		8.2916	5796.86 Y*		<0.110	<77 Y		<0.110	<77 Y		9.0453	6323.78 Y*	
Vinyl Chloride	75-01-4	62.5	5.5	0.0016	0.57 U		0.0016	0.57 U		0.0016	0.57 U		0.0016	0.57 U		0.0016	0.57 U		0.0016	0.57 U	
1,3-Butadiene	106-99-0	54.0	5.8	<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	58.1	5.9	0.202	77.84		0.1976	76.17		0.182	70.13		0.0115	4.43 J		0.013	5.01 J		0.1923	74.1	
Bromomethane	74-83-9	94.9	6.4	0.0052	1.23 U		0.0052	1.23 U		0.0052	1.23 U		0.0052	1.23 U		0.0052	1.23 U		0.0052	1.23 U	
Chloroethane	75-00-3	64.5	6.7	0.0054	1.88 U		0.0054	1.88 U		0.0054	1.88 U		0.0054	1.88 U		0.0054	1.88 U		0.0054	1.88 U	
Ethanol	64-17-5	46.0	6.8	20.1215	9796.16 Y*		20.4453	9953.83 Y*		17.7011	8617.79 Y*		<0.110	<53 Y		<0.110	<53 Y		25.3139	12324.11 Y*	
Acetonitrile	75-05-8	41.1	7.3	0.0308	16.83 J		0.0289	15.75 J		0.0303	16.54 J		0.004	2.18 U		0.004	2.18 U		0.0282	15.38 J	
Acetone	67-64-1	58.1	7.8	1.1515	444.1		1.1282	435.14		1.0826	417.54		0.0142	5.48 J,B		0.0175	6.74 J,B		1.0993	423.96	
Trichlorofluoromethane	75-69-4	137.4	8.3	0.1707	27.84		0.1635	26.66		0.1581	25.77		0.0048	0.78 U		0.0048	0.78 U		0.1623	26.47	
Pentane	109-66-0	72.2	8.9	0.0471	14.63		0.0368	11.41 J		0.0494	15.34		0.0019	0.59 J		0.0012	0.37 J		0.0376	11.67 J	
1,1-Dichloroethene	75-35-4	96.9	9.5	0.0038	0.88 U		0.0038	0.88 U		0.0038	0.88 U		0.0038	0.88 U		0.0038	0.88 U		0.0038	0.88 U	
Methylene Chloride	75-09-2	84.9	9.7	0.0176	4.65 J,B		0.0168	4.43 J,B		0.0177	4.67 J,B		0.0187	4.93 J,B		0.0173	4.56 J,B		0.0177	4.67 J,B	
1,1,2-trichloro1,2,2-trifluoroethane	76-13-1	187.4	10.2	0.004	0.48 U		0.004	0.48 U		0.004	0.48 U		0.004	0.48 U		0.004	0.48 U		0.004	0.48 U	
Propanenitrile	107-12-0	55.1	10.9	0.0109	4.44 J		0.0105	4.26 J		0.0098	3.99 J		0.0038	1.55 U		0.0038	1.55 U		0.0101	4.09 J	
Propanol	71-23-8	60.1	10.8	0.1137	42.38		0.1062	39.57		0.1074	40.04		0.0028	1.04 U		0.0028	1.04 U		0.1064	39.65	
1,1-Dichloroethane	75-34-3	99.0	11.8	0.002	0.45 U		0.002	0.45 U		0.002	0.45 U		0.002	0.45 U		0.002	0.45 U		0.002	0.45 U	
2-Butanone	78-93-3	72.1	12.4	0.1839	57.13		0.1927	59.85		0.1936	60.14		0.0155	4.8 J		0.0028	0.87 U		0.1869	58.06	
cis-1,2-Dichloroethene	156-59-2	96.9	13.3	0.0034	0.79 U		0.0034	0.79 U		0.0034	0.79 U		0.0034	0.79 U		0.0034	0.79 U		0.0034	0.79 U	
Hexane	110-54-3	86.2	13.7	0.0149	3.86 J		0.014	3.64 J		0.0137	3.56 J		0.0032	0.83 U		0.0032	0.83 U		0.0136	3.53 J	
Chloroform	67-66-3	119.4	13.9	0.0026	0.49 U		0.0026	0.49 U		0.0026	0.49 U		0.0026	0.49 U		0.0026	0.49 U		0.0026	0.49 U	
Tetrahydrofuran	109-99-9	72.1	14.6	0.0571	17.74		0.0546	16.95		0.0528	16.41		0.0016	0.5 U		0.0016	0.5 U		0.0528	16.41	
1,2-Dichloroethane	107-06-2	99.0	15.3	0.0022	0.5 U		0.0022	0.5 U		0.0022	0.5 U		0.0022	0.5 U		0.0022	0.5 U		0.0022	0.5 U	
1,1,1-Trichloroethane	71-55-6	133.4	15.8	0.0032	0.54 U		0.0032	0.54 U		0.0032	0.54 U		0.0032	0.54 U		0.0032	0.54 U		0.0032	0.54 U	
Butanenitrile	109-74-0	69.1	15.8	0.0137	4.44 J		0.0122	3.97 J		0.0106	3.45 J		0.0034	1.1 U		0.0034	1.1 U		0.0104	3.37 J	
1-Butanol	71-36-3	74.1	16.3	1.1338	342.65		1.0859	328.18		1.0335	312.33		0.008	2.43 J		0.0032	0.97 U		1.0626	321.12	
Benzene	71-43-2	78.1	16.7	0.0385	11.05		0.0367	10.53		0.035	10.04		0.0016	0.46 U		0.0016	0.46 U		0.036	10.32	
Carbon Tetrachloride	56-23-5	153.8	17.0	0.0034	0.5 U		0.0034	0.5 U		0.0034	0.5 U		0.0034	0.5 U		0.0034	0.5 U		0.0034	0.5 U	
Cyclohexane	110-82-7	84.2	17.3	0.0037	0.99 J		0.003	0.81 J		0.0029	0.78 J		0.0036	0.96 U		0.0036	0.96 U		0.0033	0.87 J	
1,2-Dichloropropane	78-87-5	113.0	18.3	0.003	0.59 U		0.003	0.59 U		0.003	0.59 U		0.003	0.59 U		0.003	0.59 U		0.003	0.59 U	
Trichloroethene	79-01-6	131.4	18.7	0.0024	0.41 U		0.0024	0.41 U		0.0024	0.41 U		0.0024	0.41 U		0.0024	0.41 U		0.0024	0.41 U	
Heptane	142-82-5	100.2	19.2	0.0191	4.27		0.0182	4.07		0.0178	3.98 J		0.0018	0.4 U		0.0018	0.4 U		0.0173	3.87 J	
cis-1,3-Dichloropropene	10061-01-5	111.0	20.4	0.0024	0.48 U		0.0024	0.48 U		0.0024	0.48 U		0.0024	0.48 U		0.0024	0.48 U		0.0024	0.48 U	
4-Methyl-2-Pentanone	108-10-1	100.2	20.4	0.0161	3.6 J		0.0167	3.74 J		0.0162	3.63 J		0.0034	0.76 U		0.0034	0.76 U		0.0159	3.55 J	
Pyridine	110-86-1	79.1	20.6	0.0218	6.16 J		0.0205	5.79 J		0.0221	6.25 J		0.0186	5.27 U		0.0186	5.27 U		0.0197	5.59 J	
trans-1,3-Dichloropropene	10061-02-6	111.0	21.5	0.0018	0.36 U		0.0018	0.36 U		0.0018	0.36 U		0.0018	0.36 U		0.0018	0.36 U		0.0018	0.36 U	
Pentanenitrile	110-59-8	83.1	21.5	0.0042	1.13 U		0.0042	1.13 U		0.0042	1.13 U		0.0042	1.13 U		0.0042	1.13 U		0.0042	1.13 U	
1,1,2-Trichloroethane	79-00-5	133.4	21.9	0.0028	0.47 U		0.0028	0.47 U		0.0028	0.47 U		0.0028	0.47 U		0.0028	0.47 U		0.0028	0.47 U	
Toluene	108-88-3	92.1	22.6	0.3565	86.66		0.3442	83.69		0.323	78.54		0.002	0.49 U		0.002	0.49 U		0.3358	81.63	
1,2-Dibromoethane	106-93-4	187.9	24.1	0.0052	0.62 U		0.0052	0.62 U		0.0052	0.62 U		0.0052	0.62 U		0.0052	0.62 U		0.0052	0.62 U	
Octane	111-65-9	114.2	24.7	0.0024	0.47 U		0.0083	1.63 J		0.0078	1.53 J		0.0024	0.47 U		0.0024	0.47 U		0.0078	1.53 J	
Tetrachloroethylene	127-18-4	165.8	25.2	0.0585	7.91		0.0544	7.35		0.0542	7.33		0.0042	0.57 U		0.0042	0.57 U		0.0547	7.39	

Table B.1 (Cont'd) SUMMA™ Analysis Results for All Target Analytes from Tank S-102 Sampled on 2/11/97

Target Analytes	CAS	MW	Ret Time	V7006-A05 167 VSS			V7006-A06 169 VSS			V7006-A04 142 VSS			V7006-A01 066 VSS			V7006-A02 089			V7006-A05 167 VSS		
				Ambient Air			Ambient Air Thru VSS			Rep											
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Chlorobenzene	108-90-7	112.6	26.8	0.0026	0.52 U		0.0026	0.52 U		0.0026	0.52 U		0.0026	0.52 U		0.0026	0.52 U		0.0026	0.52 U	
Hexanenitrile	628-73-9	97.1	27.0	0.0014	0.33 J		0.0011	0.25 J		0.0007	0.16 J		0.0052	1.2 U		0.0052	1.2 U		0.0008	0.19 J	
Ethylbenzene	100-41-4	106.2	27.6	0.0028	0.59 U		0.0028	0.59 U		0.0028	0.59 U		0.0028	0.59 U		0.0028	0.59 U		0.0028	0.59 U	
p/m-Xylene	106-42-3	106.2	28.1	0.013	2.74 U		0.013	2.74 U		0.013	2.74 U		0.013	2.74 U		0.013	2.74 U		0.013	2.74 U	
Cyclohexanone	108-94-1	98.1	28.5	0.0058	1.32 U		0.0058	1.32 U		0.0058	1.32 U		0.0058	1.32 U		0.0058	1.32 U		0.0058	1.32 U	
Styrene	100-42-5	104.2	29.0	0.0022	0.47 U		0.0022	0.47 U		0.0022	0.47 U		0.0022	0.47 U		0.0022	0.47 U		0.0022	0.47 U	
1,1,2,2-Tetrachloroethane	79-34-5	167.9	29.2	0.0042	0.56 U		0.0042	0.56 U		0.0042	0.56 U		0.0042	0.56 U		0.0042	0.56 U		0.0042	0.56 U	
o-Xylene	95-47-6	106.2	29.3	0.0028	0.59 U		0.0028	0.59 U		0.0028	0.59 U		0.0028	0.59 U		0.0028	0.59 U		0.0028	0.59 U	
Nonane	111-84-2	128.3	29.7	0.0016	0.28 U		0.0043	0.76 J		0.0016	0.28 U		0.0016	0.28 U		0.0016	0.28 U		0.0016	0.28 U	
1-Ethyl-2-Methyl-Benzene	611-14-3	120.2	32.7	0.0018	0.34 U		0.0018	0.34 U		0.0018	0.34 U		0.0018	0.34 U		0.0018	0.34 U		0.0018	0.34 U	
1,3,5-Trimethylbenzene	108-67-8	120.2	32.9	0.0018	0.34 U		0.0018	0.34 U		0.0018	0.34 U		0.0018	0.34 U		0.0018	0.34 U		0.0018	0.34 U	
1,2,4-Trimethylbenzene	95-63-6	120.2	34.2	0.0026	0.48 U		0.0026	0.48 U		0.0026	0.48 U		0.0026	0.48 U		0.0026	0.48 U		0.0026	0.48 U	
Decane	124-18-5	142.3	34.4	0.0062	0.98 J		0.0056	0.88 J		0.0057	0.9 J		0.003	0.47 U		0.003	0.47 U		0.0061	0.96 J	
1,3-Dichlorobenzene	541-73-1	147.0	34.7	0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U	
1,4-Dichlorobenzene	106-46-7	147.0	34.9	0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U	
1,2-Dichlorobenzene	95-50-1	147.0	36.0	0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U	
Undecane	1120-21-4	156.3	38.8	0.0282	4.04 U		0.0282	4.04 U		0.0282	4.04 U		0.0282	4.04 U		0.0282	4.04 U		0.0282	4.04 U	
1,2,4-Trichlorobenzene	120-82-1	181.5	42.3	0.0028	0.35 U		0.0028	0.35 U		0.0028	0.35 U		0.0028	0.35 U		0.0028	0.35 U		0.0028	0.35 U	
Dodecane	112-40-3	170.3	42.8	0.0098	1.29 U		0.0098	1.29 U		0.0263	3.46 J		0.0424	5.57 J		0.0098	1.29 U		0.0098	1.29 U	
Hexachloro-1,3-butadiene	87-68-3	260.8	44.1	0.0046	0.4 U		0.0046	0.4 U		0.0046	0.4 U		0.0046	0.4 U		0.0046	0.4 U		0.0046	0.4 U	
Tridecane	629-50-5	184.4	46.5	0.1166	14.17		0.0582	7.07 J		0.5218	63.4		1.4487	176.02		0.3759	45.68		0.0115	1.4 J	
Tetradecane	629-59-4	198.3	50.0	0.7089	80.06		0.1254	14.16		0.4219	47.65		4.0495	457.34 E		0.8383	94.68		0.049	5.53	

B Compound found in associated laboratory blank

E Target compound exceeds 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

* Denotes diluted value was reported for target compound in table

Table B.2 Triple Sorbent Trap Analysis Results for All Target Analytes from Tank S-102 Sampled on 2/11/97.

Target Analytes	CAS	MW	Ret Time	V7006-A11.1115 VSS			V7006-A12.1116 VSS			V7006-A12.1116 VSS REP			V7006-A13.1117 VSS		
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	120.9	7.9	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	8.9	0.01	4.44	J	0.0166	7.37	J	0.0122	5.4	J	0.0135	5.99	J
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	170.9	9.6	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	8.1473	5696.02	E.Y	12.5024	8740.77	E.Y	10.8589	7591.73	E.Y	10.0373	7017.32	E.Y
Vinyl Chloride	75-01-4	62.5	10.0	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	0.0955	36.81		0.0903	34.79		0.0833	32.11		0.0902	34.76	
Chloroethane	75-00-3	64.5	12.1	0.0044	1.53	U	0.0044	1.53	U	0.0044	1.53	U	0.0044	1.53	U
Ethanol	64-17-5	46.1	12.5	43.9246	21356.86	E.Y	43.3585	21081.6	E.Y	42.381	20606.37	E.Y	42.1984	20517.56	E.Y
Acetonitrile	75-05-8	41.1	13.0	0.1673	91.32		0.3334	181.9		0.4096	223.53		0.2364	128.98	
Acetone	67-64-1	58.1	13.7	0.7028	271.03		0.6982	269.27		0.5775	222.74		0.6155	237.39	
Trichlorofluoromethane	75-69-4	137.4	14.2	0.151	24.61		0.1445	23.57		0.1454	23.7		0.1425	23.24	
Pentane	109-66-0	72.0	14.9	0.0262	8.14	J	0.0277	8.61	J	0.0249	7.74	J	0.0268	8.34	J
1,1-Dichloroethene	75-35-4	96.9	15.5	0.0022	0.51	U	0.0079	1.83	J	0.0068	1.57	J	0.0022	0.51	U
Methylene Chloride	75-09-2	84.9	15.8	0.0799	21.06	J.B	0.0916	24.17	J.B	0.0861	22.72	J.B	0.0518	13.66	J.B
1,1,2-trichloro-1,1,2,2-tetrafluoroethane	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	0.0142	5.78	J	0.0157	6.4	J	0.0158	6.43	J	0.0146	5.95	J
Propanol	71-23-8	60.1	17.1	0.1133	42.25		0.1115	41.57		0.1138	42.42		0.1112	41.43	
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	0.1482	46.02		0.1386	43.06		0.1126	34.98		0.1353	42.03	
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	0.0032	0.73	J
Hexane	110-54-3	86.2	19.9	0.0204	5.3		0.0199	5.18		0.0194	5.04		0.0204	5.29	
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	20.8	0.0603	18.72		0.0605	18.79		0.0584	18.13		0.0614	19.06	
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	21.9	0.0015	0.49	U	0.0015	0.49	U	0.0015	0.49	U	0.0015	0.49	U
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	0.6798	205.79		0.5661	171.35		0.6681	202.25		0.7666	232.05	
Benzene	71-43-2	78.1	22.8	0.0352	10.1		0.0349	10		0.0347	9.95		0.0348	9.98	
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	0.0223	4.99		0.022	4.91		0.0215	4.8		0.0228	5.11	
4-Methyl-2-Pentanone	108-10-1	100.2	26.3	0.0364	8.15		0.0376	8.42		0.0346	7.75		0.0403	9.02	
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 S-102 Sampled on 2/11/97.

Target Analytes	CAS	MW	Ret Time	V7006-A11.1115 VSS			V7006-A12.1116 VSS			V7006-A12.1116 VSS REP			V7006-A13.1117 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	0.0362	10.24 J		0.0385	10.9 J		0.0438	12.4 J		0.039	11.05 J	
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	
Pentanitrile	110-59-8	83.2	27.4	0.0009	0.23 U		0.0009	0.23 U		0.0009	0.23 U		0.0016	0.43 J	
1,1,2-Trichloroethane	79-00-5	133.4	27.8	0.0108	1.82 J		0.0098	1.65 J		0.0101	1.7 J		0.0106	1.78 J	
Toluene	108-88-3	92.1	28.5	0.3125	75.96		0.3076	74.79		0.307	74.63		0.3181	77.34	
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	0.0134	2.64 J		0.0138	2.71 J		0.013	2.55 J		0.0147	2.88 J	
Tetrachloroethylene	127-18-4	165.8	31.0	0.0623	8.42		0.0631	8.52		0.0628	8.48		0.0658	8.89	
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	0.0031	0.71 U		0.0031	0.71 U		0.0031	0.71 U		0.0031	0.71 U	
Ethylbenzene	100-41-4	106.2	33.4	0.004	0.85 J		0.0038	0.81 J		0.0039	0.82 J		0.0032	0.68 J	
p/m-Xylene	106-42-3	106.2	33.9	0.0111	2.35 J		0.0115	2.44 J		0.0116	2.44 J		0.0094	1.99 J	
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	0.0067	1.42 J		0.0071	1.49 J		0.0074	1.55 J		0.0063	1.33 J	
Nonane	111-84-2	128.0	35.4	0.0078	1.37 J		0.0076	1.33 J		0.0073	1.27 J		0.0081	1.41 J	
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-Trimethyl benzene	108-67-8	120.2	38.7	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	0.0079	1.24 J		0.0084	1.32 J		0.0068	1.07 J		0.0081	1.28 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	0.0052	0.74 J		0.0047	0.68 U		0.0047	0.68 U		0.005	0.72 J	
1,2,4-Trichlorobenzene	120-82-1	181.5	48.1	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	48.5	0.0274	3.61 U		0.0274	3.61 U		0.0274	3.61 U		0.0274	3.61 U	
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	0.0279	3.4 U		0.0279	3.4 U		0.0279	3.4 U		0.0279	3.4 U	
Tetradecane	629-59-4	198.0	55.7	0.0388	4.39 J.B		0.0404	4.57 J.B		0.0366	4.15 J.B		0.033	3.74 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 found in associated laboratory blank

E Target compound exceeds 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.

Table B.3 Triple Sorbent Trap Analysis Results for All Target Analytes from Blank Samples Associated with the Sampling of Tank S-102 on 2/11/97.

Target Analytes	CAS	NW	Ret Time	V7006-A17.1344 FB #1 (mg/m3)	(ppbv)	Flag	V7006-A18.1345 FB #2 (mg/m3)	(ppbv)	Flag	V7006-A19.1346 TB #1 (mg/m3)	(ppbv)	Flag	V7006-A20.1347 TB #2 (mg/m3)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	120.9	7.9	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	8.9	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	9.6	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		<0.274	<192 Y		<0.274	<192 Y		<0.274	<192 Y	
Vinyl Chloride	75-01-4	62.5	10.0	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	<0.274	<133 Y		<0.274	<133 Y		<0.274	<133 Y		<0.274	<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	14.2	0.0044	0.72 U		0.0044	0.72 U		0.0044	0.72 U		0.0044	0.72 U	
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		0.0063	1.45 J	
Methylene Chloride	75-09-2	84.9	15.8	0.0258	6.81 JB		0.0314	8.28 JB		0.0243	6.4 JB		0.0314	13.56 JB	
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		0.0013	0.32 U		0.0013	0.32 U		0.0013	0.32 U	
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	20.8	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	21.9	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		0.0021	0.46 U		0.0021	0.46 U		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 S-102 on 2/11/97.

Target Analytes	CAS	MW	Ret	V7006-A17.1344 FB #1			V7006-A18.1345 FB #2			V7006-A19.1346 TB #1			V7006-A20.1347 TB #2		
			Time	(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	0.0098	1.64	J	0.0101	1.7	J	0.0098	1.65	J	0.0101	1.7	J
Toluene	108-88-3	92.1	28.5	0.0025	0.6	J	0.0025	0.62	J	0.0013	0.32	J	0.0055	1.33	J
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	38.7	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	48.1	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	48.5	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	0.0313	3.54	J.B	0.0244	2.76	J.B	0.0244	2.76	J.B	0.0206	2.33	J.B
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

B Compound found 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.

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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