TANK VAPOR CHARACTERIZATION PROJECT

Tank 241-BY-108 Fifth Temporal Study: Headspace Gas and Vapor Characterization Results from Samples Collected on January 30, 1997

J. C. Evans
K. H. Pool
K. B. Olsen
J. C. Hayes
A. V. Mitroshkov
J. A. Edwards
J. L. Julya
B. M. Thornton
J. S. Fruchter
K. L. Silvers

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Pacific Northwest National Laboratory
Richland, Washington 99352

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Summary

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-BY-108 (Tank BY-108) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Services Corporation (SESC) and 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 specified by the sampling and analysis plan (SAP) (Buckley 1996). Hydrogen was the principal flammable constituent of the Tank BY-108 headspace, determined to be present at approximately 0.888% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <1.979% 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 BY-108 Sampled on 1/30/97

<u>Category</u>	<u>Sample Medium</u>	<u>Analyte</u>	<u>Concentration^(a)</u>	<u>Units</u>
Inorganic Vapors	Sorbent Traps	Ammonia	775	ppmv
		Nitrogen Dioxide (NO ₂)	<0.16	ppmv
		Nitric Oxide (NO)	<0.16	ppmv
		Water	14.4	mg/L
Permanent Gases	SUMMA™ Canisters	Hydrogen	355	ppmv
		Methane	<25	ppmv
		Carbon Dioxide	<17	ppmv
		Carbon Monoxide	<17	ppmv
		Nitrous Oxide (N ₂ O)	499	ppmv
Total Non-Methane Organic Compounds	SUMMA™ Canisters	Total Non-Methane Organic Compounds	214.74	mg/m ³
Volatile Organic Vapors	SUMMA™ Canisters	1-Butanol	48.987	mg/m ³
		Tridecane	12.843	mg/m ³
		Butane	6.081	mg/m ³
Volatile Organic Vapors	Sorbent Traps	1-Butanol	23.597	mg/m ³
		Butane	3.993	mg/m ³
		Pentane	3.708	mg/m ³
Flammables	SUMMA™ Canisters and Sorbent Traps	Flammables	<1.979	% LFL

(a) Concentrations were determined using sample-volume data provided by SESC 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

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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 January 30, 1997 from the headspace of waste storage tank 241-BY-108 (Tank BY-108) at the Hanford Site in Washington State. This sampling of Tank BY-108 is the latest in a series of sampling for the temporal study. Pacific Northwest National Laboratory^(a) provided SUMMA™ canisters and sorbent traps for sample collection, and analyzed the samples according to instructions in the SAP (Buckley 1996). Analytical work was performed by the PNNL VAL in the 300 Area of the Hanford Site under the PNNL Tank Vapor Characterization Project.

Pacific Northwest National Laboratory provided six sets of sorbent traps for selected inorganic analytes (four samples and two field blanks), five SUMMA™ canisters for permanent gases and organic analytes (three headspace samples and two ambient air samples), and eight triple sorbent traps (TSTs) for organic analytes (four samples, two field blanks, and two trip blanks). Sample devices and controls were provided to SESC on January 27, 1997 and were returned to PNNL on February 4, 1997. SESC measured and reported to PNNL the sample volumes needed to determine headspace concentrations from sorbent trap samples.

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

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

2.0 Analytical Methods

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

Table 2.1. Sampling and Analysis Methods Summary

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

Table 2.2. Sample Media Preparation, Handling, and Storage

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

2.1 Inorganic Vapors

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

2.1.1 Sampling Methodology

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

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

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

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

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

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

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

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

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

2.1.2 Analytical Procedures

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

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

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

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

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

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

2.1.3 Quality Assurance/Quality Control

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

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

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

Table 2.3 Quantitation Limits for Selected
Inorganic Analytes

<u>Analyte</u>	<u>Formula</u>	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 (N₂O).

2.2.1 SUMMA™ Canister Preparation

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

2.2.2 Analytical Procedure

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

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

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

Table 2.4 Quantitation Limits for Permanent Gases

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

2.2.3 Quality Assurance/Quality Control

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

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

2.3 Total Non-Methane Organic Compounds

2.3.1 Analytical Procedure

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

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

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

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

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

2.3.2 Quality Assurance/Quality Control

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

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

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

2.4 SUMMA™ Canister Sample Analyses

2.4.1 Analytical Procedure

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

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

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

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

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

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

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

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

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

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

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

2.4.2 Quality Assurance/Quality Control

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

2.5 Triple Sorbent Trap Sample Analyses

2.5.1 Sampling Methodology

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

2.5.2 Analytical Procedure

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

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

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

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

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

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

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

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

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

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

2.5.3 Quality Assurance/Quality Control

Before tank samples were analyzed, a diagnostic check was performed on the GC/MS instrument by running a full auto tune, as described in PNL-TVP-10. Upon satisfactory completion of the instrument diagnostic check, a blank trap was analyzed to check the cleanliness of the system. The instrument was then calibrated using six different concentrations of standard gas mixture containing the compounds listed in Table B.2. A gas mixture containing difluorobenzene, chlorobenzene- d_5 , and 1,4 bromofluorobenzene was used as an IS for all calibration standard and sample analyses. Analyte responses from sample components, ISs, and standards were obtained from the extracted ion plot from their selected mass ion. A continuing calibration was generated by calculating the relative response ratios of the IS to calibration standard responses and plotting the ratios against the ratio of the calibration-standard concentration (in ppbv) to the IS concentration. Once it was determined that the relative response was linear with increasing concentration, an average response factor was calculated for each target analyte and used to determine the concentration of target compounds in each sample.

3.0 Analysis Results

Results from the sampling of the headspace of Tank BY-108 on January 30, 1997 (Sample Job V7003) are provided below.

3.1 Inorganic Vapors

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

Two field blank multi-trap trains, identical to sample multi-trap trains discussed in Section 2.1, were included in the tube bundle lowered into the headspace of Tank BY-108 during Sample Job V7003. No air was pulled through these field blank multi-trap trains. Any analyte found in the field blank multi-trap trains over and above levels in unexposed tubes was attributed to passive sampling. Data in Table 3.1 have been corrected for these minor effects of passive sampling.

Results provided in Table 3.1 are estimated to be accurate to within $\pm 10\%$ and within the $\pm 30\%$ specified by the SAP. Percent relative standard deviations of the measured concentrations were $<3\%$, which is within the 25% specified by the SAP.

3.1.1 Ammonia

Ammonia analyses were performed on February 14, 1997, 15 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 63.2 to 65.0 μmol in front sections; blank corrected back sorbent section ammonia concentrations were $<0.01 \mu\text{mol}$. Blank corrections of 0.08 μmol in front and 0.04 μmol in the back sections, were about 0.1% of collected quantities. The analysis of one sample was a duplicate and indicated a reproducibility of $\pm 0.8\%$. One blank sorbent trap was spiked with 17 ppm of ammonia and yielded a percentage recovery of 99%. One sample leachate was spiked after initial analysis with approximately the quantity of ammonia in the sample and yielded a percentage recovery of 92%. The initial and continuing calibration verification (ICV, CCV) standards, using NIST-traceable material, yielded percentage recoveries of 98% (ICV) and 100% (CCV) during the analytical session. A five-point calibration was performed over an ammonia range of 0.1 to 100 $\mu\text{g/ml}$.

3.1.2 Nitric Oxide and Nitrogen Dioxide

Nitric oxide and nitrogen dioxide analyses were performed on February 19, 1997, 20 days after sample collection, and within established holding times (Ligotke et al. 1995). All samples (100%) were successfully analyzed. No deviations from the procedure were noted.

Blank-corrected NO_2^- quantities in the sorbent traps were all $<0.013 \mu\text{mol}$. Nitrite blank levels used to correct data were $0.0122 \mu\text{mol}$ in front (four of four blanks analyzed) and $0.0075 \mu\text{mol}$ in back (two of four blanks analyzed) sorbent sections. The analyses of two samples were duplicated and yielded repeatabilities of $\pm 0\%$ and $\pm 0\%$. Two sample leachates were spiked with $0.25 \text{ ppm } \text{NO}_2^-$ and yielded percentage recoveries of 92% and 90% . A 4-point calibration was performed over a concentration range of 0 to $0.5 \mu\text{g/mL } \text{NO}_2^-$ in the desorbing matrix.

3.1.3 Water

Analyses for water vapor were performed on February 13, 1997, 14 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 14.4 mg of water per L of dry air at STP. The result was determined from an average mass gain of 28.1 mg from all four multi-trap trains. The blank correction applied to the results was -1.4 mg per multi-trap train. A control mass was measured and indicated a measurement accuracy of $\pm 0.1 \text{ mg}$. The average water vapor concentration corresponds to a tank headspace dew point at 15.4°C and relative humidity at 58% at the time of sampling.

3.2 Permanent Gases

Hydrogen analyses were performed on March 5, 1997 and analyses for other permanent gases were performed on March 10, 1997. All analyses were conducted within the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). All samples (100%) were successfully analyzed and used in the averages. No deviations from standard procedures were noted.

Measured concentrations of carbon monoxide, carbon dioxide, hydrogen, methane, and nitrous oxide are provided in Table 3.2. Results were based on three samples for each compound. Hydrogen at an average concentration of 355 ppmv and nitrous oxide at 499 ppmv were detected in Tank BY-108. The relative percent difference (RPD) between duplicate analyses of a single SUMMA™ canister was 0.6% for hydrogen and 0.2% for nitrous oxide.

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

3.3 Total Non-Methane Organic Compounds

Analyses for TNMOCs were performed on May 5, 1997 which exceeded the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994). All three tank samples and the two ambient samples (100%) were successfully analyzed and used in the averages. No deviations from standard procedures were noted.

Table 3.3 lists results of the analysis of SUMMA™ canister samples for TNMOCs. Results in Table 3.3 are reported in two different units; in the upper row the mass concentration (mg/m^3) of non-methane organic compounds is given at STP (0°C and 1.013 bar), and in the lower row, by EPA TO-12 convention, as ppmv of carbon based on propane as the standard. The average concentration in the three tank headspace samples was $214.58 \text{ mg}/\text{m}^3$ or 89.36 ppmv of carbon. The $214.58 \text{ mg}/\text{m}^3$ value compares to $110.08 \text{ mg}/\text{m}^3$ for the sum of all target compounds identified in the analysis of the SUMMA™ canisters. The $110.08 \text{ mg}/\text{m}^3$ value is conservatively low because TICs were not reported in the analysis. Results provided in Table 3.3 are estimated to be accurate to within $\pm 30\%$ as specified by the SAP. The RPD for duplicate analysis of a single SUMMA™ canister was 0.6%.

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 BY-108 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 March 14 and May 13, 1997. All analyses were conducted within the 60-day administrative holding time as specified in the WHC Tank Vapor Characterization QA Plan (WHC 1994) with the exception of the diluted samples. 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. Forty-three target analytes above the instrument detection limit (IDL) were detected in the tank headspace samples. Forty-two of the 43 target analytes were identified in two or more tank headspace samples. No TICs were reported for this temporal study. 1-Butanol at $48.987 \text{ mg}/\text{m}^3$, tridecane at $12.843 \text{ mg}/\text{m}^3$, and butane at $6.081 \text{ mg}/\text{m}^3$ were the three most abundant compounds identified in the tank headspace samples. The total average concentration was $110.08 \text{ mg}/\text{m}^3$ for the target analytes. This compares to a total concentration of $214.58 \text{ mg}/\text{m}^3$ identified in the TO-12 analysis of the three tank headspace samples.

SUMMA™ canister S7003-A05.304 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. Thirty-nine of 42 target analytes had RPDs of less than 10%.

Results of analyses for target analytes in ambient air and ambient air through the VSS samples are provided in Table 3.6. Ten target compounds were observed in one or both of the ambient air samples. All target compounds were observed below their EQL with the exception of tridecane and tetradecane which were observed at 16 and 28 ppbv, respectively.

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

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

3.4.1.1 Procedural Deviations, Observations, and Anomalies. The SUMMA™ canister samples were analyzed in one batch. The tank samples were diluted and reanalyzed in a second batch. The sample analytical sequence runs were as follows:

Batch #1: (file identifier 17031402.b) - V7003-A01.244, V7003-A02.252, V7003-A04.273, V7003-A05.304, V7003-A05.304 REP, V7003-A06.333;

Batch #2: (file identifier 17051302.b) - V7003-A06.333, V7003-A05.304, V7003-A05.304 REP, V7003-A04.273.

Batch #1:

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

Two target compounds (chloroethane at 47.60% and pyridine at 53.79%) surpassed the 30% relative standard deviation (% RSD) acceptance criteria for initial calibration. Tetradecane surpassed the 0.05 response factor criteria for the initial calibration. Tetradecane was found in all tank samples at concentrations above the upper quantitation limit (UQL), with the exceptions of ambient air sample V7003-A01.244 and tank sample V7003-A05.304 where it was found at a concentration between the EQL and UQL, and ambient air sample V7003-A02.252 where it was found at a concentration below the IDL. Chloroethane was not found in the tank samples at concentrations higher than the IDL. Pyridine was found in all tank samples at concentrations between the IDL and the EQL, with the exceptions of ambient air samples V7003-A02.252 and V7003-A01.244 where it was not found at concentrations above the IDL. Due to the initial calibration performance, the uncertainty associated with the results is higher than normal.

Three target compounds (chloroethane at 42.9%, tridecane at 28.8%, and tetradecane at 40.3%) were outside the 25% difference (% D) acceptance criteria for the continuing calibration verification (CCV) sample. However, the CCV passed the procedural criterion requiring $\pm 25\%$

D passage for 85% of all target compounds. Tridecane was found in all tank samples at concentrations between the EQL and the UQL, with the exceptions of ambient air sample V7003-A02.252 where it was found at a concentration between the IDL and the EQL, and tank samples V7003-A04.273 and V7003-A05.304, where tridecane was found at concentrations above the UQL. Due to the CCV performance for these compounds, a higher than normal uncertainty is associated with the results.

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

Batch #2:

This analytical sequence was run using 100 mL volumes of a 40x dilution of the original SUMMA canister sample to quantify target compounds in each tank sample.

Two target compounds (chloroethane at 47.60% and pyridine at 53.79%) surpassed the 30% RSD acceptance criteria for initial calibration. Tetradecane surpassed the 0.05 response factor criterion for the initial calibration. Tetradecane was found in all tank samples at concentrations between the EQL and the UQL. Chloroethane was not found in the tank samples at concentrations higher than its IDL. Pyridine was not found in tank samples above its IDL, with the exception of sample V7003-A06.333, where it was found at a concentration between its IDL and EQL. Due to the initial calibration performance, the uncertainty associated with the results is higher than normal.

Two target compounds (chloroethane at 32.8% and pyridine at 25.2%) were outside the 25% D acceptance criteria for the CCV sample. Tetradecane surpassed the 0.05 response criterion for the CCV. However, the CCV passed the procedural criterion requiring $\pm 25\%$ D passage for 85% of all target compounds. Due to the CCV performance for chloroethane, pyridine and tetradecane, a higher than normal uncertainty is associated with the results.

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

Information common to both batches:

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

3.4.2 Triple Sorbent Trap Sample Results

Analyses of TSTs were performed on April 28 and 29, 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. Thirty-three target analytes above the IDL were detected in the tank headspace samples. Of these, 31 target analytes were identified in two or more tank headspace samples. 1-Butanol at 23.597 mg/m³, butane at 3.993 mg/m³, and pentane at 3.708 mg/m³ were the three most abundant compounds identified in the tank headspace sample. The total average concentration of the target analytes was 57.20 mg/m³.

Triple sorbent trap sample S7003-A12.1363 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-six of 30 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. Five target analytes were identified in one or more of the blank samples. However, none of these compounds were detected above their EQL.

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

Batch #1 (file identifier 47042801.b) - V7003-A.17-1366, V7003-A18.1367, V7003-A19.1368, V7003-A20.1369;

Batch #2 (file identifier 47042901.b) - V7003-A.11-1362, V7003-A12.1363, V7003-A12.1363 REP, V7003-A13.1364.

Batch #1:

Samples included in this batch consisted of two VSS field blanks, and two trip blanks. Only target compounds were evaluated as stated in the SAP for this study.

The second CCV showed acceptable performance as specified in the procedure for all target compounds, with the exception of chloromethane (30.6%). Chloromethane was undetected in all field samples. The CCB showed trace amounts (below EQL) of methylene chloride and

tetradecane. Compounds found in the CCB at concentrations "in ng" greater than 5% of the sample concentration are flagged with a "B" in the tables.

Batch #2:

Samples included in this batch consisted of three VSS tank samples with one repeat. Only target compounds were evaluated as stated in the SAP for this study.

The CCV showed acceptable performance as specified in the procedure for all target compounds, with the exceptions of chloromethane (43.9%), chloroethane (25.9%), ethanol (46.1%), and 2-butanone (26%). Ethanol and 2-butanone were observed in the samples at concentrations greater than the EQL. Chloromethane and chloroethane were not detected above the IDL. Due to the CCV performance, the results for this compound have a greater uncertainty. The CCB showed a trace of methylene chloride and tetradecane (below EQL) and was clean of other target and TIC compounds. Compounds found in the CCB at concentrations "in ng" greater than 5% of the sample concentration are flagged with a "B" in the tables.

Information common to both batches:

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

Tributyl phosphate (TBP) is included in the target list based on a calibration performed on January 5 and 9, 1996. The TBP was introduced onto a series of double sorbent traps as a methanolic solution standard rather than a vapor standard. This served to determine the retention time and verify the mass spectral characteristics of the compound. However, verification of the calibration acceptability was not performed because the compound is not present in the CCV. At present, it is not possible to prepare a gas standard from this material. The calibration information on TBP demonstrated that detectability at 0.8 ppbv (based on a 200-mL sample) was possible. Tributyl phosphate was not detected in the samples.

3.5 Flammability

The analytical results presented above can be used to estimate the Tank BY-108 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 BY-108 headspace, determined to be present at approximately 0.888% of its LFL. Total headspace flammability was estimated to be <1.979% of the LFL.

Table 3.1 Inorganic Vapor Concentrations from Tank BY-108 Sampled on 1/30/97

Analyte	CAS Number	V7003-A07-22R	V7003-A08-23R	V7003-A09-24R	V7003-A10-25R	Average	Standard Deviation
Ammonia (ppmv)	7664-41-7	774	783	783	761	775	11
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)		14.4	14.6	14.5	14.0	14.4	0.3
Water ^(b) (mg/L)		12.7	13.0	12.9	12.4	12.8	0.2

Footnotes

(a) Dry air at 0°C and 1.013 bar.

(b) Moist air at tank temperature and pressure.

Table 3.2 Permanent Gas Analysis Results from Tank BY-108 Sampled on 1/30/97.

Permanent Gas Analyte	Upwind Ambient Air	Ambient Air Through VSS	Tank Samples				RPD ^(c) (%)	Mean (ppmv)	St.Dev.
	V7003-A01.244 ^(a) (ppmv)	V7003-A02.252 ^(a) (ppmv)	V7003-A04.273 ^(a) (ppmv)	V7003-A06.333 ^(a) (ppmv)	V7003-A05.304 ^(a) (ppmv)	V7003-A05.304 ^{(a)(b)} (ppmv)			
Hydrogen	<17	<17	358	356	352	354	0.6	355	3.1
Methane	<25	<25	<25	<25	<25	<25		<25	
Carbon Dioxide	473	471	<17	<17	<17	<17		<17	
Carbon Monoxide	<17	<17	<17	<17	<17	<17		<17	
Nitrous Oxide	<17	<17	492	504	502	503	0.2	499	6.4

Footnotes

(a) Sample identification number.

(b) Replicate analysis for V7003-A05.304; results are not included in the calculation of average concentrations.

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

Table 3.3 Total Non-Methane Organic Compound Analysis Results from Tank BY-108 Sampled on 01/30/97

	Upwind Ambient Air	Ambient Air Through VSS	Tank Samples				RPD ^(c) (%)	Mean	St.Dev.
	V7003-A01.244 ^(a) Concentration	V7003-A02.252 ^(a) Concentration	V7003-A04.273 ^(a) Concentration	V7003-A06.333 ^(a) Concentration	V7003-A05.304 ^(a) Concentration	V7003-A05.304 ^{(a)(b)} Concentration			
TO-12 (mg/m ³)	<0.59	<0.59	214.80	215.34	214.07	212.99	1	214.74	0.64
Total Carbon (ppmv)								89.42	

Footnotes

(a) Sample identification number.

(b) Replicate analysis for V7003-A05.304; 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 BY-108 Sampled on 1/30/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7003-A06.333 ^(b) VSS			V7003-A05.304 ^{(b)(c)} VSS			V7003-A04.273 ^(c) VSS			Mean and Standard Deviation			
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	St. Dev.	(ppbv)	St. Dev.
Dichlorodifluoromethane	75-71-8	121	4.6	0.003	0.52	U	0.003	0.55	J	0.003	0.52	U	d	d	d	d
Methanol	67-56-1	32	5.2	2.680	1874	Y	2.979	2083	Y	3.115	2178	Y	2.925	0.223	2045	156
1,3-Butadiene	106-99-0	54	5.7	0.106	44	Y	0.104	43	Y	0.114	47	Y	0.108	0.005	45	2.1
Butane	106-97-8	58	5.9	5.867	2261	*	6.440	2482	*	5.935	2288	*	6.081	0.313	2344	121
Ethanol	64-17-5	46	6.8	1.701	828	Y	1.936	942	Y	2.015	981	Y	1.884	0.163	917	79
Acetonitrile	75-05-8	41	7.3	0.225	123		0.244	133		0.251	137		0.240	0.014	131	7.4
Acetone	67-64-1	58	7.8	5.237	2020		5.542	2137		5.912	2280		5.564	0.338	2146	130
Trichlorofluoromethane	75-69-4	137	8.2	0.167	27		0.171	28		0.174	28		0.171	0.003	28	0.57
Pentane	109-66-0	72	8.9	3.892	1208		3.923	1218		4.038	1254		3.951	0.077	1227	24
Methylene Chloride	75-09-2	85	9.6	0.008	2.0	J	0.007	1.9	J	0.007	1.8	J	0.007	0.000	1.9	0.11
Propanenitrile	107-12-0	55	10.9	0.019	7.5	J	0.017	6.8	J	0.017	6.7	J	0.017	0.001	7.0	0.43
Propanol	71-23-8	60	10.8	1.535	572		1.659	618		1.556	580		1.583	0.066	590	25
2-Butanone	78-93-3	72	12.4	1.587	493		1.638	509		1.478	459		1.568	0.082	487	25
Hexane	110-54-3	86	13.7	3.593	934		3.625	942		3.532	918		3.583	0.047	931	12
Tetrahydrofuran	109-99-9	72	14.6	2.298	714		2.323	722		2.167	673		2.262	0.084	703	26
Butanenitrile	109-74-0	69	15.8	0.024	7.7	J	0.021	6.9	J	0.028	9.0	J	0.024	0.003	7.9	1.1
1-Butanol	71-36-3	74	16.2	45.890	13869	*	52.594	15895	*	48.478	14651	*	48.987	3.381	14805	1022
Benzene	71-43-2	78	16.7	0.071	20		0.073	21		0.074	21		0.073	0.001	21	0.42
Cyclohexane	110-82-7	84	17.2	0.542	144		0.516	137		0.605	161		0.554	0.046	148	12
Heptane	142-82-5	100	19.2	1.931	432		1.941	434		2.028	453		1.967	0.053	440	12
4-Methyl-2-Pentanone	108-10-1	100	20.4	0.121	27		0.124	28		0.142	32		0.129	0.011	29	2.5
Pyridine	110-86-1	79	20.6	0.033	9.4	J	0.037	10	J	0.037	11	J	0.036	0.002	10	0.63
Pentanenitrile	110-59-8	83	21.5	0.059	16		0.055	15		0.066	18		0.060	0.005	16	1.4
1,1,2-Trichloroethane	79-00-5	133	21.9	0.006	1.1	J	0.005	0.90	J	0.007	1.2	J	0.006	0.001	1.1	0.17
Toluene	108-88-3	92	22.6	0.123	30		0.124	30		0.128	31		0.125	0.002	30	0.59
Octane	111-65-9	114	24.6	0.843	165		0.855	168		0.859	168		0.852	0.008	167	1.6
Chlorobenzene	108-90-7	113	26.7	0.021	4.2	J	0.022	4.3	J	0.005	1.1	J	0.016	0.009	3.2	1.8
Hexanenitrile	628-73-9	97	27.0	0.163	38		0.151	35		0.186	43		0.167	0.018	38	4.1
Ethylbenzene	100-41-4	106	27.6	0.017	3.5	J	0.017	3.6	J	0.018	3.7	J	0.017	0.001	3.6	0.11
p/m-Xylene	106-42-3	106	28.1	0.056	12	J	0.057	12	J	0.057	12	J	0.057	0.001	12	0.19
Cyclohexanone	108-94-1	98	28.5	0.291	66		0.339	77		0.346	79		0.326	0.030	74	6.8

Table 3.4 (Cont'd) Target Organic Compound Concentrations in SUMMA™ Canisters from Tank BY-108 Sampled on 1/30/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7003-A06.333 ^(b) VSS			V7003-A05.304 ^{(b)(c)} VSS			V7003-A04.273 ^(c) VSS			Mean and Standard Deviation			
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	St. Dev.	(ppbv)	St. Dev.
1,1,2,2-Tetrachloroethane	79-34-5	168	29.2	0.017	2.3	J	0.016	2.2	J	0.015	2.0	J	0.016	0.001	2.2	0.18
o-Xylene	95-47-6	106	29.3	0.027	5.6	J	0.028	5.9	J	0.025	5.3	J	0.027	0.001	5.6	0.29
Nonane	111-84-2	128	29.7	0.387	68		0.393	69		0.403	70		0.394	0.008	69	1.4
1-Ethyl-2-Methyl-Benzene	611-14-3	120	32.7	0.003	0.58	J	0.003	0.60	J	0.003	0.57	J	0.003	0.000	0.58	0.015
1,3,5-Trimethylbenzene	108-67-8	120	32.9	0.002	0.44	J	0.002	0.45	J	0.003	0.46	J	0.002	0.000	0.45	0.0100
1,2,4-Trimethylbenzene	95-63-6	120	34.2	0.006	1.2	J	0.006	1.2	J	0.006	1.2	J	0.006	0.000	1.2	0.021
Decane	124-18-5	142	34.4	0.825	130		0.811	128		0.861	136		0.832	0.026	131	4.1
Undecane	1120-21-4	156	38.7	1.605	230		1.626	233		1.679	241		1.636	0.038	235	5.5
1,2,4-Trichlorobenzene	120-82-1	181	42.2	0.011	1.4	J	0.011	1.4	J	0.012	1.4	J	0.011	0.000	1.4	0.049
Dodecane	112-40-3	170	42.7	4.607	606		4.903	645		5.153	678		4.888	0.273	643	36
Hexachloro-1,3-butadiene	87-68-3	261	44.1	0.009	0.76	J	0.009	0.79	J	0.011	0.97	J	0.010	0.001	0.84	0.11
Tridecane	629-50-5	184	46.5	12.433	1511	*	13.193	1603	*	12.904	1568	*	12.843	0.384	1560	47
Tetradecane	629-59-4	198	50.0	7.467	843	*	3.534	399		7.221	816	*	6.074	2.203	686	249
Total Concentration of Target Analytes													110.08			

Data Quality Flags

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

U Target compound not detected at or above the IDL.

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

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

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

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

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

Table 3.5 Comparison of Target Organic Compound Concentrations from Replicate Analysis of a Single SUMMATM Canister from Tank BY-108 Sampled on 1/30/97

Target Analytes ^(a)	CAS	MW	Ret		V7003-A05.304 ^(b) VSS						RPD ^(c)
			Time		(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(%)
Dichlorodifluoromethane	75-71-8	121	4.6		0.003	0.55	J	0.003	0.52	U	
Methanol	67-56-1	32	5.2	Y	2.979	2083	Y	2.928	2047	Y	2
1,3-Butadiene	106-99-0	54	5.7	Y	0.104	43	Y	0.114	47	Y	9
Butane	106-97-8	58	5.9		6.440	2482	*	6.767	2608	*	5
Ethanol	64-17-5	46	6.8	Y	1.936	942	Y	1.623	790	Y	18
Acetonitrile	75-05-8	41	7.3		0.244	133		0.232	126		5
Acetone	67-64-1	58	7.8		5.542	2137		5.396	2081		3
Trichlorofluoromethane	75-69-4	137	8.2		0.171	28		0.174	28		2
Pentane	109-66-0	72	8.9		3.923	1218		3.904	1212		0
Methylene Chloride	75-09-2	85	9.6		0.007	1.9	J	0.008	2.1	J	7
Propanenitrile	107-12-0	55	10.9		0.017	6.8	J	0.016	6.7	J	2
Propanol	71-23-8	60	10.8		1.659	618		1.584	590		5
2-Butanone	78-93-3	72	12.4		1.638	509		1.602	498		2
Hexane	110-54-3	86	13.7		3.625	942		3.605	937		1
Tetrahydrofuran	109-99-9	72	14.6		2.323	722		2.276	707		2
Butanenitrile	109-74-0	69	15.8		0.021	6.9	J	0.020	6.5	J	6
1-Butanol	71-36-3	74	16.2		52.594	15895	*	49.631	14999	*	6
Benzene	71-43-2	78	16.7		0.073	21		0.070	20		3
Cyclohexane	110-82-7	84	17.2		0.516	137		0.550	146		6
Heptane	142-82-5	100	19.2		1.941	434		1.889	422		3
4-Methyl-2-Pentanone	108-10-1	100	20.4		0.124	28		0.120	27		4
Pyridine	110-86-1	79	20.6		0.037	10	J	0.035	10	J	4
Pentanenitrile	110-59-8	83	21.5		0.055	15		0.054	15		2
1,1,2-Trichloroethane	79-00-5	133	21.9		0.005	0.90	J	0.005	0.88	J	4
Toluene	108-88-3	92	22.6		0.124	30		0.116	28		6
Octane	111-65-9	114	24.6		0.855	168		0.787	154		8
Chlorobenzene	108-90-7	113	26.7		0.022	4.3	J	0.020	4.0	J	7
Hexanenitrile	628-73-9	97	27.0		0.151	35		0.133	31		12
Ethylbenzene	100-41-4	106	27.6		0.017	3.6	J	0.017	3.5	J	2
p/m-Xylene	106-42-3	106	28.1		0.057	12	J	0.054	11	J	6
Cyclohexanone	108-94-1	98	28.5		0.339	77		0.347	79		2
1,1,2,2-Tetrachloroethane	79-34-5	168	29.2		0.016	2.2	J	0.016	2.2	J	1
o-Xylene	95-47-6	106	29.3		0.028	5.9	J	0.026	5.4	J	9
Nonane	111-84-2	128	29.7		0.393	69		0.368	64		7
1-Ethyl-2-Methyl-Benzene	611-14-3	120	32.7		0.003	0.60	J	0.003	0.55	J	6
1,3,5-Trimethylbenzene	108-67-8	120	32.9		0.002	0.45	J	0.002	0.44	J	0
1,2,4-Trimethylbenzene	95-63-6	120	34.2		0.006	1.2	J	0.006	1.1	J	5
Decane	124-18-5	142	34.4		0.811	128		0.796	125		2
Undecane	1120-21-4	156	38.7		1.626	233		1.567	225		4
1,2,4-Trichlorobenzene	120-82-1	181	42.2		0.011	1.4	J	0.011	1.3	J	5
Dodecane	112-40-3	170	42.7		4.903	645		4.674	615		5
Hexachloro-1,3-butadiene	87-68-3	261	44.1		0.009	0.79	J	0.009	0.76	J	4
Tridecane	629-50-5	184	46.5		13.193	1603	*	12.236	1487	*	8
Tetradecane	629-59-4	198	50.0		3.534	399		6.956	786	*	65

Data Quality Flags

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

U Target compound not detected at or above the IDL.

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

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

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

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

Table 3.6 Target Organic Compound Concentrations in Ambient Air and Ambient Air through the VSS in SUMMATM Canisters Associated with the Sampling of Tank BY-108 on 1/30/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7003-A01.244 ^(b)			V7003-A02.252 ^(b)		
				Ambient Air		Flag	Ambient Air Thru VSS		Flag
				(mg/m ³)	(ppbv)		(mg/m ³)	(ppbv)	
Dichlorodifluoromethane	75-71-8	121	4.6	0.003	0.52	J	0.003	0.56	J
Ethanol	64-17-5	46	6.8	<0.110	<53	Y	<0.110	<53	Y
Acetone	67-64-1	58	7.8	0.007	2.7	J	0.009	3.3	J
Methylene Chloride	75-09-2	85	9.6	0.006	1.6	J	0.006	1.5	J
1-Butanol	71-36-3	74	16.2	0.006	1.8	J	0.003	0.97	U
Toluene	108-88-3	92	22.6	0.002	0.57	J	0.002	0.49	U
1,2,4-Trichlorobenzene	120-82-1	181	42.2	0.014	1.8	J	0.003	0.35	U
Hexachloro-1,3-butadien	87-68-3	261	44.1	0.018	1.5	J	0.005	0.40	U
Tridecane	629-50-5	184	46.5	0.129	16		0.009	1.1	J
Tetradecane	629-59-4	198	50.0	0.250	28		0.004	0.47	U

Data Quality Flags

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 BY-108 Sampled on 1/30/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7003-A11.1362 ^(b) VSS			V7003-A12.1363 ^{(b)(c)} VSS			V7003-A13.1364 ^(b) VSS			Mean and Standard Deviation			
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	St. Dev.	(ppbv)	St. Dev.
Methanol	67-56-1	32	10.0	3.427	2396	Y	1.330	930	Y	1.646	1151	Y	2.134	1.131	1492	791
Butane	106-97-8	58	10.8	4.955	1909	E	3.404	1311	E	3.622	1395	E	3.993	0.839	1539	323
Ethanol	64-17-5	46	12.6	4.136	2011	E,Y	1.972	959	Y	3.166	1539	Y	3.091	1.084	1503	527
Acetonitrile	75-05-8	41	13.0	0.456	249		0.257	140		0.254	138		0.322	0.116	176	63
Acetone	67-64-1	58	13.7	4.212	1624	E	3.178	1225	E	3.259	1257	E	3.549	0.575	1369	222
Trichlorofluoromethane	75-69-4	137	14.1	0.073	12		0.057	9.3		0.096	16		0.075	0.020	12	3.2
Pentane	109-66-0	72	14.9	4.430	1378	E	3.316	1032	E	3.379	1051	E	3.708	0.625	1154	195
Methylene Chloride	75-09-2	85	15.8	0.052	14	J,B	0.025	6.7	J,B	0.041	11	J,B	0.039	0.013	10	3.5
Propanenitrile	107-12-0	55	17.1	0.049	20		0.031	13		0.034	14		0.038	0.010	15	3.9
Propanol	71-23-8	60	17.1	0.911	340		0.530	198		0.833	310		0.758	0.201	283	75
2-Butanone	78-93-3	72	18.6	0.864	268		0.678	211		1.023	318		0.855	0.173	266	54
Hexane	110-54-3	86	19.9	3.155	820	E	2.545	662		2.590	673		2.764	0.340	718	88
Tetrahydrofuran	109-99-9	72	20.8	1.495	464		1.359	422		1.423	442		1.426	0.068	443	21
Butanenitrile	109-74-0	69	21.9	0.052	17		0.031	10		0.024	7.7		0.035	0.014	11	4.7
1-Butanol	71-36-3	74	22.3	23.953	7251	E	22.919	6938	E	23.918	7240	E	23.597	0.587	7143	178
Benzene	71-43-2	78	22.8	0.079	23		0.076	22		0.080	23		0.078	0.002	22	0.56
Heptane	142-82-5	100	25.2	1.962	439		1.695	379		1.777	397		1.811	0.137	405	31
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.233	52		0.183	41		0.202	45		0.206	0.025	46	5.7
Pyridine	110-86-1	79	26.5	0.062	17	J	0.062	17	J	0.039	11	J	0.054	0.013	15	3.7
1,1,2-Trichloroethane	79-00-5	133	27.8	0.009	1.4	J	0.002	0.28	U	0.002	0.28	U	d	d	d	d
Toluene	108-88-3	92	28.5	0.113	27		0.102	25		0.117	28		0.110	0.008	27	1.9
Octane	111-65-9	114	30.5	0.903	177		0.774	152		0.904	178		0.861	0.075	169	15
Ethylbenzene	100-41-4	106	33.4	0.014	2.9	J	0.012	2.6	J	0.014	3.1	J	0.014	0.001	2.9	0.23
p/m-Xylene	106-42-3	106	33.9	0.011	2.2	J	0.009	2.0	J	0.011	2.4	J	0.010	0.001	2.2	0.21
Cyclohexanone	108-94-1	98	34.3	0.013	3.1	U	0.120	27	J	0.013	3.1	U	d	d	d	d
Styrene	100-42-5	104	34.8	0.002	0.37	J	0.002	0.50	J	0.002	0.36	U	0.002	d	0.44	d
o-Xylene	95-47-6	106	35.1	0.021	4.4		0.018	3.8	J	0.022	4.6		0.020	0.002	4.3	0.40
Nonane	111-84-2	128	35.5	0.316	55		0.206	36		0.290	51		0.271	0.057	47	10
Decane	124-18-5	142	40.1	0.462	73		0.270	43		0.449	71		0.394	0.107	62	17
Undecane	1120-21-4	156	44.4	1.142	164		0.735	106		1.203	173		1.027	0.254	147	36
Dodecane	112-40-3	170	48.5	3.262	430		2.046	270		3.228	425		2.845	0.692	375	91
Tridecane	629-50-5	184	52.2	2.010	245		1.347	164		2.112	257		1.823	0.416	222	51
Tetradecane	629-59-4	198	55.8	1.302	147		0.970	110		1.584	179		1.285	0.307	145	35
Total Concentration of Target Analytes													57.20			

Data Quality Flags

B Compound found in associated laboratory blank

E Target compound exceeds the upper quantification limit (UQL)

J Target compound detected above the IDL but below the EQL

U Target compound not detected at or above the IDL

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

Footnotes

(a) Detected target analytes

(b) Sample identification number.

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

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

Table 3.8 Comparison of Target Organic Compound Concentrations from Replicate Analysis of a Single Triple Sorbent Trap from Tank BY-108 Sampled on 1/30/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7003-A12.1363 ^(b) VSS						RPD ^(c) (%)
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	
Methanol	67-56-1	32	10.0	1.330	930	Y	1.439	1006	Y	8
Butane	106-97-8	58	10.8	3.404	1311	E	3.620	1395	E	6
Ethanol	64-17-5	46	12.6	1.972	959	Y	2.091	1016	Y	6
Acetonitrile	75-05-8	41	13.0	0.257	140		0.285	156		10
Acetone	67-64-1	58	13.7	3.178	1225	E	3.324	1282	E	4
Trichlorofluoromethane	75-69-4	137	14.1	0.057	9.3		0.059	9.6		4
Pentane	109-66-0	72	14.9	3.316	1032	E	3.449	1073	E	4
Methylene Chloride	75-09-2	85	15.8	0.025	6.7	J,B	0.032	8.5	J,B	25
Propanenitrile	107-12-0	55	17.1	0.031	13		0.035	14		12
Propanol	71-23-8	60	17.1	0.530	198		0.505	188		5
2-Butanone	78-93-3	72	18.6	0.678	211		0.679	211		0
Hexane	110-54-3	86	19.9	2.545	662		2.705	703		6
Tetrahydrofuran	109-99-9	72	20.8	1.359	422		1.413	439		4
Butanenitrile	109-74-0	69	21.9	0.031	10		0.050	16		47
1-Butanol	71-36-3	74	22.3	22.919	6938	E	22.751	6887	E	1
Benzene	71-43-2	78	22.8	0.076	22		0.074	21		3
Heptane	142-82-5	100	25.2	1.695	379		1.758	393		4
4-Methyl-2-Pentanone	108-10-1	100	26.3	0.183	41		0.180	40		1
Pyridine	110-86-1	79	26.5	0.062	17	J	0.064	18	J	4
Toluene	108-88-3	92	28.5	0.102	25		0.102	25		1
Octane	111-65-9	114	30.5	0.774	152		0.776	152		0
Ethylbenzene	100-41-4	106	33.4	0.012	2.6	J	0.012	2.6	J	2
p/m-Xylene	106-42-3	106	33.9	0.009	2.0	J	0.010	2.0	J	1
Cyclohexanone	108-94-1	98	34.3	0.120	27	J	0.013	3.1	U	
Styrene	100-42-5	104	34.8	0.002	0.50	J	0.002	0.36	U	
o-Xylene	95-47-6	106	35.1	0.018	3.8	J	0.018	3.8	J	2
Nonane	111-84-2	128	35.5	0.206	36		0.199	35		4
Decane	124-18-5	142	40.1	0.270	43		0.262	41		3
Undecane	1120-21-4	156	44.4	0.735	106		0.707	102		4
Dodecane	112-40-3	170	48.5	2.046	270		2.015	266		2
Tridecane	629-50-5	184	52.2	1.347	164		1.339	163		1
Tetradecane	629-59-4	198	55.8	0.970	110		0.950	107		2

Data Quality Flags

B Compound found in associated laboratory blank.

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

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

U Target compound not detected at or above the IDL.

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

Footnotes

(a) Detected target analytes.

(b) Sample identification number.

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

Table 3.9 Target Organic Compound Concentrations in Triple Sorbent Trap Blank Samples Associated with the Sampling of Tank BY-108 on 1/30/97

Target Analytes ^(a)	CAS	MW	Ret Time	V7003-A17.1366 ^(b)			V7003-A18.1367 ^(b)			V7003-A19.1368 ^(b)			V7003-A20.1369 ^(b)		
				Field Blank #1			Field Blank #2			Trip Blank #1			Trip Blank #2		
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Trichlorofluoromethane	75-69-4	137	14.1	0.006	0.91	J	0.014	2.3	J	0.004	0.72	U	0.004	0.72	U
Methylene Chloride	75-09-2	85	15.8	0.024	6.2	J,B	0.028	7.4	J,B	0.020	5.4	J,B	0.019	5.1	J,B
Hexane	110-54-3	86	19.9	0.002	0.48	J	0.002	0.62	J	0.001	0.32	U	0.001	0.32	U
1-Butanol	71-36-3	74	22.3	0.009	2.7	J	0.011	3.2	J	0.008	2.3	U	0.008	2.3	U
Tetradecane	629-59-4	198	55.8	0.019	2.2	J, B	0.022	2.5	J, B	0.019	2.2	U	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 BY-108 Sampled on 1/30/97

Analyte	CAS #	Lower Flammability	Average	% of LFL ^(a)
		Limit(LFL)	Measured Concentrations	
Ammonia (ppm)	7664-41-7	150000	775	0.517
Carbon Monoxide (ppm)	630-08-0	125000	<17	<0.014
Hydrogen (ppm)	1333-74-0	40000	355	0.888
Methane (ppm)	74-82-8	50000	<25	<0.050
TNMOC (mg/m ³)		42000	214.58	0.511
Total				<1.979

(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 SUMMATM Canister Samples from Tank BY-108 Sampled on 1/30/97

3.20

1

3.22

4.0 Conclusions

The concentrations of inorganic and organic analytes were determined from samples of the headspace of Tank BY-108 on January 30, 1997 (Sample Job V7003). 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 notifications were provided because analytical results indicated ammonia exceeded the notification level of 150 ppmv; notification levels and notification procedures are described in the SAP (Buckley 1996).

5.0 References

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

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

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

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

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

Appendix A

Chain-of-Custody Sample Control Forms

Custody Form Initiator

J. A. Edwards - PNNL

Telephone (509) 373-0141

Page 85-3009 / FAX 376-0418

Company Contact

R. D. Mahon - SESC

Telephone (509) 373-7533

Page 85-9656 / FAX 373-3193

Project Designation/Sampling Locations 200 West Tank Farm
241-BY-108 Tank Vapor Sample SAF V7003

Temporal #5 Riser # 12A VSS

Ice Chest No.

Collection date 1 - 30 - 97

Preparation date 01 - 23 - 97

Field Logbook No. WHC-N-642-1D

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

Collectors: GS CAPRIO

Shipped to

PNNL

FS MAST

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

		Sample Date/Time
V7003 - A07 . 22R	Collect NH ₃ /NO _x /H ₂ O Sorbent Trap	1/30/97 / 1101
V7003 - A08 . 23R	Collect NH ₃ /NO _x /H ₂ O Sorbent Trap	/ 1101
V7003 - A09 . 24R	Collect NH ₃ /NO _x /H ₂ O Sorbent Trap	/ 1101
V7003 - A10 . 25R	Collect NH ₃ /NO _x /H ₂ O Sorbent Trap	/ 1101
V7003 - A15 . 26R	Open, close and store NH ₃ /NO _x /H ₂ O field blank #1	/ 1115
V7003 - A16 . 27R	Open, close and store NH ₃ /NO _x /H ₂ O field blank #2	/ 1115

[] Field Transfer of Custody			[X] Chain of Possession			(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time		
L M Thomas <i>L M Thomas</i>	01-27-97	1015	J A Edwards <i>J A Edwards</i>	01-27-97	1015		
J A Edwards <i>J A Edwards</i>	01-27-97	1313	CSM McCall <i>CSM McCall</i>	01-27-97	1313		
CSM McCall <i>CSM McCall</i>	1-27-97	1530	MS CD <i>MS CD</i>	1-27-97	1530		
MS CD <i>MS CD</i>	2/4/97	1010	CSM McCall <i>CSM McCall</i>	2-4-97	1010		
CSM McCall <i>CSM McCall</i>	2-4-97	1340	J A Edwards <i>J A Edwards</i>	2-4-97	1340		
J A Edwards <i>J A Edwards</i>	2-11-97	1045	LMP Thomas <i>LMP Thomas</i>	2-11-97	1045		

Final Sample Disposition

Comments:

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

POC

(X)

POC

(X)

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

(Revised 10/01/96 PNNL)

A-6000-407 (12/92) WEF061

1 of 1

Custody Form Initiator

J. A. Edwards - PNNL

Telephone (509) 373-0141

Page 85-3009 / FAX 376-0418

Company Contact

R. D. Mahon - SESC

Telephone (509) 373-7533

Page 85-9656 / FAX 373-3193

Project Designation/Sampling Locations 200 West Tank Farm

241-BY-108 Tank Vapor Sample SAF V7003

Temporal #5 Riser # 12A VSS

Ice Chest No.

Collection date 1 - 30 - 97

Preparation date 01 - 23 - 97

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: GS CAPRIO

Shipped to

PNNL

ES MAST

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

V7003 - A01 . 244

Collect Ambient Air Sample SUMMA #1

V7003 - A02 . 252

Collect Ambient Air Sample SUMMA #2

V7003 - A04 . 273

Collect SUMMA #3

V7003 - A05 . 304

Collect SUMMA #4

V7003 - A06 . 333

Collect SUMMA #5

Sample Date/Time

1/30/97 1085Z

10901

11049

11053

11057

[] Field Transfer of Custody			[X] Chain of Possession			(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time		
J A Edwards	01-27-97	1308	CS McClellan	01-27-97	1308		
CS McClellan	1-27-97	1530	GS CAPRIO	1-27-97	1530		
GS CAPRIO	2/4/97	1010	CS McClellan	2-4-97	1010		
CS McClellan	2/4/97	1341	J A EDWARDS	2-4-97	1341		

Final Sample Disposition

Comments:

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

POC

POC

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

(Revised 10/01/96 PNNL)

A-6000-407 (12/92) WEF061

1 of 1

Custody Form Initiator

J. A. Edwards - PNL

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

Company Contact

R. D. Mahon - WHC

Telephone (509) 373-7437
Page 85-9656 / S3-27 / FAX 373-7076Project Designation/Sampling Locations 200 West Tank Farm
241-BY-108 Tank Vapor Sample SAF V7003
Temporal #5 Riser # 12A (VSS Truck)
Ice Chest No.Collection date 1-30-97
Preparation date 01-23-97Field Logbook No. PNL-T-006
WHC

Erico Hi/Lo thermometer No.

PNL-T-006

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

Shipped to

WHC

Collector(s)

Caprio
Mast

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

V7003 - A11 . 1362 PNL Triple Sorbent Trap (TST) Sample #1
V7003 - A12 . 1363 PNL TST Sample #2
V7003 - A13 . 1364 PNL TST Sample #3
V7003 - A14 . 1365 PNL TST Sample #4

Sample Date/Time

1/30/97	1124
	1124
	1129
	1129
	1132
	1132
	NA
	NA

V7003 - A17 . 1366 Open, close and store TST Field Blank #1
V7003 - A18 . 1367 Open, close and store TST Field Blank #2V7003 - A19 . 1368 Store TST Trip Blank #1
V7003 - A20 . 1369 Store TST Trip Blank #2

[] Field Transfer of Custody			[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time	
JL Julva <u>JL Julva</u>	01-24-97	1315	JA Edwards <u>JA Edwards</u>	01-24-97	1315	
JA Edwards <u>JA Edwards</u>	01-27-97	1313	CS McClellan <u>CS McClellan</u>	1-27-97	1313	
CS McClellan <u>CS McClellan</u>	1-27-97	1530	GS Caprio <u>GS Caprio</u>	1-27-97	1530	
GS Caprio <u>GS Caprio</u>	2-4-97	1010	CS McClellan <u>CS McClellan</u>	2-4-97	1010	
CS McClellan <u>CS McClellan</u>	2-4-97	1340	JA Edwards <u>JA Edwards</u>	2-9-97	1340	
JA Edwards <u>JA Edwards</u>	2-11-97	1050	JL Julva <u>JL Julva</u>	2-11-97	1050	

Final Sample Disposition

Comments:

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

POC

Y

POC

Y

Comments:

Cooler Temperature Status	
IHi -13 °C / Lo -13 °C (pick up at PNL to WHC)	
IHi -9 °C / Lo -18 °C (delivery at WHC from PNL)	
IHi -10 °C / Lo -2 °C (at return to PNL from WHC)	
IHi +10 °C / Lo -18 °C (at delivery from WHC to PNL)	

(Revised 06/21/95 PNL)

Appendix B

Listing of All Target Compounds for Organic Compound Analysis

Table B.1 SUMMA™ Analysis Results for All Target Analytes from Tank BY-108 Sampled on 1/30/97

Target Analytes	CAS	MW	Ret Time	V7003-A01.244 VSS			V7003-A02.252			V7003-A05.304 VSS Rep			V7003-A06.333 VSS			V7003-A05.304 VSS			V7003-A04.273 VSS		
				Ambient Air			Ambient Air Thru VSS														
				(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag	(mg/m ³)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	120.9	4.6	0.0028	0.52 J		0.003	0.56 J		0.0028	0.52 U		0.0028	0.52 U		0.003	0.55 J		0.0028	0.52 U	
Chloromethane	74-87-3	50.5	4.9	0.0024	1.06 U		0.0024	1.06 U		0.0024	1.06 U		0.0024	1.06 U		0.0024	1.06 U		0.0024	1.06 U	
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	170.9	5.2	0.013	1.7 U		0.013	1.7 U		0.013	1.7 U		0.013	1.7 U		0.013	1.7 U		0.013	1.7 U	
Methanol	67-56-1	32.0	5.2	<0.110	<77 Y		<0.110	<77 Y		2.9279	2046.94 Y		2.6799	1873.57 Y		2.979	2082.7 Y		3.1149	2177.74 Y	
Vinyl Chloride	75-01-4	62.5	5.4	0.0016	0.57 U		0.0016	0.57 U		0.0016	0.57 U		0.0016	0.57 U		0.0016	0.57 U		0.0016	0.57 U	
1,3-Butadiene	106-99-0	54.0	5.7	<0.083	<34 Y		<0.083	<34 Y		0.1136	47.14 Y		0.1064	44.15 Y		0.1041	43.18 Y		0.1137	47.18 Y	
Butane	106-97-8	58.1	5.9	0.0024	0.92 U		0.0024	0.92 U		6.7673	2608.17 *		5.8672	2261.28 *		6.4404	2482.19 *		5.9354	2287.56 *	
Bromomethane	74-83-9	94.9	6.3	0.0052	1.23 U		0.0052	1.23 U		0.0052	1.23 U		0.0052	1.23 U		0.0052	1.23 U		0.0052	1.23 U	
Chloroethane	75-00-3	64.5	6.7	0.0054	1.88 U		0.0054	1.88 U		0.0054	1.88 U		0.0054	1.88 U		0.0054	1.88 U		0.0054	1.88 U	
Ethanol	64-17-5	46.0	6.8	<0.110	<53 Y		<0.110	<53 Y		1.6232	790.24 Y		1.7012	828.22 Y		1.9359	942.49 Y		2.0145	980.75 Y	
Acetonitrile	75-05-8	41.1	7.3	0.004	2.18 U		0.004	2.18 U		0.2315	126.31		0.2251	122.84		0.2442	133.23		0.2513	137.12	
Acetone	67-64-1	58.1	7.8	0.0069	2.68 J		0.0085	3.27 J		5.3956	2080.96		5.237	2019.79		5.5416	2137.27		5.9122	2280.17	
Trichlorofluoromethane	75-69-4	137.4	8.2	0.0048	0.78 U		0.0048	0.78 U		0.1739	28.36		0.1668	27.2		0.171	27.88		0.1737	28.33	
Pentane	109-66-0	72.2	8.9	0.0038	1.18 U		0.0038	1.18 U		3.9043	1212.16		3.892	1208.34		3.9227	1217.84		4.0384	1253.78	
1,1-Dichloroethene	75-35-4	96.9	9.5	0.0038	0.88 U		0.0038	0.88 U		0.0038	0.88 U		0.0038	0.88 U		0.0038	0.88 U		0.0038	0.88 U	
Methylene Chloride	75-09-2	84.9	9.6	0.0061	1.6 J		0.0057	1.51 J		0.0078	2.06 J		0.0076	2.02 J		0.0073	1.93 J		0.0068	1.8 J	
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	187.4	10.1	0.004	0.48 U		0.004	0.48 U		0.004	0.48 U		0.004	0.48 U		0.004	0.48 U		0.004	0.48 U	
Propanenitrile	107-12-0	55.1	10.9	0.0038	1.55 U		0.0038	1.55 U		0.0164	6.68 J		0.0185	7.53 J		0.0168	6.82 J		0.0166	6.74 J	
Propanol	71-23-8	60.1	10.8	0.0028	1.04 U		0.0028	1.04 U		1.5842	590.46		1.5346	571.97		1.6586	618.17		1.556	579.94	
1,1-Dichloroethane	75-34-3	99.0	11.8	0.002	0.45 U		0.002	0.45 U		0.002	0.45 U		0.002	0.45 U		0.002	0.45 U		0.002	0.45 U	
2-Butanone	78-93-3	72.1	12.4	0.0028	0.87 U		0.0028	0.87 U		1.6018	497.58		1.5874	493.11		1.6376	508.7		1.4779	459.08	
cis-1,2-Dichloroethene	156-59-2	96.9	13.3	0.0034	0.79 U		0.0034	0.79 U		0.0034	0.79 U		0.0034	0.79 U		0.0034	0.79 U		0.0034	0.79 U	
Hexane	110-54-3	86.2	13.7	0.0032	0.83 U		0.0032	0.83 U		3.6048	936.96		3.5927	933.82		3.625	942.2		3.5319	918.01	
Chloroform	67-66-3	119.4	13.8	0.0026	0.49 U		0.0026	0.49 U		0.0026	0.49 U		0.0026	0.49 U		0.0026	0.49 U		0.0026	0.49 U	
Tetrahydrofuran	109-99-9	72.1	14.6	0.0016	0.5 U		0.0016	0.5 U		2.2761	707.05		2.2976	713.73		2.3228	721.56		2.1665	673	
1,2-Dichloroethane	107-06-2	99.0	15.3	0.0022	0.5 U		0.0022	0.5 U		0.0022	0.5 U		0.0022	0.5 U		0.0022	0.5 U		0.0022	0.5 U	
1,1,1-Trichloroethane	71-55-6	133.4	15.8	0.0032	0.54 U		0.0032	0.54 U		0.0032	0.54 U		0.0032	0.54 U		0.0032	0.54 U		0.0032	0.54 U	
Butanenitrile	109-74-0	69.1	15.8	0.0034	1.1 U		0.0034	1.1 U		0.02	6.5 J		0.0238	7.73 J		0.0212	6.87 J		0.0277	8.98 J	
1-Butanol	71-36-3	74.1	16.2	0.0059	1.8 J		0.0032	0.97 U		49.6311	14999.15 *		45.8899	13868.51 *		52.5941	15894.59 *		48.4784	14650.79 *	
Benzene	71-43-2	78.1	16.7	0.0016	0.46 U		0.0016	0.46 U		0.0702	20.12		0.0714	20.47		0.0727	20.84		0.0743	21.31	
Carbon Tetrachloride	56-23-5	153.8	17.0	0.0034	0.5 U		0.0034	0.5 U		0.0034	0.5 U		0.0034	0.5 U		0.0034	0.5 U		0.0034	0.5 U	
Cyclohexane	110-82-7	84.2	17.2	0.0036	0.96 U		0.0036	0.96 U		0.5497	146.3		0.5421	144.28		0.5159	137.31		0.6053	161.11	
1,2-Dichloropropane	78-87-5	113.0	18.2	0.003	0.59 U		0.003	0.59 U		0.003	0.59 U		0.003	0.59 U		0.003	0.59 U		0.003	0.59 U	
Trichloroethene	79-01-6	131.4	18.7	0.0024	0.41 U		0.0024	0.41 U		0.0024	0.41 U		0.0024	0.41 U		0.0024	0.41 U		0.0024	0.41 U	
Heptane	142-82-5	100.2	19.2	0.0018	0.4 U		0.0018	0.4 U		1.8891	422.32		1.9308	431.64		1.9412	433.95		2.0278	453.32	
cis-1,3-Dichloropropene	10061-01-5	111.0	20.4	0.0024	0.48 U		0.0024	0.48 U		0.0024	0.48 U		0.0024	0.48 U		0.0024	0.48 U		0.0024	0.48 U	
4-Methyl-2-Pentanone	108-10-1	100.2	20.4	0.0034	0.76 U		0.0034	0.76 U		0.1195	26.73		0.121	27.06		0.1243	27.8		0.1419	31.72	
Pyridine	110-86-1	79.1	20.6	0.0186	5.27 U		0.0186	5.27 U		0.0354	10.02 J		0.0332	9.4 J		0.0368	10.41 J		0.0373	10.57 J	
trans-1,3-Dichloropropene	10061-02-6	111.0	21.5	0.0018	0.36 U		0.0018	0.36 U		0.0018	0.36 U		0.0018	0.36 U		0.0018	0.36 U		0.0018	0.36 U	
Pentanenitrile	110-59-8	83.1	21.5	0.0042	1.13 U		0.0042	1.13 U		0.0542	14.6		0.0588	15.84		0.0554	14.92		0.0656	17.69	
1,1,2-Trichloroethane	79-00-5	133.4	21.9	0.0028	0.47 U		0.0028	0.47 U		0.0052	0.88 J		0.0064	1.07 J		0.0054	0.9 J		0.0074	1.24 J	
Toluene	108-88-3	92.1	22.6	0.0023	0.57 J		0.002	0.49 U		0.1164	28.31		0.123	29.91		0.1239	30.12		0.1276	31.02	
1,2-Dibromoethane	106-93-4	187.9	24.1	0.0052	0.62 U		0.0052	0.62 U		0.0052	0.62 U		0.0052	0.62 U		0.0052	0.62 U		0.0052	0.62 U	
Octane	111-65-9	114.2	24.6	0.0024	0.47 U		0.0024	0.47 U		0.7866	154.25		0.8432	165.35		0.855	167.66		0.8588	168.4	
Tetrachloroethylene	127-18-4	165.8	25.1	0.0042	0.57 U		0.0042	0.57 U		0.0042	0.57 U		0.0042	0.57 U		0.0042	0.57 U		0.0042	0.57 U	

Table B.1 (Cont'd) SUMMA™ Analysis Results for All Target Analytes from Tank BY-108 Sampled on 1/30/97

Target Analytes	CAS	MW	Ret Time	V7003-A01.244 VSS			V7003-A02.252			V7003-A05.304 VSS Rep			V7003-A06.333 VSS			V7003-A05.304 VSS			V7003-A04.273 VSS		
				Ambient Air			Ambient Air Thru VSS														
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Chlorobenzene	108-90-7	112.6	26.7	0.0026	0.52 U		0.0026	0.52 U		0.0201	4.01 J		0.0209	4.16 J		0.0215	4.27 J		0.0053	1.06 J	
Hexanenitrile	628-73-9	97.1	27.0	0.0052	1.2 U		0.0052	1.2 U		0.1331	30.7		0.1633	37.66		0.1506	34.73		0.186	42.91	
Ethylbenzene	100-41-4	106.2	27.6	0.0028	0.59 U		0.0028	0.59 U		0.0167	3.52 J		0.0165	3.48 J		0.017	3.59 J		0.0175	3.7 J	
p/m-Xylene	106-42-3	106.2	28.1	0.013	2.74 U		0.013	2.74 U		0.0536	11.3 J		0.0556	11.73 J		0.0569	12 J		0.0574	12.1 J	
Cyclohexanone	108-94-1	98.1	28.5	0.0058	1.32 U		0.0058	1.32 U		0.3466	79.11		0.2913	66.49		0.3394	77.46		0.3462	79.01	
Styrene	100-42-5	104.2	29.0	0.0022	0.47 U		0.0022	0.47 U		0.0022	0.47 U		0.0022	0.47 U		0.0022	0.47 U		0.0022	0.47 U	
1,1,2,2-Tetrachloroethane	79-34-5	167.9	29.2	0.0042	0.56 U		0.0042	0.56 U		0.0161	2.15 J		0.0174	2.32 J		0.0162	2.17 J		0.0147	1.96 J	
o-Xylene	95-47-6	106.2	29.3	0.0028	0.59 U		0.0028	0.59 U		0.0256	5.39 J		0.0266	5.61 J		0.0279	5.89 J		0.0251	5.31 J	
Nonane	111-84-2	128.3	29.7	0.0016	0.28 U		0.0016	0.28 U		0.3676	64.19		0.3865	67.5		0.3932	68.66		0.4028	70.34	
1-Ethyl-2-Methyl-Benzene	611-14-3	120.2	32.7	0.0018	0.34 U		0.0018	0.34 U		0.003	0.55 J		0.0031	0.58 J		0.0032	0.6 J		0.0031	0.57 J	
1,3,5-Trimethylbenzene	108-67-8	120.2	32.9	0.0018	0.34 U		0.0018	0.34 U		0.0024	0.44 J		0.0024	0.44 J		0.0024	0.45 J		0.0025	0.46 J	
1,2,4-Trimethylbenzene	95-63-6	120.2	34.2	0.0026	0.48 U		0.0026	0.48 U		0.006	1.11 J		0.0062	1.15 J		0.0063	1.18 J		0.0064	1.19 J	
Decane	124-18-5	142.3	34.4	0.003	0.47 U		0.003	0.47 U		0.7955	125.24		0.8245	129.8		0.8112	127.71		0.8611	135.56	
1,3-Dichlorobenzene	541-73-1	147.0	34.7	0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U	
1,4-Dichlorobenzene	106-46-7	147.0	34.9	0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U	
1,2-Dichlorobenzene	95-50-1	147.0	36.0	0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U		0.0018	0.27 U	
Undecane	1120-21-4	156.3	38.7	0.0282	4.04 U		0.0282	4.04 U		1.5669	224.55		1.6046	229.94		1.6255	232.95		1.679	240.62	
1,2,4-Trichlorobenzene	120-82-1	181.5	42.2	0.0144	1.77 J		0.0028	0.35 U		0.0105	1.3 J		0.0109	1.35 J		0.011	1.36 J		0.0117	1.44 J	
Dodecane	112-40-3	170.3	42.7	0.0098	1.29 U		0.0098	1.29 U		4.6737	614.6		4.6071	605.85		4.9033	644.8		5.1526	677.58	
Hexachloro-1,3-butadiene	87-68-3	260.8	44.1	0.0176	1.51 J		0.0046	0.4 U		0.0088	0.76 J		0.0088	0.76 J		0.0092	0.79 J		0.0113	0.97 J	
Tridecane	629-50-5	184.4	46.5	0.1286	15.62		0.0088	1.07 J		12.236	1486.69 *		12.4326	1510.57 *		13.1928	1602.95 *		12.9037	1567.81 *	
Tetradecane	629-59-4	198.3	50.0	0.2497	28.19		0.0042	0.47 U		6.9558	785.57 *		7.467	843.3 *		3.5342	399.14		7.221	815.52 *	

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 BY-108 Sampled on 1/30/97

Target Analytes	CAS	MW	Ret Time	V7003-A11.1362 VSS			V7003-A12.1363 VSS			V7003-A12.1363 VSS REP			V7003-A13.1364 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
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	170.9	9.6	0.0034	0.44	U	0.0034	0.44	U	0.0034	0.44	U	0.0034	0.44	U
Methanol	67-56-1	32.0	10.0	3.4272	2396.07	Y	1.33	929.86	Y	1.4394	1006.33	Y	1.6459	1150.68	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	<0.223	<93	Y	<0.223	<93	Y	<0.223	<93	Y	<0.223	<93	Y
Butane	106-97-8	58.1	10.8	4.9545	1908.84	E	3.4038	1311.4	E	3.6199	1394.67	E	3.6217	1395.35	E
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	4.1359	2010.93	E,Y	1.9722	958.93	Y	2.0905	1016.44	Y	3.1661	1539.4	Y
Acetonitrile	75-05-8	41.1	13.0	0.4558	248.72		0.2568	140.14		0.2851	155.55		0.2535	138.35	
Acetone	67-64-1	58.1	13.7	4.2115	1624.26	E	3.1775	1225.48	E	3.3237	1281.88	E	3.2585	1256.72	E
Trichlorofluoromethane	75-69-4	137.4	14.1	0.0728	11.87		0.0567	9.25		0.0591	9.63		0.0956	15.58	
Pentane	109-66-0	72.0	14.9	4.4295	1378.08	E	3.3163	1031.73	E	3.4493	1073.13	E	3.3788	1051.19	E
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	0.052	13.71	J,B	0.0252	6.66	J,B	0.0323	8.51	J,B	0.0409	10.78	J,B
1,1,2-trichloro-2,2,2-trifluoroethane	76-13-1	187.4	16.3	0.0032	0.38	U	0.0032	0.38	U	0.0032	0.38	U	0.0032	0.38	U
Propanenitrile	107-12-0	55.1	17.1	0.0491	19.97		0.0313	12.75		0.0354	14.39		0.0339	13.77	
Propanol	71-23-8	60.1	17.1	0.9112	339.61		0.5301	197.59		0.505	188.22		0.8326	310.32	
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	0.8635	268.25		0.6777	210.5		0.679	210.94		1.0231	317.82	
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	3.1551	820.09	E	2.5454	661.61		2.7053	703.16		2.5902	673.25	
Chloroform	67-66-3	119.4	20.0	0.0031	0.57	U	0.0031	0.57	U	0.0031	0.57	U	0.0031	0.57	U
Tetrahydrofuran	109-99-9	72.1	20.8	1.4948	464.33		1.3594	422.28		1.4131	438.96		1.4234	442.16	
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	0.0516	16.71		0.0309	10.02		0.05	16.2		0.0237	7.67	
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	23.9529	7250.6	E	22.9191	6937.68	E	22.7506	6886.66	E	23.9177	7239.96	E
Benzene	71-43-2	78.1	22.8	0.079	22.66		0.0762	21.84		0.0738	21.17		0.0799	22.91	
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	1.962	438.61		1.6953	379		1.7575	392.9		1.777	397.24	
4-Methyl-2-Pentanone	108-10-1	100.2	26.3	0.2329	52.09		0.1828	40.87		0.1802	40.31		0.202	45.17	
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 BY-108 Sampled on 1/30/97

Target Analytes	CAS	MW	Ret Time	V7003-A11.1362 VSS			V7003-A12.1363 VSS			V7003-A12.1363 VSS REP			V7003-A13.1364 VSS		
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Pyridine	110-86-1	79.1	26.5	0.0616	17.45	J	0.0616	17.46	J	0.0644	18.23	J	0.039	11.05	J
trans-1,3-Dichloropropene	10061-02-6	111.0	27.4	0.0029	0.58	U	0.0029	0.58	U	0.0029	0.58	U	0.0029	0.58	U
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	0.0085	1.43	J	0.0017	0.28	U	0.0017	0.28	U	0.0017	0.28	U
Toluene	108-88-3	92.1	28.5	0.113	27.46		0.1016	24.7		0.1022	24.85		0.1166	28.34	
1,2-Dibromoethane	106-93-4	187.9	30.0	0.0025	0.3	U	0.0025	0.3	U	0.0025	0.3	U	0.0025	0.3	U
Octane	111-65-9	114.0	30.5	0.9028	177.4		0.7743	152.15		0.7758	152.43		0.9044	177.71	
Tetrachloroethylene	127-18-4	165.8	31.0	0.0027	0.36	U	0.0027	0.36	U	0.0027	0.36	U	0.0027	0.36	U
Chlorobenzene	108-90-7	112.6	32.6	0.0012	0.23	U	0.0012	0.23	U	0.0012	0.23	U	0.0012	0.23	U
Hexanenitrile	628-73-9	97.0	32.8	0.0031	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	0.0139	2.93	J	0.0124	2.61	J	0.0122	2.58	J	0.0144	3.05	J
p/m-Xylene	106-42-3	106.2	33.9	0.0105	2.21	J	0.0094	1.98	J	0.0095	2	J	0.0113	2.39	J
Cyclohexanone	108-94-1	98.1	34.3	0.0134	3.06	U	0.1201	27.41	J	0.0134	3.06	U	0.0134	3.06	U
Styrene	100-42-5	104.2	34.8	0.0017	0.37	J	0.0023	0.5	J	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	0.0209	4.41		0.0182	3.83	J	0.0179	3.78	J	0.0218	4.6	
Nonane	111-84-2	128.0	35.5	0.3164	55.38		0.2064	36.12		0.1989	34.81		0.2895	50.66	
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	0.4623	72.79		0.2703	42.56		0.2619	41.23		0.4492	70.73	
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	1.1419	163.96		0.7352	105.56		0.7072	101.55		1.2026	172.68	
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	3.2624	429.87		2.0464	269.64		2.0154	265.56		3.2275	425.27	
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	2.0104	244.74		1.3466	163.94		1.339	163.01		2.1118	257.09	
Tetradecane	629-59-4	198.0	55.8	1.3019	147.29		0.97	109.74		0.9501	107.48		1.5841	179.21	
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.

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 BY-108 on 1/30/97

Target Analytes	CAS	MW	Ret Time	V7003-A17.1366 FB #1			V7003-A18.1367 FB #2			V7003-A19.1368 TB #1			V7003-A20.1369 TB #2		
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Dichlorodifluoromethane	75-71-8	120.9	7.9	0.0043	0.79	U	0.0043	0.79	U	0.0043	0.79	U	0.0043	0.79	U
Chloromethane	74-87-3	50.5	8.9	0.0032	1.4	U	0.0032	1.4	U	0.0032	1.4	U	0.0032	1.4	U
1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	170.9	9.6	0.0032	0.41	U	0.0032	0.41	U	0.0032	0.41	U	0.0032	0.41	U
Methanol	67-56-1	32.0	10.0	<0.274	<192	Y	<0.274	<192	Y	<0.274	<192	Y	<0.274	<192	Y
Vinyl Chloride	75-01-4	62.5	10.0	0.003	1.08	U	0.003	1.08	U	0.003	1.08	U	0.003	1.08	U
1,3-Butadiene	106-99-0	54.0	10.6	<0.208	<86	Y	<0.208	<86	Y	<0.208	<86	Y	<0.208	<86	Y
Butane	106-97-8	58.1	10.8	0.0036	1.39	U	0.0036	1.39	U	0.0036	1.39	U	0.0036	1.39	U
Chloroethane	75-00-3	64.5	12.1	0.0041	1.42	U	0.0041	1.42	U	0.0041	1.42	U	0.0041	1.42	U
Ethanol	64-17-5	46.1	12.6	<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	0.0072	2.78	U	0.0072	2.78	U	0.0072	2.78	U	0.0072	2.78	U
Trichlorofluoromethane	75-69-4	137.4	14.1	0.0056	0.91	J	0.0141	2.29	J	0.0044	0.72	U	0.0044	0.72	U
Pentane	109-66-0	72.0	14.9	0.0029	0.89	U	0.0029	0.89	U	0.0029	0.89	U	0.0029	0.89	U
1,1-Dichloroethene	75-35-4	96.9	15.5	0.0021	0.47	U	0.0021	0.47	U	0.0021	0.47	U	0.0021	0.47	U
Methylene Chloride	75-09-2	84.9	15.8	0.0237	6.24	J,B	0.0279	7.36	J,B	0.0203	5.36	J,B	0.0194	5.12	J,B
1,1,2-trichloro-1,1,2,2-trifluoroethane	76-13-1	187.4	16.3	0.003	0.36	U	0.003	0.36	U	0.003	0.36	U	0.003	0.36	U
Propanenitrile	107-12-0	55.1	17.1	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	0.0019	0.48	J	0.0024	0.62	J	0.0013	0.32	U	0.0013	0.32	U
Chloroform	67-66-3	119.4	20.0	0.0029	0.53	U	0.0029	0.53	U	0.0029	0.53	U	0.0029	0.53	U
Tetrahydrofuran	109-99-9	72.1	20.8	0.0035	1.07	U	0.0035	1.07	U	0.0035	1.07	U	0.0035	1.07	U
1,2-Dichloroethane	107-06-2	99.0	21.4	0.0011	0.25	U	0.0011	0.25	U	0.0011	0.25	U	0.0011	0.25	U
Butanenitrile	109-74-0	69.1	21.9	0.0014	0.45	U	0.0014	0.45	U	0.0014	0.45	U	0.0014	0.45	U
1,1,1-Trichloroethane	71-55-6	133.4	21.9	0.0027	0.44	U	0.0027	0.44	U	0.0027	0.44	U	0.0027	0.44	U
1-Butanol	71-36-3	74.0	22.3	0.009	2.74	J	0.0106	3.21	J	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 BY-108 on 1/30/97

Target Analytes	CAS	MW	Ret Time	V7003-A17.1366 FB #1			V7003-A18.1367 FB #2			V7003-A19.1368 TB #1			V7003-A20.1369 TB #2		
				(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag	(mg/m3)	(ppbv)	Flag
Pyridine	110-86-1	79.1	26.5	0.0214	6.06	U	0.0214	6.06	U	0.0214	6.06	U	0.0214	6.06	U
trans-1,3-Dichloropropene	10061-02-6	111.0	27.4	0.0027	0.53	U	0.0027	0.53	U	0.0027	0.53	U	0.0027	0.53	U
Pentanenitrile	110-59-8	83.2	27.4	0.0008	0.22	U	0.0008	0.22	U	0.0008	0.22	U	0.0008	0.22	U
1,1,2-Trichloroethane	79-00-5	133.4	27.8	0.0015	0.26	U	0.0015	0.26	U	0.0015	0.26	U	0.0015	0.26	U
Toluene	108-88-3	92.1	28.5	0.0009	0.23	U	0.0009	0.23	U	0.0009	0.23	U	0.0009	0.23	U
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	0.0194	2.19	J,B	0.0217	2.45	J,B	0.019	2.15	U	0.019	2.15	U
Tributyl Phosphate	126-73-8	266.0	63.1	<0.0099	<0.83	Z	<0.0099	<0.83	Z	<0.0099	<0.83	Z	<0.0099	<0.83	Z

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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