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Pacific Northwest National Laboratory

Operated by Battelle for the
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TANK VAPOR CHARACTERIZATION PROJECT

Tank 241-S-102 Fourth Temporal Study: Headspace Gas and Vapor Characterization Results from Samples Collected on December 19, 1996

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September 1997

Prepared for Lockheed Martin Hanford
under a Related Services Agreement
with the U.S. Department of Energy
Contract DE-AC06-76RLO 1830

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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 2.410% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <2.973% 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 12/19/96

Category	Sample Medium	Analyte	Concentration[a]	Units
Inorganic Vapors	Sorbent Traps	Ammonia	688	ppmv
		Nitrogen Dioxide (NO_2)	<0.16	ppmv
		Nitric Oxide (NO)	<0.16	ppmv
		Water	14.0	mg/L
Permanent Gases	SUMMA™ Canisters	Hydrogen	964	ppmv
		Methane	<25	ppmv
		Carbon Dioxide	<17	ppmv
		Carbon Monoxide	<17	ppmv
		Nitrous Oxide (N_2O)	914	ppmv
Total Non-Methane Organic Compounds	SUMMA™ Canisters	Total Non-Methane Organic Compounds	17.06	mg/m^3
Volatile Organic Vapors	SUMMA™ Canisters	Ethanol	14.500	mg/m^3
		Methanol	8.344	mg/m^3
		1-Butanol	1.760	mg/m^3
Volatile Organic Vapors	Sorbent Traps	Ethanol	21.723	mg/m^3
		Methanol	8.137	mg/m^3
		1-Butanol	1.366	mg/m^3
Flammables	SUMMA™ Canisters and Sorbent Traps	Flammables	<2.973	% LFL

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

Acknowledgments

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

Terms and Abbreviations

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

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1.0 Introduction

This report presents results of chemical analyses of vapor samples collected by SESC on December 19, 1996 from the headspace of waste storage tank 241-S-102 (Tank S-102) at the Hanford Site in Washington State. These samples represent the fourth temporal sampling of Tank S-102. 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 for sorbent traps for inorganic analytes, sample devices and controls for SUMMA™ canisters, and TSTs were provided to SESC on December 18, 1996. All samples were returned to PNNL on January 2, 1997. SESC measured and reported to PNNL the sample volumes needed to determine headspace concentrations from sorbent trap samples.

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

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

2.0 Analytical Methods

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

Table 2.1. Sampling and Analysis Methods Summary

Analyte	Sampling Media	Extraction Method	Analysis Method	Procedure
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

Sampling Media	Supplier and Catalog Number	Preparation Procedure	Handling and Storage Procedure
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 (NO_2), 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, NO_2, 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 [$(NH_4)_2SO_4$]. The NO_2 traps contained a zeolite impregnated with triethanolamine (TEA), with 400 mg in the primary and 200 mg in the breakthrough sections. The NO_2 was absorbed and disproportionated to equi-molar quantities of nitrite ions (NO_2^-) and nitrate ions (NO_3^-). Glass tubes containing 800 mg of an oxidant were used to convert NO to NO_2. The converted NO was then collected as nitrite and nitrate in an NO_2 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 $\leq$ 10°C because of handling recommendations for the oxidizer tubes attached to some samples. After receipt of exposed and

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(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

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

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-μg/mL ammonia stock standard solution from dried reagent-grade NH_4Cl and DIW, 2) preparing 0.1-, 0.5-, 1.0-, 10-, and 100-μg/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

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(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 ± 10%, and for NO results it is ± 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

Analyte	Formula	EQL[(a)] (ppmv)
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 (N_2O).

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 and humidified air and evacuates them for several cycles while the canister is heated. If the canister is verified as clean, the canister is evacuated to 5 mtorr and tagged. Before sending the canisters to the field for sampling, the canister vacuum is measured to determine if any leakage has occurred. If the vacuum has remained constant during storage, the canisters are prehumidified with 100 µL 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, N_2O, 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

Analyte	Formula	EQL (ppmv)
Carbon Dioxide	CO_2	17
Carbon Monoxide	CO	17
Methane	CH_4	25
Hydrogen	H_2	17
Nitrous Oxide	N_2O	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 N_2O 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 ± 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/m^3 was derived from the 10-point multilevel calibration curve from the propane standard using the following equation:

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

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/m^3. 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

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(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/m^3 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:

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

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/m^3:

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

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 TD^3), 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 3.4.1.1. The method employs Supelco Carbotrap™ 300 traps for sample collection and preconcentration. The traps are ground-glass tubes (11.5 cm long X 6 mm OD, 4 mm ID) containing a series of sorbents arranged in order of increasing retentivity. Each trap contains 300 mg of Carbotrap™ C, 200 mg of Carbotrap™ B, and 125 mg of Carbosieve™ S-III. The first two sorbents are deactivated graphite with limited sorption power for less volatile compounds. The final trapping stage, the Carbosieve™ S-III, is a graphetized 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

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(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/m^3 assumes STP conditions (0°C and 1.013 bar) and was calculated directly from the following equation:

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

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/m^3:

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

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 December 19, 1996 (Sample Job V6001) are provided below.

3.1 Inorganic Vapors

Measured vapor concentrations of ammonia, nitric oxide (NO), nitrogen dioxide (NO_2), 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 V6001. 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 ± 10% and within the ± 30% specified by the SAP. Percent relative standard deviations of the measured concentrations were <4.3%, which is within the 25% specified by the SAP.

3.1.1 Ammonia

Ammonia analyses were performed on January 10 and 13, 1997, 22 and 25 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 56.0 to 58.9 μmol in front sections; blank corrected back sorbent section ammonia concentrations were <0.01 μmol. 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 ± 1.6%. One blank sorbent trap was spiked with 17 ppm of ammonia and yielded a percentage recovery of 105%. One sample leachate was spiked after initial analysis with approximately the quantity of ammonia in the sample and yielded a percentage recovery of 96%. The initial and continuing calibration verification (ICV, CCV) standards, using NIST-traceable material, yielded percentage recoveries of 99% (ICV) and 103% (CCV) during the analytical session. A five-point calibration was performed over an ammonia range of 0.1 to 100 μg/ml.

3.1.2 Nitric Oxide and Nitrogen Dioxide

Nitric oxide and nitrogen dioxide analyses were performed on January 10 and 13, 1996, 22 and 25 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 µmol. Nitrite blank levels used to correct data were 0.0143 µmol in front (four of four blanks analyzed) and 0.0054 µmol in back (two of four blanks analyzed) sorbent sections. The analyses of two samples were duplicated and yielded repeatabilities of ± 4.3% and ± 4.0%. Two sample leachates were spiked with 0.25 ppm NO_2^- and yielded percentage recoveries of 95% and 101%. A 4-point calibration was performed over a concentration range of 0 to 0.5 µg/mL NO_2^- in the desorbing matrix.

3.1.3 Water

Analyses for water vapor were performed on January 7, 1997, 19 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 14.0 mg of water per L of dry air at STP. The result was determined from an average mass gain of 28.6 mg from all four multi-trap trains. The blank correction applied to the results was - 2.6 mg per multi-trap train. A control mass was measured and indicated a measurement accuracy of ± 0.1 mg. The average water vapor concentration corresponds to a tank headspace dew point at 15.0°C and relative humidity at 50% at the time of sampling.

3.2 Permanent Gases

Hydrogen analyses were performed on January 20, 1997, and analyses for other permanent gases were performed on January 16, 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. Sample V6001-A06.312 was observed to have hydrogen at 9009 ppmv. Upon reanalysis the hydrogen value was measured at 8604 ppmv. Reanalysis of the SUMMA™ canister on a second system found helium to be a interference causing the elevated hydrogen value. Because of this interference the hydrogen value from SUMMA™ canister V6001-A06.312 was not used in the mean value calculation. No other deviations 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, with the exception of the hydrogen value. Hydrogen at 964 ppmv and nitrous oxide at 914 ppmv were detected in samples from Tank S-102. The relative percent difference (RPD) between duplicate analyses of a single SUMMA™ canister was less than 1% for hydrogen and nitrous oxide.

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

3.3 Total Non-Methane Organic Compounds

Analyses for TNMOCs were performed on January 21, 1997 which is within the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). All three tank samples and the two ambient samples (100%) were successfully analyzed and used in the averages.

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 17.06 mg/m^3 or 7.11 ppmv of carbon. The 17.06 mg/m^3 value compares to 28.25 mg/m^3 for the sum of all target compounds identified in the analysis of the SUMMA™ canisters. The 28.25 mg/m^3 value should be considered a minimum value as TICs were not considered in this report. Results provided in Table 3.3 are estimated to be accurate to within ± 30% as specified by the SAP. The RPD for duplicate analysis of a single SUMMA™ canister was less than 0.1%.

3.3.1 Procedural Deviations, Observations, and Anomalies.

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

3.4 Organic Compound Characterization

Organic vapors in the Tank 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 April 23 and May 1, 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 3.4.1.1.

Measured concentrations of target analytes are presented in Table 3.4. Thirty-four target analytes above the instrument detection limit (IDL) were detected in the tank headspace samples. All 34 target analytes were identified in two or more tank headspace samples. Ethanol at 14.500 mg/m^3, methanol at 8.344 mg/m^3, and 1-butanol at 1.760 mg/m^3 were the three most abundant compounds identified in the tank headspace samples. The total average concentration was 28.25 mg/m^3 for the target analytes. This compares to a total concentration of 17.06 mg/m^3 identified in the TO-12 analysis of the three tank headspace samples.

SUMMA™ canister V6001-A05.276 was analyzed in replicate for target analytes to determine analytical precision. The RPD results are presented in Table 3.5. The RPDs were calculated for analytes detected above the IDL and found in both replicates. Twenty-nine of 32 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. Twelve target compounds were observed in one or both of the ambient air samples. All target compounds were observed below the EQL with the exception of acetone.

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 two batches. The sample analytical sequence runs were as follows:

(File Identifier # 17042302.b) - V6001-A01.031, V6001-A02.248, V6001-A04.272, V6001-A05.276, V6001-A05.276 REP, V6001-A06.312;

(File Identifier # 17050102.b) - V6001-A05.276, V6001-A05.276 REP, V6001-A06.312.

Batch #1:

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

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

Tetradecane and chloroethane were not found in the tank samples at concentrations higher than their IDLs. Pyridine was found in all tank samples at concentrations between its IDL and EQL, except in ambient air samples V6001-A01.031 and V6006-A02.248 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 (chloroethane - 29.6%, hexachloro-1,3-butadiene - 38.1%, tridecane - 28.3%, and tetradecane - 118.9%) were outside the 25% difference (% D) acceptance criteria for the CCV sample. However, the CCV passed the procedural criterion requiring ±25% D passage for 85% of all target compounds.

Pyridine and tridecane were found in all tank samples at concentrations between IDL and EQL except ambient air samples V6001-A01.031 and V6001-A02.248 where they were not found at concentration above their IDLs. Hexachloro-1,3-butadiene was not found in the tank samples at concentration above its IDL, except ambient air sample where it was found at concentration between IDL and EQL. The presence of this compound in the samples is explained by its crossover from the standard. 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 initial calibration blank (ICB) above its EQLs. No target compound was detected in the continuing calibration blank (CCB) above their EQLs.

Batch #2:

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

Two target compounds (chloroethane - 47.60% and pyridine - 53.79%) surpassed the 30% RSD acceptance criteria for initial calibration. Tetradecane surpassed 0.05 RF criteria for the initial calibration. Tetradecane and chloroethane were not found in the tank samples at concentrations higher than their IDLs. Pyridine was found in all tank samples at concentrations between its IDL and EQL, except samples V6001-A06.312 and V6006-A05.276 REP where it was not found at concentrations above its IDL. Due to the initial calibration performance the uncertainty associated with the results is higher than normal. One target compound (chloroethane - 30.5%) was outside the 25% difference (% D) acceptance criteria for the CCV sample. Tetradecane surpassed 0.05 RF 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 CCB above their EQLs.

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, ethanol, and 1,3-butadiene 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 April 16 and 17, 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. Results are based on three samples for each compound. Twenty-nine target analytes above the IDL were detected in the tank headspace samples. All 29 target analytes were identified in two or more tank headspace samples. Ethanol at 21.723 mg/m^3, methanol at 8.137 mg/m^3, and 1-butanol at 1.366 mg/m^3 were the three most abundant compounds identified in the tank headspace sample. The total average concentration of the target analytes was 33.84 mg/m^3.

Triple sorbent trap sample V6001-A12.1394 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. Twenty-three of 28 target analytes had RPDs of less than 10%.

Results of analyses of target analytes in the field and trip blanks are provided in Table 3.9. Six target analytes were identified in one or more of the blank samples. Most of the compounds observed were below the EQL with the exception of trichlorofluoromethane and toluene in one trip blank.

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

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

3.4.2.1 Procedural Deviations, Observations, and Anomalies. Samples were run under the protocols of TVP-10, Rev. 2 with the initial calibration performed on April 8, 1997 and quantitated against a CCV run at beginning of the batch.

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

Batch #1 (file identifier 47014601.b) - V6001-A17.1352, V6001-A18.1353, V6001-A19.1354, V6001-A20.1355;

Batch #2 (file identifier 47041701.b) - V6001-A11.1348, V6001-A12.1349, V6001-A12.1349 REP, V6001-A13.1350.

Batch #1:

This batch contained field and trip blanks collected on 12/19/96 associated with the fourth temporal sampling study on tank S-102. Only target compounds were evaluated as stated in the SAP for this study.

The CCV was satisfactory for all target compounds except chloromethane (38.8%), methanol (40.6%), chloroethane (25.8%), ethanol (51.1%), tridecane (30.2%), and tetradecane (49.8%). The field blanks and one trip blank contained minor amounts of tetradecane (below EQL). The uncertainty in the CCV would only impact the quantitation of those compounds if present in significant quantities in the analytical batch. Tetradecane has consistently exhibited a much higher than average uncertainty in reproducibility of standards. The CCB contained a trace amount (below EQL) of methylene chloride, tridecane, 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.

Batch #2:

This batch consisted of samples collected on 12/19/96 associated with the fourth temporal sampling study on tank S-102. Only target compounds were evaluated as stated in the SAP for this study.

The CCV was satisfactory for all target compounds except chloromethane (44.4%), methanol (39.0%), chloroethane (29.9%), and ethanol (55.4%). The tank samples contained quantifiable amounts of methanol and ethanol. 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. Some apparent minor carryover from the CCV was apparently the cause for the CCB to contained trace levels (below the EQL) of methylene chloride, propanol, 2-butanone, 1-butanol, benzene and tetradecane. Carryover in a CCB is unusual but should not represent any serious impact on the samples since the CCB is effectively a cleanout run for the instrument. Compounds found in the CCB at concentrations (in ng) greater than 5% of the sample concentration are flagged with a "B" in the tables.

Instrument detection limits, precision, and accuracy have not been experimentally evaluated for 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. The methanol, ethanol, and 1,3-butadiene results falling within the calibration range are quantitative results as evidenced by a valid calibration for these compounds.

Tributyl phosphate (TBP) is included in the target list based on a calibration performed on January 5 and 9, 1996. The TBP was introduced onto a series of double sorbent traps as a methanolic solution standard rather than a vapor standard. This served to determine the retention time and verify the mass spectral characteristics of the compound. However, verification of the calibration acceptability was not performed because the compound is not present in the CCV. At present, it is not possible to prepare a gas standard from this material. The calibration information on TBP demonstrated that detectability at 0.80 ppbv (based on a 200-mL sample) was possible. Tributyl phosphate was not detected in the samples.

3.5 Flammability

The analytical results presented above can be used to estimate the Tank 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 2.410% of its LFL. Total headspace flammability was estimated to be <2.973% of the LFL.

Table 3.1 Inorganic Vapor Concentrations from Tank S-102 Sampled on 12/19/96

Analyte	CAS Number	V6001-A07-10R	V6001-A08-11R	V6001-A09-12R	V6001-A10-13R	Average	Standard Deviation
Ammonia (ppmv)	7664-41-7	675	677	710	690	688	16
Nitric Oxide (ppmv)		<0.16	<0.16	<0.16	<0.16	<0.16	
Nitrogen Dioxide (ppmv)		<0.16	<0.16	<0.16	<0.16	<0.16	
Water[(a)] (mg/L)		14.3	13.5	13.5	14.6	14.0	0.6
Water[(b)] (mg/L)		12.7	12.0	12.0	13.0	12.4	0.5

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 12/19/96

Permanent Gas Analyte	Ambient Air Upwind V6001-A01.031[a] (ppmv)	Ambient Air Through Bundle V6001-A02.248[a] (ppmv)	Tank Samples V6001-A04.272[a] (ppmv)	V6001-A06.312[a] (ppmv)	V6001-A05.276[a] (ppmv)	V6001-A05.276[a][b] (ppmv)	RPD[c] (%)	Mean (ppmv)	St.Dev.
Hydrogen	<17	<17	965	9009[d]	963	957	0.6	964	1.4
Methane	<25	<25	<25	<25	<25	<25		<25	
Carbon Dioxide	464	467	<17	<17	<17	<17		<17	
Carbon Monoxide	<17	<17	<17	<17	<17	<17		<17	
Nitrous Oxide	<17	<17	918	906	919	920	0.1	914	7.2

Footnotes

(a) Sample identification number.

(b) Replicate analysis for V6001-A05.276; results are not included in the calculation of average concentrations.

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

(d) Replicate analysis for V6001-A06.312 found 8604 ppmv of hydrogen; results are not included in the calculation of average concentrations. See discussion in Section 3.2.1.

Table 3.3 Total Non-Methane Organic Compound Analysis Results from Tank S-102 Sampled on 12/19/96

	Ambient Air Upwind V6001-A01.031[(a)] Concentration	Ambient Air Through Bundle V6001-A02.248[(a)] Concentration	Tank Samples V6001-A04.272[(a)] Concentration	Tank Samples V6001-A06.312[(a)] Concentration	Tank Samples V6001-A05.276[(a)] Concentration	Tank Samples V6001-A05.276[(a)(b)] Concentration	RPD[(c)] (%)	Mean	St.Dev.
TO-12 (mg/m^3)	< 0.59	< 0.59	17.17	17.00	17.01	17.01	0.0	17.06	0.10
Total Carbon (ppmv)								7.11	

Footnotes

(a) Sample identification number.

(b) Replicate analysis for V6001-A05.276; 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 12/19/96

			Ret	V6001-A05 276 [b][c] VSS			V6001-A06.312 [b] VSS			V6001-A04.272 [b] VSS			Mean and Standard Deviation			
Target Analytes[a]	CAS	MW	Time	(mg/m^3)	(ppbv)	Flag	(mg/m^3)	(ppbv)	Flag	(mg/m^3)	(ppbv)	Flag	(mg/m^3)	St. Dev.	(ppbv)	St. Dev.
Dichlorodifluoromethane	75-71-8	121	4.6	0.004	0.82	J	0.005	0.88	J	0.004	0.79	J	0.004	0.000	0.83	0.046
Chloromethane	74-87-3	50	5.0	0.005	2.2	J	0.005	2.3	J	0.005	2.1	J	0.005	0.000	2.2	0.085
Methanol	67-56-1	32	5.2	8.829	6173	Y*	8.726	6100	Y*	7.476	5227	Y*	8.344	0.753	5833	526
Butane	106-97-8	58	5.9	0.183	70		0.184	71		0.182	70		0.183	0.001	70	0.53
Ethanol	64-17-5	46	6.8	14.559	7088	Y*	15.638	7614	Y*	13.303	6476	Y*	14.500	1.169	7059	569
Acetonitrile	75-05-8	41	7.3	0.039	21	J	0.045	24		0.033	18	J	0.039	0.006	21	3.2
Acetone	67-64-1	58	7.9	1.252	483		1.252	483		1.221	471		1.242	0.018	479	7.0
Trichlorofluoromethane	75-69-4	137	8.3	0.242	39		0.238	39		0.233	38		0.238	0.005	39	0.75
Pentane	109-66-0	72	9.0	0.066	20		0.070	22		0.073	23		0.070	0.004	22	1.2
Methylene Chloride	75-09-2	85	9.7	0.007	2.0	J,B	0.008	2.0	J,B	0.007	1.9	J,B	0.007	0.000	1.9	0.067
Propanenitrile	107-12-0	55	10.9	0.015	5.9	J	0.014	5.9	J	0.014	5.6	J	0.014	0.000	5.8	0.16
Propanol	71-23-8	60	10.9	0.218	81		0.211	79		0.216	80		0.215	0.004	80	1.4
2-Butanone	78-93-3	72	12.5	0.232	72		0.230	72		0.225	70		0.229	0.004	71	1.2
Hexane	110-54-3	86	13.7	0.042	11		0.041	11		0.040	10		0.041	0.001	11	0.32
Tetrahydrofuran	109-99-9	72	14.6	0.147	46		0.140	44		0.142	44		0.143	0.004	44	1.1
Butanenitrile	109-74-0	69	15.8	0.015	4.8	J	0.015	4.8	J	0.014	4.4	J	0.014	0.001	4.7	0.26
1-Butanol	71-36-3	74	16.3	1.838	555		1.671	505		1.770	535		1.760	0.084	532	25
Benzene	71-43-2	78	16.7	0.075	22		0.071	20		0.072	21		0.072	0.002	21	0.71
Cyclohexane	110-82-7	84	17.3	0.005	1.3	J	0.008	2.1	J	0.004	0.96	U	0.006	d	1.7	d
Heptane	142-82-5	100	19.3	0.059	13		0.056	12		0.057	13		0.057	0.002	13	0.42
4-Methyl-2-Pentanone	108-10-1	100	20.5	0.029	6.5	J	0.028	6.3	J	0.027	6.0	J	0.028	0.001	6.3	0.26
Pyridine	110-86-1	79	20.6	0.046	13	J	0.041	11	J	0.050	14	J	0.046	0.005	13	1.4
Toluene	108-88-3	92	22.6	0.747	182		0.695	169		0.700	170		0.714	0.028	174	6.9
Octane	111-65-9	114	24.7	0.030	5.9		0.028	5.6		0.029	5.7		0.029	0.001	5.7	0.18
Tetrachloroethylene	127-18-4	166	25.2	0.087	12		0.082	11		0.081	11		0.083	0.003	11	0.43
Ethylbenzene	100-41-4	106	27.7	0.008	1.7	J	0.008	1.6	J	0.008	1.6	J	0.008	0.000	1.6	0.040
p/m-Xylene	106-42-3	106	28.1	0.025	5.4	J	0.024	5.1	J	0.025	5.2	J	0.025	0.001	5.2	0.15
Cyclohexanone	108-94-1	98	28.5	0.006	1.3	U	0.039	8.9	J	0.045	10	J	0.042	d	9.6	d
o-Xylene	95-47-6	106	29.3	0.012	2.4	J	0.011	2.3	J	0.011	2.3	J	0.011	0.000	2.4	0.049
Nonane	111-84-2	128	29.8	0.017	3.0		0.017	2.9		0.017	2.9		0.017	0.000	3.0	0.046
Decane	124-18-5	142	34.5	0.020	3.1	J	0.018	2.9	J	0.020	3.1	J	0.019	0.001	3.0	0.12
Undecane	1120-21-4	156	38.8	0.011	1.6	J	0.010	1.5	J	0.011	1.6	J	0.011	0.000	1.5	0.058
Dodecane	112-40-3	170	42.8	0.010	1.3	U	0.011	1.4	J	0.018	2.3	J	0.014	d	1.9	d
Tridecane	629-50-5	184	46.5	0.017	2.1	J	0.012	1.5	J	0.035	4.2	J	0.021	0.012	2.6	1.4
Total Concentration of Target Analytes													**28.25**			

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 SUMMA™ Canister from Tank S-102 Sampled on 12/19/96

Target Analytes[a]	CAS	MW	Ret Time	V6001-A05.276 [b] VSS (mg/m³)	(ppbv)	Flag	(mg/m³)	(ppbv)	Flag	RPD[c] (%)
Dichlorodifluoromethane	75-71-8	121	4.6	0.004	0.82	J	0.005	0.87	J	7
Chloromethane	74-87-3	50	5.0	0.005	2.2	J	0.005	2.2	J	2
Methanol	67-56-1	32	5.2	8.829	6173	Y*	7.994	5589	Y*	10
Butane	106-97-8	58	5.9	0.183	70		0.185	71		2
Ethanol	64-17-5	46	6.8	14.559	7088	Y*	15.201	7401	Y*	4
Acetonitrile	75-05-8	41	7.3	0.039	21	J	0.039	21	J	1
Acetone	67-64-1	58	7.9	1.252	483		1.248	481		0
Trichlorofluoromethane	75-69-4	137	8.3	0.242	39		0.242	40		0
Pentane	109-66-0	72	9.0	0.066	20		0.066	20		0
Methylene Chloride	75-09-2	85	9.7	0.007	2.0	J,B	0.008	2.0	J,B	4
Propanenitrile	107-12-0	55	10.9	0.015	5.9	J	0.014	5.8	J	3
Propanol	71-23-8	60	10.9	0.218	81		0.214	80		2
2-Butanone	78-93-3	72	12.5	0.232	72		0.228	71		2
Hexane	110-54-3	86	13.7	0.042	11		0.041	11		3
Tetrahydrofuran	109-99-9	72	14.6	0.147	46		0.146	45		1
Butanenitrile	109-74-0	69	15.8	0.015	4.8	J	0.016	5.2	J	8
1-Butanol	71-36-3	74	16.3	1.838	555		1.760	532		4
Benzene	71-43-2	78	16.7	0.075	22		0.073	21		3
Cyclohexane	110-82-7	84	17.3	0.005	1.3	J	0.006	1.6	J	18
Heptane	142-82-5	100	19.3	0.059	13		0.057	13		4
4-Methyl-2-Pentanone	108-10-1	100	20.5	0.029	6.5	J	0.027	6.1	J	7
Pyridine	110-86-1	79	20.6	0.046	13	J	0.043	12	J	6
Toluene	108-88-3	92	22.6	0.747	182		0.711	173		5
Octane	111-65-9	114	24.7	0.030	5.9		0.029	5.8		3
Tetrachloroethylene	127-18-4	166	25.2	0.087	12		0.084	11		4
Ethylbenzene	100-41-4	106	27.7	0.008	1.7	J	0.008	1.7	J	3
p/m-Xylene	106-42-3	106	28.1	0.025	5.4	J	0.025	5.3	J	1
o-Xylene	95-47-6	106	29.3	0.012	2.4	J	0.011	2.3	J	4
Nonane	111-84-2	128	29.8	0.017	3.0		0.017	3.0		1
Decane	124-18-5	142	34.5	0.020	3.1	J	0.020	3.2	J	2
Undecane	1120-21-4	156	38.8	0.011	1.6	J	0.010	1.5	J	7
Dodecane	112-40-3	170	42.8	0.010	1.3	U	0.011	1.5	J	
Tridecane	629-50-5	184	46.5	0.017	2.1	J	0.014	1.7	J	20

Data Quality Flags

B Compound found in associated laboratory blank.

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.

* 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 on12/19/96

				V6001-A01.031[(b)] Ambient Air			V6001-A02.248[(b)] Ambient Air Thru VSS		
Target Analytes[(a)]	CAS	MW	Ret Time	(mg/m^3)	(ppbv)	Flag	(mg/m^3)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	121	4.6	0.003	0.56	J	0.004	0.68	J
Methanol	67-56-1	32	5.2	<0.110	<77	Y	<0.110	<77	Y
Butane	106-97-8	58	5.9	0.002	0.92	U	0.004	1.4	J
Ethanol	64-17-5	46	6.8	<0.110	<53	Y	<0.110	<53	Y
Acetone	67-64-1	58	7.9	0.047	18		0.048	18	
Methylene Chloride	75-09-2	85	9.7	0.006	1.6	J,B	0.002	0.53	U
Propanol	71-23-8	60	10.9	0.004	1.4	J	0.003	1.0	U
2-Butanone	78-93-3	72	12.5	0.010	3.0	J	0.011	3.4	J
1-Butanol	71-36-3	74	16.3	0.003	0.97	U	0.015	4.6	J
Toluene	108-88-3	92	22.6	0.002	0.49	U	0.007	1.7	J
1,2,4-Trichlorobenzene	120-82-1	181	42.3	0.012	1.5	J,B	0.003	0.35	U
Hexachloro-1,3-butadien	87-68-3	261	44.1	0.016	1.4	J,B	0.005	0.40	U

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.

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

Table 3.7 Target Organic Compound Concentrations in Triple Sorbent Traps from Tank S-102 Sampled on 12/19/96

Target Analytes[a]	CAS	MW	Ret Time	V6001-A11.1348[b] VSS (mg/m³)	(ppbv)	Flag	V6001-A12.1349[b,c] VSS (mg/m³)	(ppbv)	Flag	V6001-A13.1350[b] VSS (mg/m³)	(ppbv)	Flag	Mean and Standard Deviation (mg/m³)	St. Dev.	(ppbv)	St. Dev.
Methanol	67-56-1	32	10.1	5.470	3824	E,Y	5.864	4099	E,Y	13.077	9142	E,Y	8.137	4.283	5689	2994
Butane	106-97-8	58	10.8	0.181	70		0.164	63		0.171	66		0.172	0.008	66	3.2
Ethanol	64-17-5	46	12.6	12.665	6158	E,Y	17.343	8432	E,Y	35.161	17096	E,Y	21.723	11.870	10562	5772
Acetonitrile	75-05-8	41	13.0	0.158	86		0.161	88		0.197	107		0.172	0.021	94	12
Acetone	67-64-1	58	13.7	0.494	191		0.575	222		0.484	186		0.518	0.050	200	19
Trichlorofluoromethane	75-69-4	137	14.2	0.205	33		0.155	25		0.224	37		0.195	0.036	32	5.8
Pentane	109-66-0	72	14.9	0.045	14		0.041	13		0.045	14		0.044	0.002	14	0.60
Methylene Chloride	75-09-2	85	15.8	0.053	14	J,B	0.027	7.2	J,B	0.049	13	J,B	0.043	0.014	11	3.7
Propanenitrile	107-12-0	55	17.1	0.014	5.6	J	0.014	5.9	J	0.014	5.9	J	0.014	0.000	5.8	0.17
Propanol	71-23-8	60	17.1	0.084	31	B	0.095	35	B	0.180	67	B	0.120	0.052	45	19
2-Butanone	78-93-3	72	18.6	0.093	29		0.106	33		0.180	56		0.126	0.047	39	14
Hexane	110-54-3	86	19.9	0.040	10		0.037	9.6		0.038	9.9		0.038	0.002	10.0	0.40
Tetrahydrofuran	109-99-9	72	20.8	0.121	37		0.118	37		0.134	42		0.124	0.009	39	2.7
Butanenitrile	109-74-0	69	21.9	0.002	0.49	U	0.011	3.4	J	0.010	3.3	J	0.010	d	3.4	d
1-Butanol	71-36-3	74	22.3	1.239	375		1.233	373		1.625	492		1.366	0.225	413	68
Benzene	71-43-2	78	22.8	0.067	19		0.067	19		0.069	20		0.067	0.001	19	0.33
Heptane	142-82-5	100	25.2	0.049	11		0.048	11		0.049	11		0.049	0.000	11	0.093
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.053	12		0.052	12		0.053	12		0.052	0.000	12	0.081
Pyridine	110-86-1	79	26.5	0.060	17	J	0.058	16	J	0.035	9.9	J	0.051	0.014	14	3.9
Toluene	108-88-3	92	28.5	0.587	143		0.583	142		0.594	144		0.588	0.005	143	1.3
Octane	111-65-9	114	30.5	0.028	5.5	J	0.029	5.6		0.029	5.7		0.028	0.000	5.6	0.086
Tetrachloroethylene	127-18-4	166	31.0	0.065	8.8		0.068	9.2		0.070	9.5		0.068	0.002	9.2	0.33
Ethylbenzene	100-41-4	106	33.4	0.006	1.3	J	0.006	1.2	J	0.006	1.3	J	0.006	0.000	1.3	0.035
p/m-Xylene	106-42-3	106	33.9	0.020	4.1	J	0.020	4.1	J	0.020	4.2	J	0.020	0.000	4.1	0.045
o-Xylene	95-47-6	106	35.1	0.010	2.1	J	0.010	2.1	J	0.010	2.1	J	0.010	0.000	2.1	0.010
Nonane	111-84-2	128	35.5	0.015	2.6		0.014	2.5		0.016	2.8		0.015	0.001	2.6	0.15
Decane	124-18-5	142	40.1	0.021	3.3	J	0.013	2.0	J	0.013	2.1	J	0.016	0.005	2.5	0.74
Undecane	1120-21-4	156	44.4	0.020	2.8	J	0.010	1.4	J	0.018	2.6	J	0.016	0.005	2.3	0.77
Tetradecane	629-59-4	198	55.8	0.061	6.9	J,B	0.046	5.2	J,B	0.044	4.9	J,B	0.050	0.009	5.7	1.1
Total Concentration of Target Analytes													**33.84**			

Data Quality Flags

B Compound found in associated laboratory blank.

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

E Target compound exceeds the upper quantification limit (UQL)

U Target compound not detected at or above the IDL.

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

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

(c) 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 12/19/96

Target Analytes[a]	CAS	MW	Ret Time	V6001-A12.1349[b] VSS (mg/m^3)	(ppbv)	Flag	(mg/m^3)	(ppbv)	Flag	RPD[c] (%)
Methanol	67-56-1	32	10.1	5.864	4099	E,Y	5.148	3599	E,Y	13
Butane	106-97-8	58	10.8	0.164	63		0.158	61		4
Ethanol	64-17-5	46	12.6	17.343	8432	E,Y	17.167	8347	E,Y	1
Acetonitrile	75-05-8	41	13.0	0.161	88		0.213	116		28
Acetone	67-64-1	58	13.7	0.575	222		0.531	205		8
Trichlorofluoromethane	75-69-4	137	14.2	0.155	25		0.156	25		1
Pentane	109-66-0	72	14.9	0.041	13		0.042	13		2
Methylene Chloride	75-09-2	85	15.8	0.027	7.2	J,B	0.030	7.8	J,B	9
Propanenitrile	107-12-0	55	17.1	0.014	5.9	J	0.013	5.3	J	10
Propanol	71-23-8	60	17.1	0.095	35	B	0.092	34	B	4
2-Butanone	78-93-3	72	18.6	0.106	33		0.097	30		9
Hexane	110-54-3	86	19.9	0.037	9.6		0.037	9.5		1
Tetrahydrofuran	109-99-9	72	20.8	0.118	37		0.117	36		0
Butanenitrile	109-74-0	69	21.9	0.011	3.4	J	0.002	0.49	U	
1-Butanol	71-36-3	74	22.3	1.233	373		1.335	404		8
Benzene	71-43-2	78	22.8	0.067	19		0.069	20		3
Heptane	142-82-5	100	25.2	0.048	11		0.048	11		1
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.052	12		0.050	11		4
Pyridine	110-86-1	79	26.5	0.058	16	J	0.066	19	J	14
Toluene	108-88-3	92	28.5	0.583	142		0.585	142		0
Octane	111-65-9	114	30.5	0.029	5.6		0.028	5.5	J	1
Tetrachloroethylene	127-18-4	166	31.0	0.068	9.2		0.067	9.0		2
Ethylbenzene	100-41-4	106	33.4	0.006	1.2	J	0.006	1.2	J	0
p/m-Xylene	106-42-3	106	33.9	0.020	4.1	J	0.020	4.2	J	2
o-Xylene	95-47-6	106	35.1	0.010	2.1	J	0.010	2.1	J	0
Nonane	111-84-2	128	35.5	0.014	2.5		0.014	2.4		3
Decane	124-18-5	142	40.1	0.013	2.0	J	0.013	2.1	J	2
Undecane	1120-21-4	156	44.4	0.010	1.4	J	0.009	1.3	J	9
Tetradecane	629-59-4	198	55.8	0.046	5.2	J,B	0.035	4.0	J,B	26

Data Quality Flags

B Compound found in associated laboratory blank.

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

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

U Target compound not detected at or above the IDL.

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

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

(c) Relative percent differences (RPDs) based on mg/m^3 values.

Table 3.9 Organic Compound Concentrations in Triple Sorbent Trap Blank Samples Associated with the Sampling of Tank S-102 on 12/19/96

				V6001-A17.1352[(b)] Field Blank #1			V6001-A18.1353[(b)] Field Blank #2			V6001-A19.1354[(b)] Trip Blank #1			V6001-A20.1355[(b)] Trip Blank #2		
Target Analytes[(a)]	CAS	MW	Ret Time	(mg/m^3)	(ppbv)	Flag	(mg/m^3)	(ppbv)	Flag	(mg/m^3)	(ppbv)	Flag	(mg/m^3)	(ppbv)	Flag
Acetone	67-64-1	58	13.7	0.010	3.7	J	0.010	4.0	J	0.007	2.8	U	0.007	2.8	U
Trichlorofluoromethane	75-69-4	137	14.2	0.004	0.72	U	0.017	2.8	J	0.228	37		0.004	0.72	U
Methylene Chloride	75-09-2	85	15.8	0.023	6.2	J,B	0.030	8.0	J,B	0.111	29	J,B	0.025	6.5	J,B
1,1,2-Trichloroethane	79-00-5	133	27.8	0.010	1.6	J	0.010	1.7	J	0.002	0.26	U	0.002	0.26	U
Toluene	108-88-3	92	28.5	0.001	0.23	U	0.001	0.23	U	0.048	12		0.003	0.62	J
Tetradecane	629-59-4	198	55.8	0.031	3.5	J,B	0.025	2.8	J,B	0.029	3.3	J,B	0.019	2.2	U

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 12/19/96

Analyte	CAS #	Lower Flammability Limit(LFL)	Average Measured Concentrations	% of LFL[(a)]
Ammonia (ppm)	7664-41-7	150000	688	0.459
Carbon Monoxide (ppm)	630-08-0	125000	<17	<0.014
Hydrogen (ppm)	1333-74-0	40000	964	2.410
Methane (ppm)	74-82-8	50000	<25	<0.050
TNMOC (mg/m^3)		42000	17.06	0.041
Total				<2.973

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

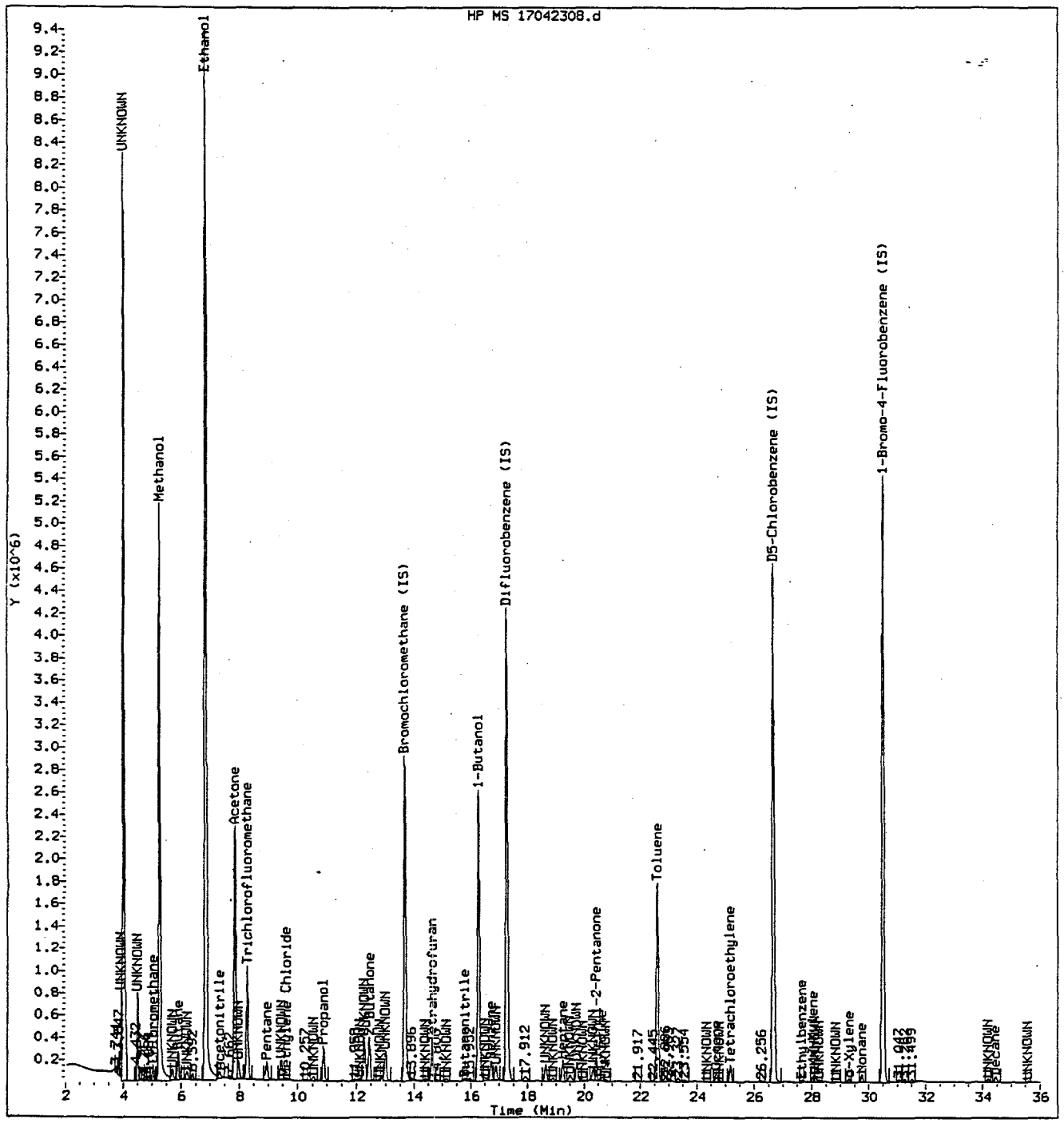

Figure 3.1a Typical Total Ion Chromatogram (2 - 36 min) for SUMMA™ Canister Samples from Tank S-102 Sampled on 12/19/96

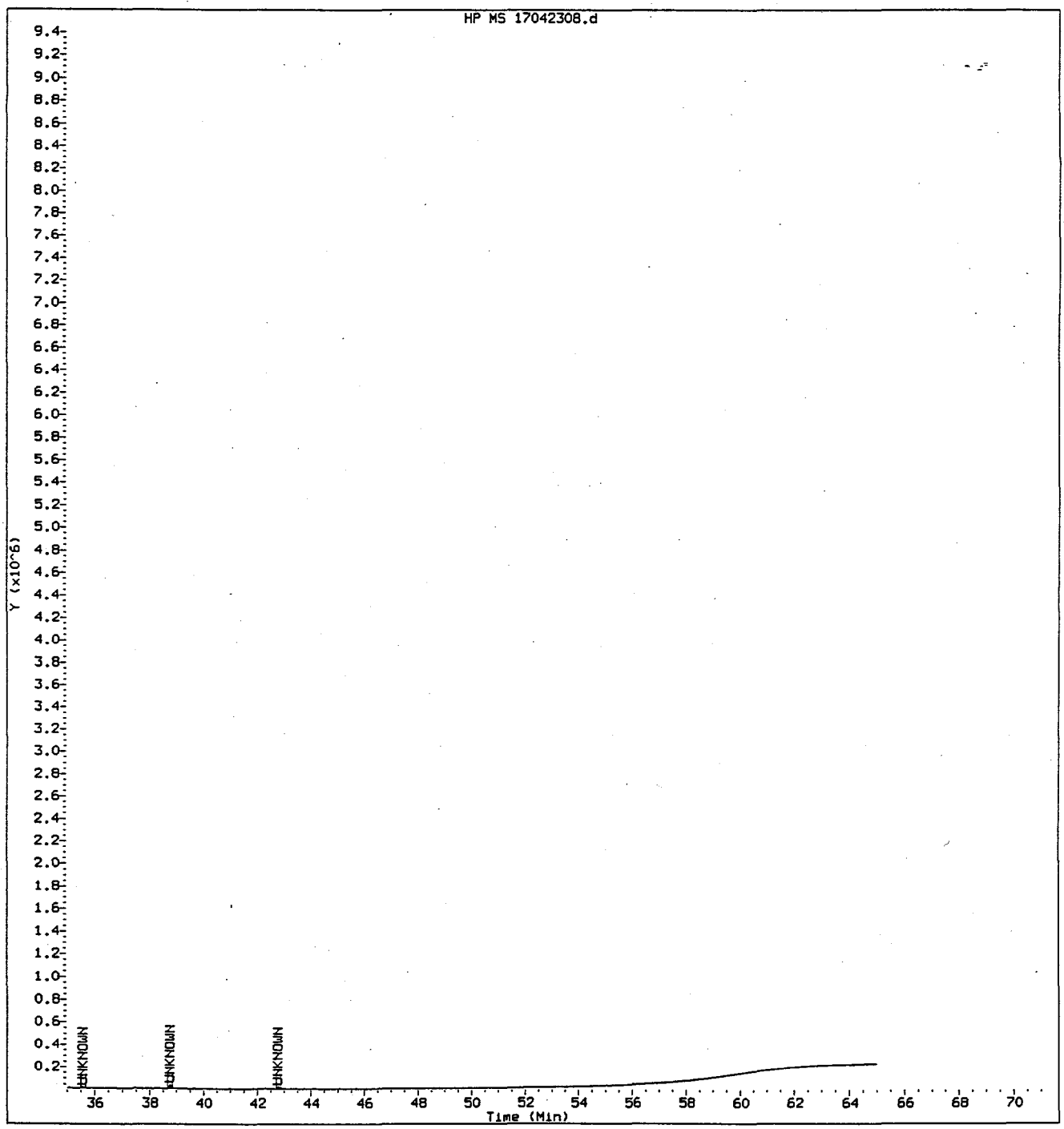

Figure 3.1b Typical Total Ion Chromatogram (36 - 70 min) for SUMMA™ Canister Samples from Tank S-102 Sampled on 12/19/96

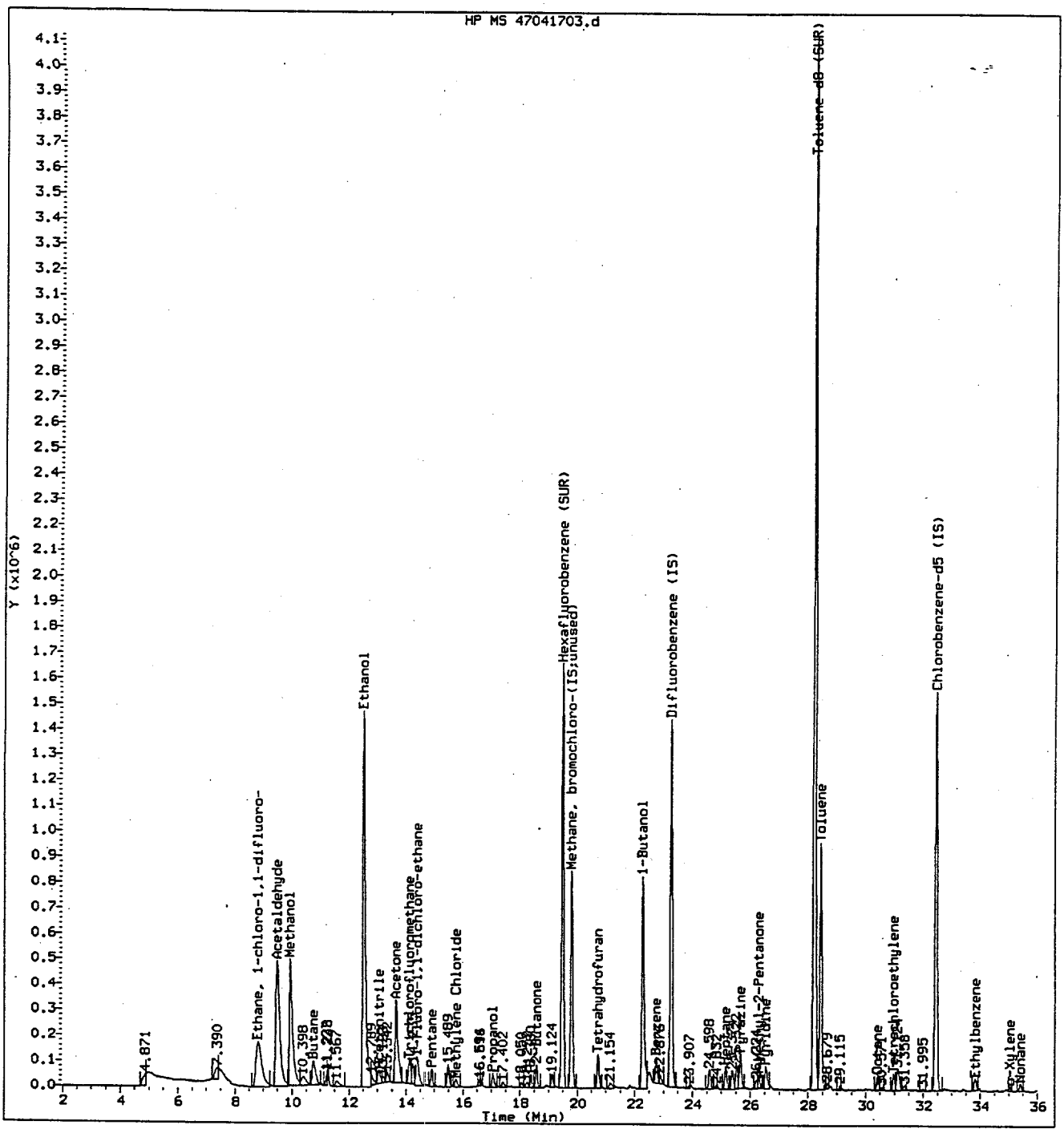

Figure 3.2a Typical Total Ion Chromatogram (2 - 36 min) for Triple Sorbent Trap Samples from Tank S-102 Sampled on 12/19/96

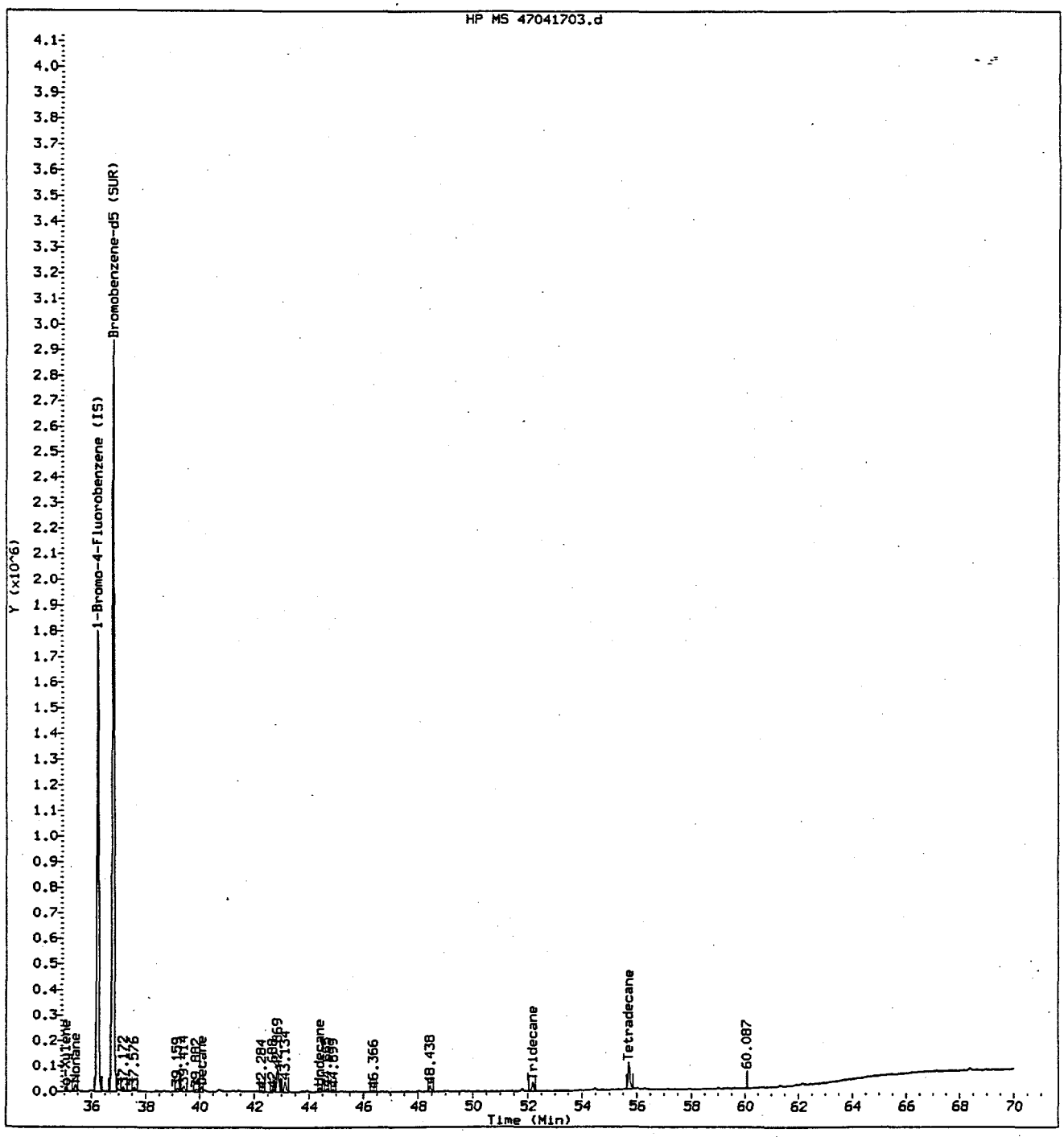

Figure 3.2b Typical Total Ion Chromatogram (36 - 70 min) for Triple Sorbent Trap Samples from Tank S-102 Sampled on 12/19/96

4.0 Conclusions

The concentrations of inorganic and organic analytes were determined from samples of the headspace of Tank S-102 on December 19, 1996 (Sample Job V6001). 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.

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Appendix A

Chain-of-Custody Sample Control Forms

Battelle Pacific National Northwest Lab	CHAIN OF CUSTODY	WHC 100648

Custody Form Initiator: J. A. Edwards - PNNL
Telephone (509) 373-0141
Page 85-3009 / FAX 376-0418

Company Contact: R. D. Mahon - WHC
Telephone (509) 373-7533
Page 85-9656 / FAX 373-3793

Project Designation/Sampling Locations: 200 West Tank Farm
241-S-102 Tank Vapor Sample SAF V6001
VSS

Collection date: 12 - 19 - 96
Preparation date: 12 - 09 - 96

Ice Chest No. Riser #7

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: caprio, mahoy mast

Shipped to: PNNL

Possible Sample Hazards/Remarks: Unknown at time of sampling

Sample Identification

		Time Collection	Date
V6001 - A07 . 10R	Collect $NH_3/NO_x/H_2O$ Sorbent Trap	1117 - 1127	12/19/96
V6001 - A08 . 11R	Collect $NH_3/NO_x/H_2O$ Sorbent Trap	1117 - 1127	12/19/96
V6001 - A09 . 12R	Collect $NH_3/NO_x/H_2O$ Sorbent Trap	1117 - 1127	12/19/96
V6001 - A10 . 13R	Collect $NH_3/NO_x/H_2O$ Sorbent Trap	1117 - 1127	12/19/96
V6001 - A15 . 14R	Open, close and store $NH_3/NO_x/H_2O$ field blank #1	1131-1132	12/19/9
V6001 - A16 . 15R	Open, close and store $NH_3/NO_x/H_2O$ field blank #2	1131-1132	12/19/9

[ ] Field Transfer of Custody [X] Chain of Possession (Sign and Print Names)

Relinquished By	Date	Time	Received By	Date	Time
G W Dennis	12- 09 -96	0900	J A Edwards	12- 09 -96	0900
J A Edwards	12-18-96	1545	cs mcclellan	12- 18 96	1545
CS McClellan	12-18-96	1720	RD Mahon	12-18-96	1720
Rick Mahon	12-19-96	1415	ES Mast	12-19-96	1415
ES Mast	01/02/97	1420	JA Edwards	01/02/97	1420
JA Edwards	01/06/97	1545	KH Pool	01/06/97	1545

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 / (Y) N	
◊	COC info/signatures complete?	(Y) N / (Y) N	
◊	Rad release stickers on samples?	/ Y (N)	
◊	Activity report from 222S?	/ (Y) N	
◊	RSR/release? (a ≤100/β ≤400 pCi/g)	/ (Y) N	
◊	COC copy for LRB, RIDS filed?	/ (Y) N	

POC (illegible) POC (illegible)

(WHC-SD-WM-TP-335, REV. 2, Table 2b) (Revised 05/30/96 PNNL)

A-6000-407 (12/92) WEF061 1 of 1

Battelle Pacific Northwest National Lab	CHAIN OF CUSTODY	WHC 100646

Custody Form Initiator: J. A. Edwards - PNNL
Telephone (509) 373-0141
Page 85-3009 / FAX 376-2329

Company Contact: R. D. Mahon - SESC
Telephone (509) 373-7533
Page 85-9656 / FAX 373-3193

Project Designation/Sampling Locations 200 West Tank Farm
241-S-102 Tank Vapor Sample SAF V6001
Temporal #4 Riser # 7 VSS
Ice Chest No.

Collection date 12 - 19 - 96
Preparation date 12 - 09 - 96

Field Logbook No. WHC-N-647-10

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment: Government Truck

Collector(s): E Mast, R Mahon
G CAPRIO

Shipped to: PNNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

		Date / Time
V6001 - A01 . 031	Collect Ambient Air Upwind SUMMA #1	12 - 19 - 96 / 0913-0914 1106-1107
V6001 - A02 . 248	Collect Ambient Air Through SUMMA #2	12 - 19 - 96 / 0918-0919
V6001 - A04 . 272	Collect SUMMA #3	12 - 19 - 96 / 1106-1107
V6001 - A05 . 276	Collect SUMMA #4	12 - 19 - 96 / 1110-1111
V6001 - A06 . 312	Collect SUMMA #5	12 - 19 - 96 / 1114-1115

[ ] Field Transfer of Custody [X] Chain of Possession (Sign and Print Names)

Relinquished By	Date	Time	Received By	Date	Time
J A Edwards JAEdwards	12-18-96	1545	CS McClellan CSMcClellan	12-18-96	1545
CS McClellan CSMcClellan	12-19-96	1716	R D Mahon RDMahon	12-18-96	1716
R D Mahon RDMahon	12-19-96	1415	ES MAST ES Mast	12-19-96	1415
ES MAST ES Mast	01/02/97	1415	JAEDWARDS JAEdwards	01/02/97	1415

Final Sample Disposition

Comments:

	PNNL (only) Checklist	Pick-up / Delivery	Comments:
◊	Media labeled and checked?	(Y) N	
◊	Letter of instruction?	(Y) N	
◊	Media in good condition?	(Y) N / (Y) N	
◊	COC info/signatures complete?	(Y) N / (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 (signature) POC (signature)

(WHC-SD-WM-TP-335, REV. 2, Table 2b) (Revised 05/30/96 PNNL)

A-6000-407 (12/92) WEF061 1 of 1

Battelle Pacific Northwest National Laboratory	CHAIN OF CUSTODY	WHC 100647

Custody Form Initiator: J. A. Edwards - PNL
Telephone (509) 373-0141
Page 85-3009 / P8-08 / FAX 376-0418

Company Contact: R. D. Mahon - WHC
Telephone (509) 373-7437
Page 85-9656 / S3-27 / FAX 373-7076

Project Designation/Sampling Locations 200 West Tank Farm
241-S-102 Tank Vapor Sample SAF V6001
Temporal #4 Riser # 2 (VSS Truck)
Ice Chest No.

Collection date 12 - 19 - 96
Preparation date 12 -17 - 96

Field Logbook No. WHC- W - 697 10

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 WHC-

Collector(s) GS CAPRIO
RD MAHON
E MAST

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

V6001 - A11 . 1348	PNL Triple Sorbent Trap (TST) Sample #1	12 - 19 - 96 / 1137-1139
V6001 - A12 . 1349	PNL TST Sample #2	12 - 19 - 96 / 1137-1139
V6001 - A13 . 1350	PNL TST Sample #3	12 - 19 - 96 / 1137-1139
V6001 - A14 . 1351	PNL TST Sample #4	12 - 19 - 96 / 1137-1139
V6001 - A17 . 1352	Open, close & store TST Field Blank #1	12 - 19 - 96 / 1137-1139
V6001 - A18 . 1353	Open, close & store TST Field Blank #2	12 - 19 - 96 / 1137-1139
V6001 - A19 . 1354	Store TST Trip Blank #1	12 - 19 - 96 / NA
V6001 - A20 . 1355	Store TST Trip Blank #2	12 - 19 - 96 / NA

[ ] Field Transfer of Custody [X] Chain of Possession (Sign and Print Names)

Relinquished By	Date	Time	Received By	Date	Time
JL Julya	12-18-96	0600	JA Edwards	12-18-96	0600
JA Edwards	12-18-96	1595	CSMcClellan	12-18-96	1595
CSMcClellan	12-19-96	1720	RD Mahon	12-18-96	1720
RD Mahon	12-19-96	1415	ES Mast	12-19-96	1415
ES Mast	01/02/97	1415	JA Edwards	01/02/97	1415

Final Sample Disposition

Comments:

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

Comments:

Cooler Temperature Status	
Hi -15 °C / Lo -15 °C	(pick up at PNL to WHC)
Hi +10 °C / Lo ___ °C	(delivery at WHC from PNL)
Hi +10 °C / Lo -15 °C	(at return to PNL from WHC)
Hi +10 °C / Lo -15 °C	(at delivery from WHC to PNL)

(Revised 06/21/95 PNL)

A-6000-407 (12/92) WEF061

Appendix B

Listing of All Target Compounds for Organic Compound Analysis

Table B.1 SUMMA™ Analysis Results for All Target Analytes from Tank S-102 Sampled on 12/19/96

			Ret	V6001-A05.276 VSS			V6001-A06.312 VSS			V6001-A04.272 VSS			V6001-A01.031 VSS Ambient Air			V6001-A02.248 Ambient Air Thru VSS			V6001-A05.276 VSS Rep		
Target Analytes	**CAS**	**MW**	**Time**	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	120.91	4.603	0.0044	0.82	J	0.0048	0.88	J	0.0042	0.79	J	0.003	0.56	J	0.0037	0.68	J	0.0047	0.87	J
Chloromethane	74-87-3	50.49	4.98	0.005	2.23	J	0.0052	2.3	J	0.0048	2.13	J	0.0024	1.06	U	0.0024	1.06	U	0.0049	2.15	J
12dichloro1122-tetrafluoroethane	76-14-2	170.92	5.185	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	32.04	5.249	8.829	6172.68	Y*	8.726	6100.27	Y*	7.476	5226.92	Y*	<0.110	<77	Y	<0.110	<77	Y	7.994	5588.51	Y*
Vinyl Chloride	75-01-4	62.5	5.476	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	5.777	<0.083	<34	Y	<0.083	<34	Y	<0.083	<34	Y	<0.083	<34	Y	<0.083	<34	Y	<0.083	<34	Y
Butane	106-97-8	58.12	5.895	0.1826	70.37		0.1843	71.02		0.1816	69.98		0.0024	0.92	U	0.0035	1.37	J	0.1854	71.47	
Bromomethane	74-83-9	94.94	6.369	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	64.51	6.724	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	46.01	6.843	14.559	7088.05	Y*	15.638	7613.51	Y*	13.3028	6476.48	Y*	<0.110	<53	Y	<0.110	<53	Y	15.201	7400.56	Y*
Acetonitrile	75-05-8	41.05	7.338	0.0391	21.32	J	0.0446	24.34		0.0329	17.93	J	0.004	2.18	U	0.004	2.18	U	0.0387	21.13	J
Acetone	67-64-1	58.08	7.855	1.2516	482.72		1.2523	483		1.2206	470.74		0.0467	18		0.0476	18.35		1.2483	481.46	
Trichlorofluoromethane	75-69-4	137.37	8.286	0.2422	39.49		0.2382	38.85		0.233	38		0.0048	0.78	U	0.0048	0.78	U	0.2424	39.52	
Pentane	109-66-0	72.15	8.953	0.0658	20.44		0.0703	21.84		0.0733	22.77		0.0038	1.18	U	0.0038	1.18	U	0.0656	20.36	
1,1-Dichloroethene	75-35-4	96.94	9.513	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	84.93	9.685	0.0074	1.95	J,B	0.0075	1.99	J,B	0.007	1.86	J,B	0.0059	1.56	J,B	0.002	0.53	U	0.0077	2.03	J,B
112trichloro122trifluoroethane	76-13-1	187.38	10.191	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	55.08	10.913	0.0146	5.94	J	0.0144	5.85	J	0.0139	5.63	J	0.0038	1.55	U	0.0038	1.55	U	0.0142	5.76	J
Propanol	71-23-8	60.1	10.88	0.2183	81.36		0.2108	78.58		0.2159	80.46		0.0037	1.39	J	0.0028	1.04	U	0.2136	79.62	
1,1-Dichloroethane	75-34-3	98.96	11.838	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	72.11	12.463	0.2322	72.12		0.2302	71.52		0.2249	69.87		0.0097	3.03	J	0.0109	3.37	J	0.2276	70.71	
cis-1,2-Dichloroethene	156-59-2	96.94	13.367	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	86.18	13.744	0.0424	11.03		0.0405	10.52		0.0401	10.43		0.0032	0.83	U	0.0032	0.83	U	0.0413	10.72	
Chloroform	67-66-3	119.38	13.906	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	72.11	14.649	0.1471	45.7		0.1402	43.56		0.1418	44.06		0.0016	0.5	U	0.0016	0.5	U	0.1457	45.26	
1,2-Dichloroethane	107-06-2	98.96	15.316	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	15.844	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	69.11	15.801	0.0148	4.78	J	0.0149	4.83	J	0.0135	4.36	J	0.0034	1.1	U	0.0034	1.1	U	0.0161	5.21	J
1-Butanol	71-36-3	74.12	16.285	1.8376	555.35		1.6714	505.13		1.7696	534.81		0.0032	0.97	U	0.0153	4.64	J	1.7601	531.91	
Benzene	71-43-2	78.11	16.737	0.0752	21.57		0.0705	20.22		0.0715	20.51		0.0016	0.46	U	0.0016	0.46	U	0.0727	20.85	
Carbon Tetrachloride	56-23-5	153.82	17.028	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	84.16	17.308	0.0051	1.34	J	0.0078	2.07	J	0.0036	0.96	U	0.0036	0.96	U	0.0036	0.96	U	0.0061	1.61	J
1,2-Dichloropropane	78-87-5	112.99	18.32	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	131.39	18.761	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	19.267	0.0592	13.24		0.0556	12.43		0.0565	12.62		0.0018	0.4	U	0.0018	0.4	U	0.0571	12.77	
cis-1,3-Dichloropropene	10061-01-5	110.97	20.452	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	100.16	20.462	0.0292	6.53	J	0.0283	6.33	J	0.0269	6.02	J	0.0034	0.76	U	0.0034	0.76	U	0.0271	6.07	J
Pyridine	110-86-1	79.1	20.613	0.0457	12.93	J	0.0405	11.46	J	0.0503	14.25	J	0.0186	5.27	U	0.0186	5.27	U	0.043	12.18	J
trans-1,3-Dichloropropene	10061-02-6	110.97	21.528	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	83.13	21.571	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	21.97	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	92.14	22.616	0.7467	181.54		0.6954	169.07		0.7003	170.25		0.002	0.49	U	0.0069	1.68	J	0.7112	172.91	
1,2-Dibromoethane	106-93-4	187.86	24.155	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	114.23	24.704	0.0302	5.92		0.0283	5.56		0.0291	5.71		0.0024	0.47	U	0.0024	0.47	U	0.0294	5.77	
Tetrachloroethylene	127-18-4	165.83	25.2	0.087	11.75		0.0817	11.03		0.0812	10.97		0.0042	0.57	U	0.0042	0.57	U	0.0836	11.29	

Table B.1 (Cont'd) SUMMA™ Analysis Results for All Target Analytes from Tank S-102 Sampled on 12/19/96

				V6001-A05.276 VSS			V6001-A06.312 VSS			V6001-A04.272 VSS			V6001-A01.031 VSS Ambient Air			V6001-A02.248 Ambient Air Thru VSS			V6001-A05.276 VSS Rep		
Target Analytes	**CAS**	**MW**	**Ret Time**	(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	112.56	26.804	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	97.13	27.062	0.0052	1.2	U	0.0052	1.2	U	0.0052	1.2	U	0.0052	1.2	U	0.0052	1.2	U	0.0052	1.2	U
Ethylbenzene	100-41-4	106.17	27.676	0.0078	1.65	J	0.0075	1.58	J	0.0075	1.58	J	0.0028	0.59	U	0.0028	0.59	U	0.008	1.69	J
p/m-Xylene	106-42-3	106.17	28.128	0.0254	5.36	J	0.024	5.07	J	0.0245	5.16	J	0.013	2.74	U	0.013	2.74	U	0.0251	5.29	J
Cyclohexanone	108-94-1	98.14	28.527	0.0058	1.32	U	0.0389	8.87	J	0.045	10.26	J	0.0058	1.32	U	0.0058	1.32	U	0.0058	1.32	U
Styrene	100-42-5	104.15	29.033	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	167.85	29.259	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	106.17	29.334	0.0115	2.42	J	0.0111	2.33	J	0.0111	2.34	J	0.0028	0.59	U	0.0028	0.59	U	0.0111	2.34	J
Nonane	111-84-2	128.26	29.776	0.0173	3.01		0.0168	2.93		0.0168	2.93		0.0016	0.28	U	0.0016	0.28	U	0.0171	2.99	
1-Ethyl-2-Methyl-Benzene	611-14-3	120.19	32.736	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	120.19	32.952	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	120.19	34.222	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	142.28	34.459	0.0198	3.12	J	0.0184	2.9	J	0.0196	3.08	J	0.003	0.47	U	0.003	0.47	U	0.0202	3.18	J
1,3-Dichlorobenzene	541-73-1	147	34.739	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	34.943	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	36.063	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	156.31	38.787	0.011	1.57	J	0.0103	1.47	J	0.011	1.57	J	0.0282	4.04	U	0.0282	4.04	U	0.0103	1.48	J
1,2,4-Trichlorobenzene	120-82-1	181.45	42.297	0.0028	0.35	U	0.0028	0.35	U	0.0028	0.35	U	0.0121	1.49	J,B	0.0028	0.35	U	0.0028	0.35	U
Dodecane	112-40-3	170.34	42.803	0.0098	1.29	U	0.0107	1.41	J	0.0175	2.3	J	0.0098	1.29	U	0.0098	1.29	U	0.0113	1.48	J
Hexachloro-1,3-butadiene	87-68-3	260.76	44.127	0.0046	0.4	U	0.0046	0.4	U	0.0046	0.4	U	0.0162	1.39	J,B	0.0046	0.4	U	0.0046	0.4	U
Tridecane	629-50-5	184.36	46.539	0.0174	2.11	J	0.0123	1.49	J	0.0346	4.21	J	0.006	0.73	U	0.006	0.73	U	0.0142	1.73	J
Tetradecane	629-59-4	198.34	50.038	0.0042	0.47	U	0.0042	0.47	U	0.0042	0.47	U	0.0042	0.47	U	0.0042	0.47	U	0.0042	0.47	U

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

Table B.2 Triple Sorbent Trap Analysis Results for All Target Analytes from Tank S-102 Sampled on 12/19/96.

Target Analytes	CAS	MW	Ret Time	V6001-A11.1348 VSS			V6001-A12.1349 VSS			V6001-A12.1349 VSS REP			V6001-A13.1350 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	0.0034	1.5	U	0.0034	1.5	U	0.0034	1.5	U	0.0034	1.5	U
12dichloro1122-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	10.1	5.4696	3823.96	E,Y	5.8637	4099.46	E,Y	5.1476	3598.83	E,Y	13.077	9142.45	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	0.1807	69.63		0.1643	63.29		0.158	60.88		0.1713	66	
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	12.6	12.6653	6158.1	E,Y	17.3426	8432.28	E,Y	17.1671	8346.91	E,Y	35.1611	17095.92	E,Y
Acetonitrile	75-05-8	41.1	13.0	0.1583	86.39		0.1614	88.08		0.2134	116.43		0.1968	107.41	
Acetone	67-64-1	58.1	13.7	0.4942	190.59		0.5753	221.86		0.5307	204.7		0.4835	186.48	
Trichlorofluoromethane	75-69-4	137.4	14.2	0.2048	33.39		0.1549	25.26		0.1557	25.39		0.2242	36.56	
Pentane	109-66-0	72.0	14.9	0.045	14		0.0414	12.88		0.0422	13.12		0.0445	13.83	
1,1-Dichloroethene	75-35-4	96.9	15.5	0.0022	0.51	U	0.0022	0.51	U	0.0022	0.51	U	0.0022	0.51	U
Methylene Chloride	75-09-2	84.9	15.8	0.0533	14.07	J,B	0.0272	7.17	J,B	0.0297	7.82	J,B	0.0494	13.03	J,B
112trichloro122trifluoroethane	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	17.1	0.0137	5.56	J	0.0144	5.85	J	0.013	5.27	J	0.0144	5.87	J
Propanol	71-23-8	60.1	17.1	0.0841	31.36	B	0.0951	35.46	B	0.0918	34.21	B	0.1795	66.91	B
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	0.0934	29.02		0.1058	32.87		0.0968	30.06		0.1795	55.75	
cis-1,2-Dichloroethene	156-59-2	96.9	19.5	0.0027	0.62	U	0.0027	0.62	U	0.0027	0.62	U	0.0027	0.62	U
Hexane	110-54-3	86.2	19.9	0.04	10.39		0.037	9.62		0.0365	9.48		0.0379	9.85	
Chloroform	67-66-3	119.4	20.1	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	0.1206	37.45		0.1175	36.5		0.1172	36.4		0.134	41.63	
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	0.0105	3.41	J	0.0015	0.49	U	0.0102	3.32	J
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	1.239	375.04		1.2325	373.08		1.3348	404.04		1.6251	491.93	
Benzene	71-43-2	78.1	22.8	0.0671	19.23		0.0665	19.06		0.0685	19.65		0.0687	19.69	
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	0.0485	10.84		0.0484	10.82		0.0477	10.66		0.0491	10.99	
4-Methyl-2-Pentanone	108-10-1	100.2	26.3	0.0526	11.76		0.052	11.63		0.0498	11.14		0.0527	11.78	
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 12/19/96.

			Ret	V6001-A11.1348 VSS			V6001-A12.1349 VSS			V6001-A12.1349 VSS REP			V6001-A13.1350 VSS		
Target Analytes	**CAS**	**MW**	**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	0.0599	16.97	J	0.0576	16.3	J	0.0663	18.78	J	0.0349	9.89	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
Pentanenitrile	110-59-8	83.2	27.4	0.0009	0.23	U	0.0009	0.23	U	0.0009	0.23	U	0.0009	0.23	U
1,1,2-Trichloroethane	79-00-5	133.4	27.8	0.0017	0.28	U	0.0017	0.28	U	0.0017	0.28	U	0.0017	0.28	U
Toluene	108-88-3	92.1	28.5	0.5874	142.8		0.5828	141.69		0.5852	142.27		0.5936	144.31	
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	30.5	0.028	5.5	J	0.0285	5.61		0.0282	5.53	J	0.0289	5.67	
Tetrachloroethylene	127-18-4	165.8	31.0	0.0653	8.82		0.0684	9.24		0.0668	9.03		0.0701	9.47	
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	0.0061	1.29	J	0.0058	1.22	J	0.0058	1.23	J	0.006	1.26	J
p/m-Xylene	106-42-3	106.2	33.9	0.0196	4.14	J	0.0195	4.1	J	0.0198	4.17	J	0.0199	4.19	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	0.0101	2.14	J	0.01	2.12	J	0.01	2.11	J	0.0101	2.13	J
Nonane	111-84-2	128.0	35.5	0.015	2.62		0.0142	2.48		0.0138	2.42		0.0159	2.78	
1-Ethyl-2-methyl benzene	611-14-3	120.2	38.4	0.0025	0.47	U	0.0025	0.47	U	0.0025	0.47	U	0.0025	0.47	U
1,3,5-Trimethylbenzene	108-67-8	120.2	38.7	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	0.0212	3.33	J	0.013	2.04	J	0.0132	2.08	J	0.0131	2.06	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	0.0196	2.81	J	0.0097	1.4	J	0.0089	1.28	J	0.0183	2.62	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	55.8	0.0609	6.89	J,B	0.046	5.2	J,B	0.0354	4.01	J,B	0.0436	4.93	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 upper quantification limit (UQL).

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

U Target compound not detected at or above the IDL.

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

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

Table B.3 Triple Sorbent Trap Analysis Results for All Target Analytes from Blank Samples Associated with the Sampling of Tank S-102 on 12/19/96

Target Analytes	CAS	MW	Ret Time	V6001-A17.1352 FB #1 (mg/m3)	(ppbv)	Flag	V6001-A18.1353 FB #2 (mg/m3)	(ppbv)	Flag	V6001-A19.1354 TB #1 (mg/m3)	(ppbv)	Flag	V6001-A20.1355 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
12dichloro1122-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	10.1	<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	12.6	<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	0.0095	3.65	J	0.0103	3.97	J	0.0072	2.78	U	0.0072	2.78	U
Trichlorofluoromethane	75-69-4	137.4	14.2	0.0044	0.72	U	0.0168	2.75	J	0.228	37.17		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	0.0021	0.47	U
Methylene Chloride	75-09-2	84.9	15.8	0.0233	6.16	J,B	0.0303	8	J,B	0.1109	29.25	J,B	0.0246	6.49	J,B
112trichloro122trifluoroethane	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	17.1	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	20.1	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 12/19/96

Target Analytes	CAS	MW	Ret Time	V6001-A17.1352 FB #1 (mg/m3)	(ppbv)	Flag	V6001-A18.1353 FB #2 (mg/m3)	(ppbv)	Flag	V6001-A19.1354 TB #1 (mg/m3)	(ppbv)	Flag	V6001-A20.1355 TB #2 (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	0.0096	1.62	J	0.0098	1.65	J	0.0015	0.26	U	0.0015	0.26	U
Toluene	108-88-3	92.1	28.5	0.0009	0.23	U	0.0009	0.23	U	0.0475	11.56		0.0025	0.62	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	30.5	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	35.5	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	55.8	0.0313	3.54	J,B	0.0251	2.83	J,B	0.029	3.28	J,B	0.019	2.15	U
Tributyl Phosphate	126-73-8	266.0	63.1	<0.0099	<0.83	Z	<0.0099	<0.83	Z	<0.0099	<0.83	Z	<0.0099	<0.83	Z

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.

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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