

Waste Tank Vapor Project

**Vapor Space Characterization of Waste
Tank 241-BY-108: Results from *In Situ*
Sample Collected on 3/24/94**

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June 1995

**Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830**

**Pacific Northwest Laboratory
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Richland, Washington 99352

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Summary

This report describes organic results from vapors of the Hanford double-shell waste storage Tank 241-BY-108 (referred to as Tank BY-108). Several organic analytes were quantitatively determined, but quantities of non-TO-14 analytes were estimated (see Summary Table). Approximately 70 tentatively identified organic analytes were observed above the detection limit of 10 ppb, but standards for most of these were not available at the time of analysis, and their quantitative determination is beyond the scope of this study. The SUMMA™ canister samples were also analyzed for the 41 organic compounds listed in U.S. Environmental Protection Agency Compendium Method TO-14. Of these, only a few were observed above the 2-ppb detection limits. These are summarized in Table 2.1. Estimated quantitations of tentatively identified compounds (TIC) were also determined. A summary of these results is shown in Table 2.2. The 14 organic analytes with the highest estimated concentrations are shown in the Summary Table below.

Summary Table

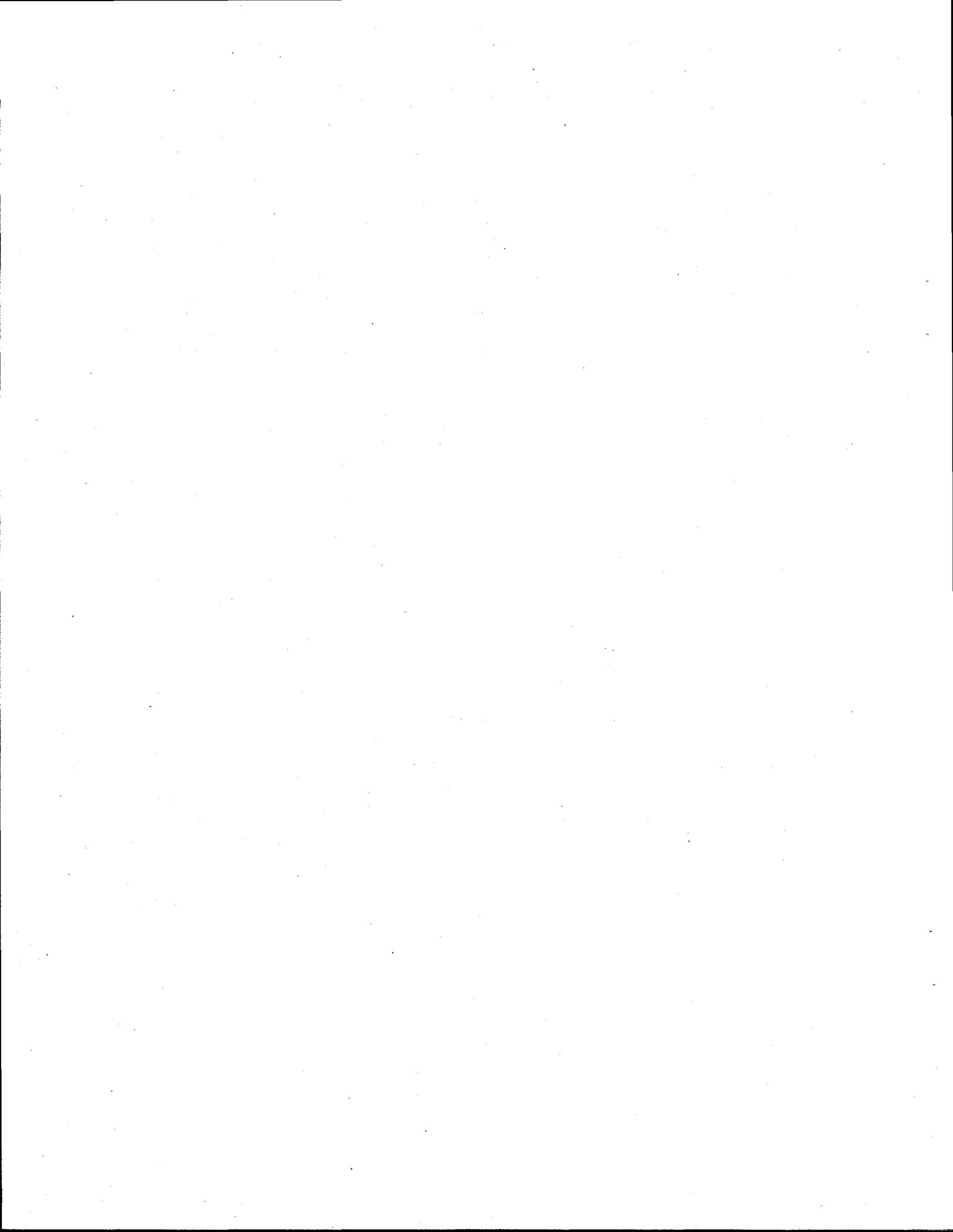
<u>Selected Organic Analytes (TIC)</u>	<u>Approximate Concentrations (mg/m³)</u>
1-propene / propane	8
Other C4 Alkenes	9
butane	5
acetone	8
pentane	6
2-methylpentane	8
hexane	5
butanol	14
heptane	4
dodecane	8
unknown C12 Alkane	6
unknown C13 Alkane	6
Tridecane	6

These 14 analytes account for approximately 75% (93 mg/m³) of the total organic components in Tank BY-108. Although not present in sufficient concentrations to be listed in the Summary Table, a group of analytes not previously detected in Hanford tank headspace samples are present in the sample from Tank BY-108. These include decahydronaphthalene, substituted decahydronaphthalenes, and a variety of substituted cycloalkanes (see Table 2.2). Decahydronaphthalene, substituted decahydronaphthalenes, and normal paraffin hydrocarbons were used as solvents in the plutonium-uranium extraction (PUREX) process during the late 1950s and are presumed to be the source of these compounds in the tank headspace samples. The total amount of TIC seen in this tank (165 mg/m³) is almost four times the amount of total organic components seen in Tank BY-104. Detailed descriptions of the results appear in the text.



Acknowledgments

The authors gratefully acknowledge the support of other Pacific Northwest Laboratory (PNL) project staff who contributed to the successful completion of this sampling and analysis activity. Jeff Edwards served as the PNL single-point-of-contact and coordinated sample handling and communications with Westinghouse Hanford Company. Jeff also supported work in the organic analytical laboratory. Amit Sharma assisted in the organic analytical laboratory and assisted in preparing this report.



Abbreviations

COC	chain of custody
EPA	U.S. Environmental Protection Agency
GC/MS	gas chromatography/mass spectrometry
HP	Hewlett Packard
IS	internal standard
NPH	normal paraffin hydrocarbon
PNL	Pacific Northwest Laboratory
STP	standard temperature and pressure
TIC	tentatively identified compounds
WHC	Westinghouse Hanford Company



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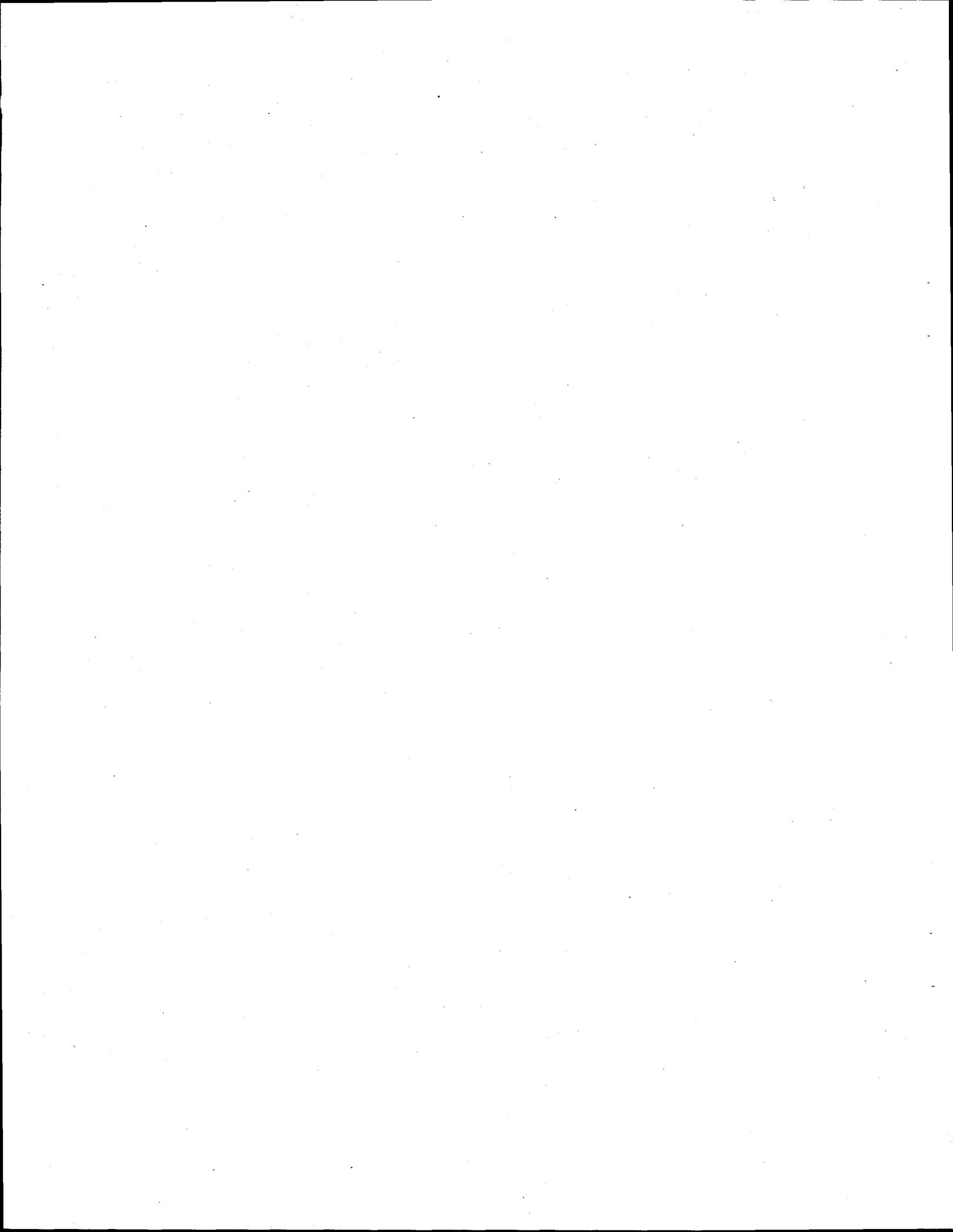
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1.0 Introduction

This report describes results of the analysis of tank headspace samples taken from the Hanford waste Tank 241-BY-108 (referred to as Tank BY-108) on March 24, 1994. Preliminary results of the SUMMA™ canister analysis for this tank are included in the interim letter report "Hanford Waste Tank BY-107 and BY-108 Preliminary Report Draft" submitted to Westinghouse Hanford Company (WHC) on 4/22/94^(a). The WHC sample job number was S4014.

The sampling device consisted of one SUMMA™ canister for organic analysis and was supplied to the WHC sampling staff on March 23, 1994. The sample was taken (by WHC) on March 24, returned from the field on March 29, and brought to Pacific Northwest Laboratory (PNL)^(b) on chain of custody (COC) 006851. The canister was inspected upon delivery to the 326/23B laboratory, logged into PNL laboratory record book 55408, and stored in the 326/23B laboratory at ambient (25°C) temperature until the time of analysis^(c). Access to the 326/23B laboratory is limited to PNL personnel working on the waste-tank safety program. The analysis described in the text of this report was performed at PNL in the 300 area, 326/23B laboratory, of the Hanford Reservation.

-
- (a) Report written by B. D. McVeety, J. S. Fruchter, R. B. Lucke, and S. C. Goheen. Pacific Northwest Laboratory, Richland, Washington.
 - (b) Pacific Northwest Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute under Contract DE-AC06-76RLO 1830.
 - (c) Procedure conducted according to technical procedure PNL-TVP-07 (Rev. 0) 2/94, *Sample Shipping and Receiving Procedure* - DRAFT for PNL Waste Tank Samples, Pacific Northwest Laboratory, Richland, Washington.



2.0 Organic Analysis

2.1 Sample Analysis Method

Analysis of the SUMMA™ canister sample was performed according to PNL Technical Procedure PNL-TVP-03, *Determination of TO-14 Volatile Organic Compounds in Hanford Waste Tank Headspace Samples Using SUMMA™ Passivated Canister Sampling and Gas Chromatographic-Mass Spectrometry Analysis*. The method uses an EnTech cryoconcentration system, which is interfaced with a Hewlett Packard (HP) 5971 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 air volume, and then transfer the volume to the GC/MS for analysis. A 50-mL volume of air is measured and analyzed from the tank headspace sample. The organic components in the sampled air are separated on an analytical column, J&W Scientific DB-1 phase, 60-m by 0.32-mm inside diameter with 3-μm film thickness. The GC column is programmed for a temperature gradient beginning at 40°C, held for 5 min, and ramped at 4°C per min to a final temperature of 260°C, with a 5-min hold.

2.2 Quality Assurance/Quality Control

Before the tank headspace sample was analyzed, a diagnostic check was performed on the GC/MS instrument by running an instrument "quick 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 over 6 data points ranging from 2 ppb to 100 ppb, using a standard gas mixture containing 40 volatile organic compounds listed in U.S. Environmental Protection Agency (EPA) compendium Method TO-14. A gas mixture containing bromochloromethane, 1,4-difluorobenzene, and chlorobenzene-d₅ was used as an internal standard for all blank, calibration standard, and sample analyses. The calibration curve was generated by calculating the relative response ratios of the internal standard to calibration-standard responses, and plotting the ratios against the ratio of the calibration-standard concentration (in ppb) to the internal-standard concentration. A least-squares linear-regression routine was applied to the data set to generate the best-fit line for each compound. The equation for that line was then used to determine the concentration of the specific compounds in the tank samples.

2.2.1 Quantitation of TO-14 Results. The quantitative-analysis results for the TO-14 volatile organic compounds were calculated directly from the calibration curve generated using the internal-standard method described above and in PNL-TVP-03. The conversion from ppm to mg/m³ assumes standard temperature and pressure (STP) conditions of 760 torr and 273°K and was calculated directly from the following equation:

$$\text{mg/m}^3 = \frac{\text{ppmv} \times \text{molecular weight of compound}}{22.4}$$

2.2.2 Identification and Quantitation of Tentatively Identified Compounds. The results listed in Table 2.2 are for tentatively identified compounds (TIC). These compounds are identified by performing a mass-spectral library search on each integrated peak using the EPA/NIST/WILEY Library, which is a part of the HP 5971 instrument-operating system. A search was performed only on chromatographic peaks with an area count greater than, or equal to, one half of the total area count of the chlorobenzene-d₅ internal-standard peak at the 20-ppb calibration level. This standard was chosen to determine the integration cutoff as it is in the middle of the chromatographic range, and not in a region affected by

coelution of other compounds. 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 analyte listed in Table 2.2 was estimated using a relative response factor calculated using a corrected total peak area for the internal standard chlorobenzene-d₅. Specifically, the total integrated area for the chlorobenzene-d₅ peak had to be corrected for coeluting compounds before calculating the response factor. The corrected total peak area for the internal standard was calculated by multiplying the internal-standard quantitation ion by a correction factor based on the ratio to the total integrated peak area to the quantitation ion as measured in blank runs. The corrected peak area was then used to calculate a response factor using the internal-standard concentration in mg/m³:

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

where IS = internal standard.

The calculated response factor was then multiplied by the TIC peak area to give an estimated concentration for that compound. For acetone, the total peak area was multiplied by the response factor for chlorobenzene-d₅ to give an estimated concentration of 7.91 mg/m³. Internal standards bromochloromethane and difluorobenzene were not used to quantitate the TIC because coeluting compounds appeared to have greatly altered the signal of the quantitation ions for those two internal standards.

The internal-standard level added to all blank, standard, and sample injections was 18.2 ppb for bromochloromethane, 18.3 ppb for 1,4-difluorobenzene, and 20.2 ppb for chlorobenzene-d₅. The internal-standard concentrations were converted from ppb at STP to mg/m³ using a molecular weight of 129.39 (g/mol) for bromochloromethane, 114.09 for 1,4-difluorobenzene, and 117.6 for chlorobenzene-d₅.

2.3 Analysis Results

Table 2.1 lists the quantitative results for compounds listed in Method TO-14. The levels of TO-14 analytes observed in the samples collected from Tank BY-108 were higher than seen in previous tanks. The most predominant TO-14 species seen in this sample were benzene (55 ppb), freon-11 (434 ppb), and 1,2-dibromoethane (145 ppb). The other TO-14 compounds seen were at 30 ppb or less.

Table 2.2 lists the semi-quantitative results for the TICs. The predominant species observed in these samples were coeluting peaks 1-propene/propane, butenes, butane, acetone, pentane, 2-methylpentane, hexane, and butanol. As in previous tanks, normal paraffin hydrocarbon (NPH) was also observed in the tank headspace, but did not constitute the major portion of organic components seen. However, it should be noted that because the SUMMA™ canisters were not heated at the time of analysis, the NPH concentrations listed after the retention time of decane may not be a true accounting of all the NPH in the sample. Similarly, polar compounds that might adhere to the inside surface of the canister may also be under-represented in this analysis. The total concentration of the TIC compounds was 165 mg/m³.

3.0 Conclusions

The concentrations of selected organic compounds were determined from samples of the tank headspace of Hanford waste Tank BY-108. A group of analytes not previously tested in Hanford tank headspace samples are present in samples from Tank BY-108. These include decahydronaphthalene, alkyl-substituted decahydronaphthalenes, and alkyl-substituted cycloalkanes. Figure 1 is a chromatograph of the tank headspace sample from Tank BY-108. Figure 2 is the chain-of-custody form.

4.0 Further Reading

Pacific Northwest Laboratory (PNL). 1994a. Quality Assurance Manual, Part 2: Good Practices Standards. PNL-MA-70. Richland, Washington.

Pacific Northwest Laboratory (PNL). 1994b. *Determination of TO-14 Volatile Organic Compounds in Ambient Air Using SUMMA™ Passivated Canister Sampling and Gas Chromatographic-Mass Spectrometry Analysis*, Technical Procedure PNL-TVP-01 (Rev. 0) 8/93, Richland, Washington.

Pacific Northwest Laboratory (PNL). 1994c. *Cleaning SUMMA™ Canisters and the Validation of the Cleaning Process*, Technical Procedure PNL-TVP-02 (Rev. 0) 8/94, Richland, Washington.

Table 2.1. TO-14 Analysis Results for *In Situ* Sample S4014-SUM.076^(a), Collected from Tank BY-108 into SUMMA Canister on 3/24/94.

TO-14 Analyte	CAS #	Mol Wt	S4014-SUM.076 ^(a)	
			PNL 076 ^(b)	
			Tank Air	
			Concentration	
			ppbv	mg/m ³
Dichlorodifluoromethane	75-71-8	120.9	< 2	< 0.01
Chloromethane	74-87-3	50.5	< 2	< 0.005
1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	170.9	< 2	< 0.02
Vinyl Chloride	75-01-4	62.5	< 2	< 0.01
Bromomethane	74-83-9	94.9	< 2	< 0.01
Chloroethane	75-00-3	64.5	8.5	0.02
Trichlorofluoromethane	75-69-4	137.4	435	2.67
1,1-Dichloroethene	75-35-4	96.9	< 2	< 0.01
Methylene Chloride	75-09-2	84.9	< 2	< 0.01
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	187.4	< 2	< 0.02
1,1-Dichloroethane	75-34-3	99.0	< 2	< 0.01
cis-1,2-Dichloroethene	156-59-2	96.9	< 2	< 0.01
Chloroform	67-66-3	119.4	< 2	< 0.01
1,2-Dichloroethane	107-06-2	99.0	< 2	< 0.01
1,1,1-Trichloroethane	71-55-6	133.4	< 2	< 0.01
Benzene	71-43-2	78.1	55.4	0.19
Carbon Tetrachloride	56-23-5	153.8	< 2	< 0.01
1,2-Dichloropropane	78-87-5	113.0	< 2	< 0.01
Trichloroethene	79-01-6	131.4	< 2	< 0.01
cis-1,3-Dichloropropene	10061-01-5	111.0	< 2	< 0.01
trans-1,3-Dichloropropene	10061-02-6	111.0	< 2	< 0.01
1,1,2-Trichloroethane	79-00-5	133.4	< 2	< 0.01
Toluene	108-88-3	92.1	146	0.60
1,2-Dibromoethane	106-93-4	187.9	< 2	< 0.02
Tetrachloroethylene	127-18-4	165.8	< 2	< 0.02
Chlorobenzene	108-90-7	112.6	4.3	0.02
Ethylbenzene	100-41-4	106.2	17.1	0.08
p/m-Xylene(c)	106-42-3	106.2	26.3	0.12
Styrene	100-42-5	104.2	7.3	0.03
1,1,2,2-Tetrachloroethane	79-34-5	167.9	21.4	0.16
o-Xylene	95-47-6	106.2	< 2	< 0.01
1,3,5-Trimethylbenzene	108-67-8	120.2	< 2	< 0.01
1,2,4-Trimethylbenzene	95-63-6	120.2	< 2	< 0.01
Chloromethylbenzene, alpha	108-67-8	126.6	< 2	< 0.01
1,3-Dichlorobenzene	541-73-1	147.0	< 2	< 0.01
1,4-Dichlorobenzene	106-46-7	147.0	< 2	< 0.01
1,2-Dichlorobenzene	95-50-1	147.0	< 2	< 0.01
1,2,4-Trichlorobenzene	120-82-1	181.5	< 2	< 0.02
Hexachloro-1,3-butadiene	87-68-3	260.8	2.21	0.03

(a) WHC sample identification number.

(b) PNL canister number.

(c) m-xylene and p-xylene coelute; reported concentrations are the sum of these two compounds.

Table 2.2 Table of Tentatively Identified Compounds and Estimated Concentrations in Tank BY-108 *In Situ* SUMMA™ Canister Sample S4014-SUM-076^(a) Collected on 3/24/94.

<u>Tentatively Identified Compound^(c)</u>	<u>Retention Time</u>	<u>PNL 076^(b)</u>	<u>Concentration (mg/m³)^(d)</u>
Carbon dioxide	5.81		0.10
Carbon dioxide	6.08		0.85
1-propene	6.59		7.75
propane (coeluent)			
1-propyne	6.94		0.16
1-propene	7.28		0.53
2-methyl propane	7.54		1.32
C4 Alkene ^(e)	8.01		8.70
C4 Alkane ^(e)	8.22		5.00
C4 Alkene ^(e)	8.45		0.69
C4 Alkene ^(e)	8.76		1.25
Ethanol	9.47		0.21
2-pentene	9.73		0.95
Acetone	10.29		7.91
Trichlorofluoromethane	10.62		0.45
C5 Alkene ^(e)	10.82		3.24
C5 Alkane ^(e)	11.07		0.62
Pentane	11.25		6.51
C5 Alkene ^(e)	11.52		0.58
C5 Alkene ^(e)	11.84		0.45
C5 Alkene ^(e)	12.04		0.73
Dimethyl butane	12.79		0.14
4-methyl-1-pentene	13.68		2.26
2-methylpentane	14.30		8.28
2-butanone	14.65		0.76
3-methyl pentane	15.02		1.17
1-hexene	15.25		2.53
Bromochloromethane (IS)	15.81		
Hexane (coeluent)			5.30
Tetrahydrofuran	16.74		1.86
Methylcyclopentane	17.43		1.02
Butanol	18.33		14.55
1,4-difluorobenzene (IS)	19.37		
Cyclohexane (coeluent)			2.56
3-methylhexane	19.90		2.03
1-heptene	20.52		1.66
Heptane	21.12		4.39
C7 Alkane ^(e)	22.30		0.20
Methylcyclohexane	22.70		0.73
Alkene	24.08		0.48
Toluene	24.46		0.34
2-methylheptane	24.66		2.03
C8 Alkane ^(e)	25.66		0.18
3-octene	25.81		0.39
2,4-dimethylhexane	26.40		1.69
Dimethylcyclohexane ^(e)	26.81		0.11
Siloxane	27.09		0.13
2,6-dimethylheptane	27.98		0.46
Chlorobenzene-d5 (IS)	28.46		
Trimethylcyclohexane ^(e)	28.89		0.60
3-methyloctane	29.82		0.62

Table 2.2 (contd)

Tentatively Identified Compound ^(c)	Retention Time	PNL 076 ^(b)	Concentration (mg/m ³) ^(d)
unknown	30.14		0.53
unknown	30.55		0.19
unknown	30.98		0.56
Nonane	31.40		1.39
2-butoxy ethanol	31.94		0.15
Trimethylcyclohexane ^(e)	32.39		0.28
C9 Alkane ^(e)	33.16		0.82
Trimethylcyclohexane ^(e)	33.41		0.45
Unknown	33.66		0.12
4-methylnonane	34.41		0.27
3-methylnonane	34.85		0.24
C4 Cyclohexane ^(e)	35.03		0.47
C2 Cyclohexane ^(e)	35.46		0.28
C2 Cyclohexane ^(e)	35.72		0.28
C2 Cyclohexane ^(e)	35.88		0.38
Decane	36.06		1.61
Trimethylcyclohexane ^(e)	36.48		0.14
C10 Alkane ^(e)	37.20		0.96
C11 Alkane ^(e)	37.98		0.26
Butylcyclohexane	38.09		0.57
C5 Cyclohexane ^(e)	38.63		0.29
C5 Cyclohexane ^(e)	38.79		0.19
C5 Cyclohexane ^(e)	38.92		0.36
C5 Cyclohexane ^(e)	39.24		0.68
decahydronaphthalene	39.70		0.43
unknown	40.23		0.39
Undecane	40.39		3.11
5-Decene	40.96		0.74
C12 Alkane	41.66		0.86
unknown	41.88		0.41
2-Methyldecahydronaphthalene	42.10		1.06
Pentylcyclohexane	42.46		1.17
C12 Alkane ^(e)	42.67		0.93
Methyl-decahydronaphthalene	42.85		1.41
C12 Alkane ^(e)	43.03		1.05
1,1-oxybis-decane	43.34		0.69
C12 Alkane ^(e)	44.18		0.91
Dodecane	44.42		7.87
C12 Alkane ^(e)	45.04		6.40
C12 Alkene ^(e)	46.47		3.02
Dimethylnaphthalenes	46.73		0.77
unknown	46.88		1.09
C13 Alkane ^(e)	47.30		5.88
Tridecane	48.16		5.89
C14 Alkane ^(e)	51.03		2.88
Tetradecane	51.66		1.65
C15 Alkane ^(e)	53.86		0.61
Pentadecane	54.94		0.13

- (a) WHC sample number.
 (b) PNL SUMMA™ canister number.
 (c) Obtained by mass-spectral interpretation and comparison with the EPA/NIST/WILEY Library.
 (d) Semi-quantitative estimate calculated using concentration of closest eluting internal standard.
 (e) Other structural isomers should be considered.

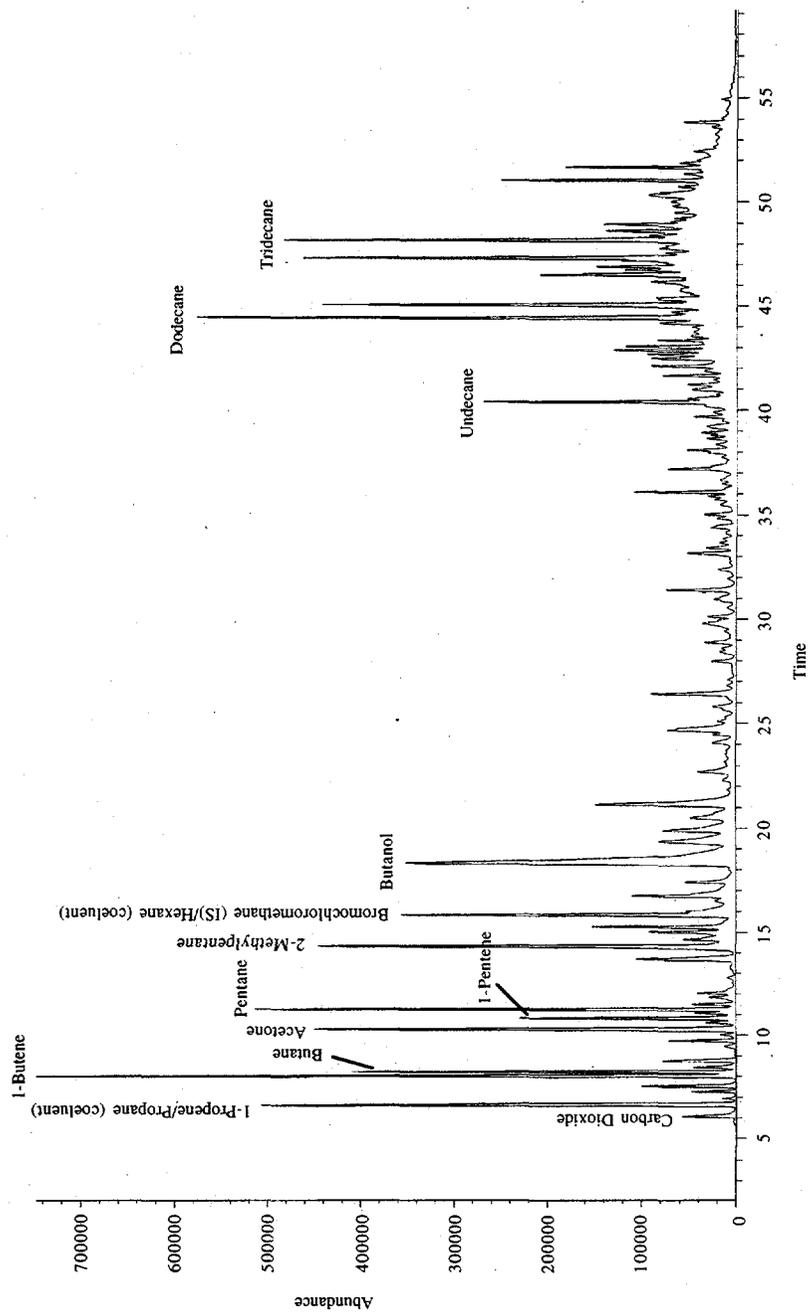


Figure 2.1 GC/MS Chromatogram of Hanford Waste Tank BY-108 *In Situ* SUMMA™ Canister Vapor Sample S4014-SUM-076 Collected on 3/24/94.

Westinghouse Hanford Company	CHAIN OF CUSTODY	WHC 006861
---	-------------------------	-------------------

Custody Form Initiator J. A. Edwards

Company Contact J. L. Huckaby Telephone (509) 373-0141

Project Designation/Sampling Locations 200 East Tank Farm Collection Date 03-24-94 ²⁸ (P)

BY Tank 108 Vapor Sample SAF S4011, LAP (ISS) Field Logbook No. WHC-N-847-^{717 LAP 3-28-94}

Ice Chest No. (P) S4014 3/23/94 Offsite Property No. N/A

Bill of Lading/Airbill No. N/A

Method of Shipment Government Truck

Shipped to WHC

Possible Sample Hazards/Remarks Unknown at time of sampling **POTENTIALLY RADIOACTIVE**

Sample Identification

- S4014
- ① S4011 - SOR .X24 ✓ SAP Ref INORGANIC SAMPLES
 - ① S4011 - SOR .X25 ✓ SAP Ref INORGANIC SAMPLES
 - ① S4011 - SOR .X26 ✓ SAP Ref INORGANIC SAMPLES
 - ① S4011 - SOR .X27 ✓ SAP Ref INORGANIC SAMPLES
 - ① S4011 - SOR .X28 ✓ SAP Ref INORGANIC SAMPLES
 - ① S4011 - SOR .X29 ✓ SAP Ref INORGANIC SAMPLES
 - ① S4011 - SOR .X30 ✓ SAP Ref INORGANIC SAMPLES *

* SAMPLE S4014-SOR.X30 TRANSFERRED TO WHC CHAIN OF CUSTODY # 006551
3-28-94/1235 JG Hogan

<input checked="" type="checkbox"/> Field Transfer of Custody		Chain of Possession (Sign and Print Names)			
Relinquished By	Date	Time	Received By	Date	Time
J. A. Edwards <i>J. Edwards</i>	03-27-94	1046	J.E. Darling - KB Hulse <i>J.E. Darling</i>	3-25-94	1046
<i>JG Hogan</i>	3-25-94	1130	<i>JG Hogan</i>	3-25-94	1130
<i>JG Hogan</i>	3-28-94	0900	<i>JG Hogan</i>	3-28-94	0900
<i>JG Hogan</i>	3-28-94	1230	<i>JG Hogan</i>	3-28-94	1230
<i>JG Hogan</i>	3-29-94	1145	<i>JG Hogan</i>	3-29-94	1145

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

Comments

① Incorrect WHC I.D LAP 3/23/94
Change to S4014

A-6000-407 (12/92) WEP061

Figure 2.2a. Chain-of-Custody Form for Inorganic Samples for Tank BY-108

Westinghouse Hanford Company	CHAIN OF CUSTODY	WHC 006851
---	-------------------------	-------------------

Custody Form Initiator *OK LMP 3/23/94*
J. A. Edwards

Company Contact	J. L. Huckaby	Telephone	(509) 373-0141
Project Designation/Sampling Locations	200 East Tank Farm	Collection Date	03-24-94 ²⁸ [Ⓟ]
Tank BY 108 Vapor Sample SAF	S4001, LMP (ISS)	Field Logbook No.	WHC-N-047 ^{797 LMP} ^{3/23/94}
Ice Chest No. [Ⓟ]	S4014 ^{3/23/94}	Offsite Property No.	N/A
Bill of Lading/Airbill No.	N/A		
Method of Shipment	Government Truck		
Shipped to	WHC		

Possible Sample Hazards/Remarks Unknown at time of sampling *POTENTIALLY RADIOACTIVE*

Sample Identification

LMP 3/23/94
 S4011 - SUM .076 SAP Ref PNL summa Day 2 PNL# SUMMA 076
 S4014

<input checked="" type="checkbox"/> Field Transfer of Custody			<input type="checkbox"/> Chain of Possession			(Sign and Print Names)		
Relinquished By	Date	Time	Received By	Date	Time			
J. A. Edwards <i>J.A. Edwards</i>	03-23-94	0845	J.E. Darling <i>J.E. Darling</i>	3-23-94	0845	<i>J. Hogan</i>		
<i>J. Hogan</i>	3-23-94	0850	<i>J.A.P.</i>	3-23-94	0850			
<i>L.A. Pivuel</i>	3/23/94	1230	<i>J. Hogan</i>	3-23-94	1230			
<i>J. Hogan</i>	3-23-94	1150	<i>J.A. Edwards</i>	3/23/94	1150			

Final Sample Disposition

Disposal Method:
 Disposed by:
 Date/Time:
 Comments

A-6000-407 (12/92) WEF061

Figure 2.2b. Chain-of-Custody Form for Organic Samples for Tank BY-108

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