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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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1	WHC-SD-WM-RPT-176	ALL	0	VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-112 USING THE VAPOR SAMPLING SYSTEM	Q	2	1	

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2	1	Cog.Eng. R.D. MAHON		10/24/95	S3-27	RESOURCE CENTER			R2-12	3	
2	1	Cog. Mgr. J.D. DORIAN		10/24/95	S3-27	JAMES L. HUCKABY			K6-80	3	
2	2	QA C.J. STEPHAN		11/1/95	T6-03						
3		DAVE BRATZEL			S7-21						
3		JOHN DEICHMAN			T6-03						
3		RAMPUR VISWANATH			S3-90						
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APPROVED FOR PUBLIC RELEASE

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Kara Broz — 11/6/95

SUPPORTING DOCUMENT

1. Total Pages 36

2. Title	3. Number	4. Rev No.
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5. Key Words	6. Author
241-S-112 VSS SUMMA TST SORBENT TANK	Name: G.S. CAPRIO Signature Organization/Charge Code OM624/E61920

7. Abstract

.THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE JULY 11, 1995, SAMPLING OF SST 241-S-112 USING THE VAPOR SAMPLING SYSTEM.

8. RELEASE STAMP

APPROVALS

Document title: Vapor and Gas Sampling of Single-Shell Tank 241-S-112 Using the Vapor Sampling System

Approved by: R. A. Westberg, Field Scientist, Vapor Sampling Project, Sampling and Mobile Laboratories — Date: 10/9/95

Approved by: R. D. Mahon, Project Lead, Vapor Sampling Project, Sampling and Mobile Laboratories — Date: 17 OCT 95

Approved by: D. L. Edwards, Technical Lead, Vapor Sampling Project, Sampling and Mobile Laboratories — Date: 10-23-95

CONTENTS

LIST OF TABLES

LIST OF TERMS

CGI	Combustible Gas Indicator
COC	Chain Of Custody
DOT	U.S. Department of Transportation
GC	Gas Chromatograph
GC/FID	Gas Chromatograph/Flame Ionization Detector
GEA	Gamma Energy Analysis
HEPA	High-Efficiency Particulate Air (filter)
NH_3	Ammonia
NO_2	Nitrogen Dioxide
NO_x	Nitric Oxide
H_2O	Water Vapor
OPC	Offsite Property Control
OVM	Organic Vapor Meter
PNL	Pacific Northwest Laboratory
SML	Sampling and Mobile Laboratories
SST	Single-Shell Tank
TCP	Tank Characterization Plan
team	SML Vapor Team
TOC	Total Organic Carbon
TST	Triple Sorbent Trap
VSS	Vapor Sampling System
WHC	Westinghouse Hanford Company

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VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-112 USING THE VAPOR SAMPLING SYSTEM

1.0 SCOPE

The Vapor Issue Resolution Program tasked the Sampling and Mobile Laboratories (SML) to collect representative headspace samples from Hanford Site single-shell tank (SST) 241-S-112. This document presents sampling data resulting from the July 11, 1995 sampling of SST 241-S-112. Analytical results will be presented in separate reports issued by the laboratories that supplied and analyzed the sampling media.

2.0 SAMPLING EQUIPMENT DESCRIPTION

2.1 VAPOR SAMPLING SYSTEM

The SML vapor team (the team) used the vapor sampling system (VSS) to collect representative samples of the air, gases, and vapors from the headspace of SST 241-S-112 on July 11, 1995. Mahon et al. (1994) describes in detail the VSS, its performance, and its operation. The team used the VSS to collect sorbent trap and SUMMA[1] canister headspace samples from SST 241-S-112. The team then sent these samples to the analytical laboratories for analysis.

The VSS comprises a mobile laboratory, a hot-water-jacketed stainless-steel probe that is inserted into the tank headspace, and stainless-steel transfer tubing that connects the mobile laboratory to the probe. A vacuum pump draws sample vapor from the tank headspace and through all transfer tubing and the sampling manifold. Electrically activated, pneumatically actuated, valves direct sample flow within the VSS. Instrumentation housed in the mobile laboratory monitors and controls system temperature, monitors absolute and differential system pressure, meters and controls vapor mass flow, and monitors sample vapor total organic carbon (TOC) content using a gas chromatograph/flame ionization detector (GC/FID).

A key feature of the VSS is its use of heated transfer tubing and a heated sampling manifold. Maintaining the system temperature at an electronically controlled, elevated temperature prevents vapor condensation and reduces vapor adsorption on surfaces exposed to sample vapor. Mahon et al. (1994) describes various tests and observations that indicate the VSS sample transfer efficiency is consistently high.

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[1] SUMMA is a registered trademark of Molectrics, Inc., Cleveland, Ohio.

Sorbent trap samples are collected at the sorbent trap station of the sampling manifold. Sorbent traps are pencil-size stainless-steel or glass tubes that contain vapor-adsorbing media. A known amount of sample vapor is passed through the tube, which traps (by adsorption) virtually all the target analytes. The concentration of analytes in the vapor sampled is calculated from the quantity of analyte found in the sorbent media and the volume of vapor passed through the sorbent trap.

The sorbent trap station uses highly accurate mass flow controllers to measure and control the flow rate of sample vapor through the sorbent traps. The controllers FICV-1 through FICV-9 are mounted on top of the sorbent station between the inlet and outlet valves. Controllers FICV-10 and FICV-11 are located downstream of the sorbent trap station and the in-line driers, which remove moisture from the sample vapor before it is metered. Errors associated with the mass flow controllers were determined by the Westinghouse Hanford Company (WHC) Standards Laboratory before the SST 241-S-112 sampling event (see Table 1). Flow rates and the duration of flow are specified by the analytical laboratories that supply and analyze the sorbent traps.

Table 1. Flow Control Calibration.

Flow-indicating Control valve	Typically used Flow ($stdcm^3/min$)	% Change from 647 to Actual	% Change from Datalogger to Actual
1	200	-0.7	-0.85
2	200	0.05	-0.10
3	200	-0.45	-0.60
4	200	0.05	-0.10
5	200	0.55	0.35
6	200	0.25	0.05
7	200	0.4	0.20
8	200	0.25	-1.81
9	50	-0.128	-0.27
10	200	-1.1	-1.20
11	5000	0.332	0.17

The VSS is also equipped with a gas chromatograph (GC). The Hewlett Packard 5890 Series II GC is equipped with a flame-ionization detector (FID), a 1 mL sample loop, a 10 port injection valve, a 2 meter chromatographic column, a programmable oven, and a portable computer loaded with the HP-Chemstation[2]

[2]HP-Chemstation is a registered trademark for the Hewlett Packard Company, Avondale, Pennsylvania.

software used to control the GC. The GC is plumbed to directly transfer sample from the VSS manifold to the GC sample loop. After the sample is transferred into the sample loop and reaches equilibrium, the run is initiated manually. HP-Chemstation™ software activates the 10 port valve to transfer the sample from the sample loop to the column. The sample passes through the column and the FID generates a signal for total organic carbon (TOC). All data is then transmitted to the computer where it is stored for further analysis.

The GC is equipped with a HP-5 column which is 2 meters long, 0.25 mm inside diameter, and which contains a 0.25 um phenyl methyl silicone phase. The GC oven is programmed to heat from 50 °C to 270 °C at a rate of approximately 70 °C per minute. Helium is the carrier gas, air and hydrogen the combustion gases, and nitrogen the make-up gas.

The GC/FID is configured to quantitatively estimate concentrations of Total Organic Carbon (TOC). The GC/FID confirms sampling system cleanliness, ambient air background TOC concentrations during sampling, and TOC concentration of tank vapor samples. The system is multi-point calibrated at the weather station on a as available basis, the last time being January 1995. The GC/FID has displayed a high degree of stability over a period of months. For further details, see Section 3.6, Field GC/FID Results.

The sampling manifold also has a station for sampling vapor with evacuated SUMMA™ canisters. SUMMA™ canisters are stainless-steel vessels with internal surfaces that have been prepared by the SUMMA™ process, which passivates active sites on the canister walls to minimize adsorption of gases and vapors. An analytical laboratory must clean and evacuate SUMMA™ canisters before use. The evacuated canister is filled with sample vapor through a manually operated valve, which is then closed to seal the sample inside. SUMMA™ canisters essentially allow collection and transfer of whole-air samples from the sample site to an analytical laboratory where the sample is analyzed. The standard capacity of each SUMMA™ canister is 6 liters.

3.0 SAMPLING EVENT DESCRIPTION

3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in WHC-SD-WM-TP-335, Rev. OE, *Vapor Sampling and Analysis Plan* (Homi 1995). The Sampling and Analysis Plan also specifies the types and number of samples to be collected, flow rates, and durations. These key sampling parameters are summarized on the sample log sheets in Appendix A. In addition to the sample log sheets, checksheets for each individual sample help ensure correct sampling procedures. SML retains these documents in the project file. This sample event's project-specific number is S5-044.

3.2 OPERATIONS AND SAMPLING PERSONNEL

Steve Carter was the Tank Farm Operations person-in-charge. The other SML vapor team members included:

G. S. Caprio, VSS Technician
R. D. Mahon, VSS Lead Scientist
T. B. Utecht, VSS Technician
R. A. Westberg, Field Scientist.

The VSS was set up at SST 241-S-112 on July 10, 1995 and was allowed to warm up overnight. Sampling began shortly after 8:30 a.m. on July 11, 1995, and was completed by 11:15 a.m. the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Before hooking up to SST 241-S-112, an industrial hygiene technician field tested tank vapors. The technician purged the vapor probe sample tube for 5 minutes and then field measured vapor stream contents using a combustible gas indicator (CGI) and an organic vapor meter (OVM). The measurements were verbally reported, LEL 1%, NH_3 50 ppm, O_2 20.8%, and total organic carbon 7.1 ppm.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, July 11, 1995 was cloudy and warm with light winds between 5 to 10 miles per hour from the northwest. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2.5 miles northeast of S-Farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser R14 of SST 241-S-112. The probe length, from the sample inlet to the top of the riser flange, was 6.7 meters.

All zones of the VSS were heated to 60 °C during setup of the VSS at SST 241-S-112 on July 10, 1995. The team stabilized the VSS temperature zones by 8:30 a.m. on July 11, 1995, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-S-112 were 990 mbar (742.9 torr) and 30.8 °C, respectively. The sample log sheets in Appendix A provide a complete chronology of the sample event including start and end times, flow rates, volumes, and specific sample identifiers.

Approximately 20 hours before the first samples were collected, the team began heating the VSS transfer tubing and sampling manifold. During this warmup period, the team began a purge of all vapor transfer tubing and the sampling

manifold with ambient air. Before sampling tank vapors on July 11, 1995, the team collected two SUMMA™ canister samples of ambient air, one manually 10 meters upwind of the VSS connection with SST 241-S-112, and the other using the VSS sampling manifold. The former was collected to establish background levels of trace organic vapors, and the latter was collected to establish the cleanliness of the sampling manifold.

A leak check of the VSS sampling manifold and transfer tubing (up to the connection to the sampling probe) was performed before opening the tank probe vapor sampling valve. The system was evacuated to 292 mbar (219.2 torr) and leakage of ambient air into the system was observed by monitoring system pressure for 15 minutes. Leakage resulted in an increase of 4.53 mbar (3.4 torr) in system pressure during the 15 minute test. Given a system volume of not more than 10 L, this pressure increase corresponds to a leak rate of approximately 10.34 mL/min at a 292 mbar (219.2 torr). This leak rate was then estimated for average SUMMA™, triple sorbent traps (TSTs), and sorbent sampling pressures. It was found that for the SUMMA™ canisters, dilution by ambient air was approximately 0.1%, for TST sampled at 200 mL/min the dilution was approximately 0.4%, and for sorbent traps the dilution was approximately 0.4%.

The tank probe vapor sampling valve was opened and the VSS was purged with sample vapor from SST 241-S-112 for 30 minutes at a total flow rate of 5.46 L/min. This purge was performed to flush ambient air from the system and saturate the system's active adsorption sites. Because the volume of transfer tubing and the sampling manifold upstream of the sampling devices is estimated to be no more than 10 L, this purge provided about 16.4 air turnovers in the system.

One analytical laboratory provided sample media. Pacific Northwest Laboratory (PNL) provided SUMMA™ canisters, TSTs, and sorbent traps for organic vapors, ammonia (NH_3), nitrogen dioxide (NO_2), and water vapor (H_2O).

3.6 FIELD GC/FID RESULTS

The GC was single point calibrated on the day of sampling using 6.0 ppmC Propane standard by Scott Specialty Gas. The standard is an E.P.A. Protocol Gas that is ±2% NIST traceable.

Table 2 displays the Field GC/FID results from the sampling of SST 241-S-112.

Table 2. TOC Results.

Number of Runs	Description	Average TOC Concentration (ppmC)	% Standard Deviation
3	Propane	6.00	3.11
4	Ambient	2.63	0.82
4	Tank Vapor	11.43	1.14

3.7 RADIATION SCREENING

Samples are unconditionally released from the SST farm in accordance with 1995-33300-RSP-03, *Release of Vapor Sampling Equipment* (WHC 1995c). Radiological screening results are used to determine (1) if the samples must be shipped as radioactive or nonradioactive in accordance with U.S. Department of Transportation (DOT) regulations and (2) if the samples meet the laboratory acceptance criteria.

The DOT limits for shipping a nonradioactive sample are 2,000 combined pCi/g of beta-gamma activity and alpha activity. Samples exceeding these DOT limits may be shipped as radioactive material if the samples do not exceed the following laboratory acceptance criteria:

PNL: Beta-gamma activity <400 pCi/g of sample media. Alpha activity <100 pCi/g of sample media.

To protect the sampling manifold and sampling devices from radioactive particulates, all sample vapor for the July 11, 1995, SST 241-S-112 vapor sampling event was drawn through a series of four glass-fiber high-efficiency particulate air (HEPA) filters placed upstream of the sampling manifold. These four filters were in place any time tank vapors were flowing through the system. When sampling was complete, the filters were removed and assigned unique sample identifiers. All four HEPA filters were submitted to Laboratory 222-S for total alpha, total beta, and gamma energy analysis (GEA). The HEPA filter closest to the sampling manifold was analyzed to determine if the samples met DOT shipping criteria and laboratory acceptance criteria. Moisture from the tank vapors was collected in a silica gel trap through one of the sorbent station ports and analyzed for tritiated water. SST 241-S-112 filter and silica gel analysis results are shown in Table 3. SML scientists use the activity results in Table 3 to calculate pCi/g of sample media. SML maintains this information in the project-specific file. The results in Table 3 indicate that the samples collected from SST 241-S-112 met the laboratory acceptance criteria and the DOT definition of a nonradioactive shipment.

Table 3. Radionuclide Analysis Results.

Filter	Sample Identifier	Activity Results[a] (pCi/sample)	Activity[b] (pCi/L of tank gas)
Upstream HEPA filter (box)	S5044-A51.0U1	Total Alpha = 3680 Total Beta = 4040 GEA = .0007 (^{208}TL) GEA = .002 (^{212}Pb) GEA = 0.002 (^{212}Bi)	= 12.02 = 13.20 = <detectable = <detectable = <detectable
Downstream HEPA filter (box)	S5044-A52.0D1	Total Alpha = <0.663 Total Beta = <2.04 GEA = <detectable	= <0.002 = 0.007 = <detectable
Upstream HEPA filter (VSS)	S5044-A53.0U2	Total Alpha = 1.22 Total Beta = 2.47 GEA = <detectable	= 0.004 = 0.008 = <detectable
Downstream HEPA filter (VSS)	S5044-A54.0D2	Total Alpha = <0.579 Total Beta = <1.3 GEA = <detectable	= <detectable = <0.004 = <detectable
Tritium trap	S5044-A03.0T1	Total activity = <50.0	= <50.0[c]

Notes:

The samples are nonradioactive. These results were evaluated against laboratory acceptance criteria and DOT limits.

[a]All less than (<) values represent the minimum detection limits at Laboratory 222-S.

[b]Numbers based on an approximation of the total volume of tank vapor through the HEPA filters. Appendix A and the sample checksheets were used to estimate a total flow through the VSS of 306 L.

[c]Number is calculated using a total volume of 1 L passing through the tritium trap.

4.0 SAMPLE CHAIN OF CUSTODY: RECEIPT, STORAGE, AND SHIPMENT

All sorbent trains, sorbent tubes, and SUMMA™ canisters received from PNL are kept in a custody locked storage area maintained by SML. Sorbent trains and tubes were maintained at 4 ±2 °C in a refrigeration unit. SUMMA™ canisters were stored in the same locked storage area, but were not refrigerated. These sampling devices were picked up from PNL by SML and transported in a government vehicle to a custody locked storage area.

After sampling, the PNL sorbent tubes and SUMMA™ canisters were transported by government vehicle directly to PNL and delivered to J. A. Edwards on July 27, 1995. Table 4 lists the sample identifiers, sample types, and COC form numbers for all PNL samples.

Table 4. Pacific Northwest Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5044-A01.237	Ambient upwind SUMMA™	008910
S5044-A02.238	Ambient SUMMA™ (VSS)	008910
S5044-A04.244	SUMMA™	008910
S5044-A12.245	SUMMA™	008910
S5044-A20.246	SUMMA™	008910
S5044-A08.U72	$NH_3/NO_x/H_2O$ sorbent	008909
S5044-A09.U73	$NH_3/NO_x/H_2O$ sorbent	008909
S5044-A10.U74	NO_x/H_2O sorbent	008909
S5044-A11.U75	$NH_3/H_2O/H_2O$ sorbent	008909
S5044-A16.U76	$NH_3/NO_x/H_2O$ sorbent	008909
S5044-A17.U77	$NH_3/NO_x/H_2O$ sorbent	008909
S5044-A18.U78	NO_x/H_2O sorbent	008909
S5044-A19.U79	$NH_3/H_2O/H_2O$ sorbent	008909
S5044-A25.U80	$NH_3/NO_x/H_2O$ field blank	008909
S5044-A26.U81	$NH_3/NO_x/H_2O$ field blank	008909
S5044-A27.U82	$NH_3/NO_x/H_2O$ field blank	008909
S5044-A05.519	PNL TST	008911
S5044-A06.520	PNL TST	008911
S5044-A07.521	PNL TST	008911
S5044-A13.522	PNL TST	008911
S5044-A14.523	PNL TST	008911
S5044-A15.524	PNL TST	008911
S5044-A21.525	PNL TST Field Blank	008911
S5044-A22.526	PNL TST Field Blank	008911
S5044-A23.527	PNL TST Trip Blank	008911
S5044-A24.528	PNL TST Trip Blank	008911

From the time that samples are received by SML until they are shipped back to the analytical laboratory, all COCs are maintained by SML in accordance with WHC-IP-1127-1.3, *Chain-of-Custody/Special Analysis Request for RCRA and CERCLA Protocol Samples* (WHC 1995a). Copies of the completed COC forms for this sampling event are included in Appendix C.

5.0 QUALITY ASSURANCE AND CONTROLS

5.1 VAPOR SAMPLING SYSTEM CLEANING

Immediately before sampling of SST 241-S-112, the VSS manifold and vapor sample transfer tubing was heated to 60 °C and ambient air was purged through the system for 20 hours. Also, all pertinent system valves were actuated to release any contaminants that may have collected in the VSS valves themselves. After this purge an ambient air sample was drawn through the VSS manifold and a GC/FID run was initiated. No significant level of contaminants was detected. A second ambient air GC/FID run confirmed that the VSS manifold and transfer tubing was free of organic remnant residue down to ambient levels. A SUMMA™ canister ambient air sample was then collected to confirm by laboratory analysis that the VSS sampling manifold was free of trace organic contaminants (or to determine which contaminants were present and at what concentration), as discussed in Section 3.5. For further details, refer to Appendix E of WHC-IP-1127-4.10 (WHC 1995b) and the project-specific file located with SML.

In compliance with LO-080-405/A0, *Vapor Space Probe Cleaning Procedure* (WHC 1993) the team cleaned the hot-water-jacketed probe before it was installed in SST 241-S-112. This procedure requires a solvent rinse of all internal probe surfaces with acetone and methanol to clear the sample line of possible contamination remaining from the construction process. The probes are then heated to 90 °C, and dry air is passed through the probe to evaporate the solvents. Before the probes are released, the team ensures by a hand-held organic vapor meter that the total organic concentration in the sample line is below 1 ppmv.

5.2 INSTRUMENT CALIBRATION

Instruments located in the VSS are calibrated on an annual basis at the WHC Standards Laboratory. VSS instrumentation calibration data, maintained in files by SML, are summarized in Table 5. According to the calibration schedule shown in Table 5, all instrumentation was within its calibration period during the SST 241-S-112 sampling event.

Table 5. Calibration Data.

Element	Calibration Date	Expiration Date	WHC Standards Laboratory Code
FICV-1	5/08/95	5/08/96	518-28-03-012
FICV-2	5/08/95	5/08/96	518-28-03-008
FICV-3	5/08/95	5/08/96	518-28-03-004
FICV-4	5/08/95	5/08/96	518-28-03-006
FICV-5	5/08/95	5/08/96	518-28-03-011
FICV-6	5/08/95	5/08/96	518-28-03-009
FICV-7	5/08/95	5/08/96	518-28-03-014
FICV-8	5/08/95	5/08/96	518-28-03-013
FICV-9	5/08/95	5/08/96	518-28-03-007
FICV-10	5/08/95	5/08/96	518-28-03-010
FICV-11	5/08/95	5/08/96	518-28-03-005
PE-1	5/04/95	5/04/96	518-80-02-005
PE-2	5/04/95	5/04/96	518-80-02-006
PE-3	5/04/95	5/04/96	518-80-02-008
PE-4	5/04/95	5/04/96	518-80-02-007
PD-1	5/04/95	5/04/96	518-80-02-004
PD-2	5/04/95	5/04/96	518-80-02-003
Temperature Control System	3/30/95	3/30/96	804-67-74-009

5.3 BLANK SAMPLES

Trip blanks are samples that accompany the sample media from the point of generation through sample analysis. They are transported to the field with the sample collection media but remain unopened during the sampling event. Analysis of trip blanks is used to assess cross-contamination of sample media during field transport and storage.

Field blanks are sampling devices similar to trip blanks. They are prepared and handled in the same manner as the sampling media, but no tank vapors are drawn through them.

Spiked blanks are prepared as regular sampling media but also contain a known amount of special analyte. Tank vapors are drawn through these blanks and they are handled and analyzed just like any other sample. Analysis of the spiked blanks is used to evaluate potential sample loss during shipment or storage.

Ambient blanks are samples of ambient air collected at the sampling location. Analysis of ambient blanks is used to assess contamination that may be present in the atmosphere or in the transfer tubing or sampling manifold of the VSS immediately before sampling operations.

Table 4 lists sample blanks used during the sampling of SST 241-S-112.

6.0 ANOMALIES

All samples were collected in accordance with the Tank Characterization Plan (TCP) and WHC-IP-1127-4.11, *Collection of Parallel Sorbent Tube and SUMMA Canister Samples Using the Vapor Sampling System* (1995b). There were no anomalies during the sample collection process.

7.0 REFERENCES

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Mahon, R. D., C. M. Jones, and M. S. Story, 1994 (draft), *Evaluation of the Capabilities and Use of the Vapor Sampling System for Tank Headspace Sampling and Characterization*, SD-WM-RPT-094, Westinghouse Hanford Company, Richland, Washington.

WHC, 1995a, *Chain-of-Custody/Special Analysis Request for RCRA and CERCLA Protocol Samples*, Procedure WHC-IP-1127-1.3, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

WHC, 1995b, *Collection of Parallel Sorbent Tube and SUMMA Canister Samples Using the Vapor Sampling System*, Procedure WHC-IP-1127-4.10, Westinghouse Hanford Company, Richland, Washington.

WHC, 1995c, *Release of Vapor Sampling Equipment*, Procedure 1995-33300-RSP-03, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993, *Vapor Space Probe Cleaning Procedure*, Procedure LO-080-405/A0, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A

SAMPLE LOG SHEETS

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Waste Tank
241-S-112

Set up VSS (Secton A)(Temperature set point = 60°C)

Ensure HEPA filters are installed

Ensure connection to sample probe

System status check sheet. (Verify zones are to temp)

Tank Temperature 30.8 C

GC Standard Runs

GC Ambient Air Runs through port 10

Date: 7/11/95

VSS Personnel: Westberg, Mahon, Caprio, Utecht

Trailer Personnel: Utecht

WHC Sample ID	PNL ORNL Sample ID	Port Valve #	Description	Desired Flow Rate SCCM	Desired Duration (min.)	Desired Total Flow SCCM	Actual Flow Rate SCCM	Actual Start Time	Actual End Time	Actual Total Time (min.)	Actual Total Flow Liters
Purge with ambient air for 30 min.			Overnight	5500	30	165000	5500	7/10-12:00	7/11-8:18	1218	
S5044- A01. 237	237		AMBIENT #1		1			8:40	8:41	1	
GC Run #1	Ambient air/Cleanliness check							8:45			
S5044- A02. 238	238	15	AMBIENT #2		1			8:49	8:50	1	
GC RUN#2	Ambient air							8:52			
LEAK CHECK(APPENDIX A)	Leak Rate: 13.6 torr/hr							9:02	9:17	15	
Purge with tank air for 30 min				5500	30	165000	5500	9:26	9:56	30	165.00
Measure tank pressure			PE-1 = 742.9 torr					10:00			
GCRUN #3 (Tank run #1)								10:05			
S5044- A04. 244	244	11	SUMMA #3		1			10:11	10:12	1	6.00

Waste Tank 241-S-112

WHC Sample ID	PNL ORNL Sample ID	Port Valve #	Description	Desired Flow Rate SCCM	Desired Duration (min.)	Desired Total Flow SCCM	Actual Flow Rate SCCM	Actual Start Time	Actual End Time	Actual Total Time (min.)	Actual Total Flow Liters
S5044- A05. 519	TST#519	1	TST #1	200	5	1000	200.00	10:18	10:23	5	1.00
S5044- A06. 520	TST#520	2	TST #2	200	5	1000	200.00	10:18	10:23	5	1.00
S5044- A07. 521	TST#521	3	TST #3	200	5	1000	200.00	10:18	10:23	5	1.00
S5044- A03. 0T1	T-2174 (222-S)	4	Tritium Trap	200	5	1000	200.00	10:18	10:23	5	1.00
S5044- A08. U72	U72	5	NH3/NOx/H2O (#1)	200	15	3000	200.00	10:18	10:33	15	3.00
S5044- A09. U73	U73	6	NH3/NOx/H2O (#2)	200	15	3000	200.00	10:18	10:33	15	3.00
S5044- A10. U74	U74	7	NOx/H2O (#3)	200	15	3000	194.10	10:18	10:33	15	2.91
S5044- A11. U75	U75	8	NH3/H2O/H2O (#4)	200	15	3000	199.10	10:18	10:33	15	2.99
GCRUN #4 (Tank run # 2)								10:38			
S5044- A12. 245	245	13	SUMMA #4		1			10:42	10:43	1	6.00
S5044- A13. 522	TST#522	1	TST #4	200	5	1000	200.00	10:47	10:52	5	1.00
S5044- A14. 523	TST#523	2	TST #5	200	5	1000	200.00	10:47	10:52	5	1.00
S5044- A15. 524	TST#524	3	TST #6	200	5	1000	200.00	10:47	10:52	5	1.00
S5044- A16. U76	U76	5	NH3/NOx/H2O (#5)	200	15	3000	200.00	10:47	11:02	15	3.00
S5044- A17. U77	U77	6	NH3/NOx/H2O (#6)	200	15	3000	200.00	10:47	11:02	15	3.00
S5044- A18. U78	U78	7	NOx/H2O (#7)	200	15	3000	192.70	10:47	11:02	15	2.89
S5044- A19. U79	U79	8	NH3/H2O/H2O (#8)	200	15	3000	198.50	10:47	11:02	15	2.98
GCRUN #5 (Tank run #3)								11:05			
S5044- A20. 246	246	15	SUMMA # 5		1			11:09	11:10	1	6.00
GCRUN#6 (Tank run # 4)								11:16			

Waste Tank 241-S-112

WHC Sample ID	PNL ORNL Sample ID	Port Valve #	Description	Desired Flow Rate SCCM	Desired Duration (min.)	Desired Total Flow SCCM	Actual Flow Rate SCCM	Actual Start Time	Actual End Time	Actual Total Time (min.)	Actual Total Flow Liters
S5044- A21. 525	TST#525	1	TST FIELD BLANK #1					10:55	10:56		
S5044- A22. 526	TST#526	2	TST FIELD BLANK #2					10:55	10:56		
S5044- A25. U80	U80	1	3/NOx/H2O FIELD BLANK#1					11:00	11:01		
S5044- A26. U81	U81	2	3/NOx/H2O FIELD BLANK#2					11:00	11:01		
S5044- A27. U82	U82	3	3/NOx/H2O FIELD BLANK#3					11:00	11:01		

TOTAL TANK GAS USED DURING SAMPLING RUNS 48.77

S5044- A28. 0U1	T-2175 (222S)	Upstream HEPA(box)
S5044- A29. 0D1	T-2176 (222S)	Downstream HEPA(box)
S5044 A30. OU2	T-2177 (222S)	Upstream HEPA(VSS)
S5044- A31. 0D2	T-2178 (222S)	Downstream HEPA (VSS)

Trip Blanks (DO NOT EXPOSE)

S5044- A23. 527	TST#527	TST TRIP #1
S5044- A24. 528	TST#528	TST TRIP #2

S-112
TOTAL TANK VAPOR USED

	NUMBER OF EVENTS	TIME IN MINUTES	VOLUME IN SCCM	TOTAL VOLUME, LITERS
LEAK CHECKS	1	0	5600	5.60
TANK PURGE PUMP DOWNS	3	1	5600	16.80
TANK PURGE TIME (From Spreadsheet)	1	30	5450	165.00
GC PURGES	4	2	5000	40.00
SUMMA PURGES	3	2	5000	30.00
ALL SAMPLES COLLECTED				48.77
TOTAL FOR TANK SAMPLING RUN				306.17

VSS SAMPLING RADIOLOGICAL SCREENING RESULTS
S-112

S5044-A28.OU1						S5044-A29.OD1				
HEPA BOX UPSTREAM FILTER (T2175)	Liters	pCi / filter		pCi / liter		HEPA BOX DOWNSTREAM FILTER (T2176	Liters	pCi / filter		pCi / liter
TOTAL VOLUME	306.17					TOTAL VOLUME	306.17			
BETA		4040.000		13.195		BETA		<0.663		<Detectable
ALPHA		3680.000		12.020		ALPHA		<2.04		<Detectable
GEA - Am-243		< Detectable		< Detectable		GEA - Am-243		<Detectable		<Detectable
- Bi-212		0.002		0.000		- Bi-212		<Detectable		<Detectable
- Np-237		< Detectable		< Detectable		- Np-237		<Detectable		<Detectable
- Pb-212		0.002		0.000		- Pb-212		<Detectable		<Detectable
- Th-229		< Detectable		< Detectable		- Th-229		<Detectable		<Detectable
- Tl-208		0.001		0.000		- Tl-208		<Detectable		<Detectable
-Cd-109		< Detectable		< Detectable						
S5044-A30.OU2						S5044-A31.OD2				
VSS UPSTREAM FILTER (T2177)	Liters	pCi / filter		pCi / liter		VSS DOWNSTREAM FILTER (T2178)	Liters	pCi / filter		pCi / liter
TOTAL VOLUME	306.17					TOTAL FLOW	306.17			
BETA		2.470		0.008		BETA		1.3		0.004
ALPHA		1.220		0.004		ALPHA		<0.579		< Detectable
GEA - Am-243		< Detectable		< Detectable		GEA - Am-243		< Detectable		< Detectable
- Bi-212		< Detectable		< Detectable		- Bi-212		< Detectable		< Detectable
- Np-237		< Detectable		< Detectable		- Np-237		< Detectable		< Detectable
- Pb-212		< Detectable		< Detectable		- Pb-212		< Detectable		< Detectable
- Th-229		< Detectable		< Detectable		- Th-229		< Detectable		< Detectable
- Tl-208		< Detectable		< Detectable		- Tl-208		< Detectable		< Detectable
S5044-A03.0T1										
TRITIUM TRAP (T2174)	Liters	pCi / filter		pCi / liter						
TOTAL VOLUME	1.0									
TOTAL ACTIVITY		< 50.0		< 50.0						
SAMPLE EXPOSURE ANALYSIS, USING VSS DOWNSTREAM FILTER ANALYSIS AS POSSIBLE EXPOSURE LEVEL										
= BETA and ALPHA Less than DOT shipping limits										
SORBENT SAMPLING						ALL TST'S, ALPHA AND BETA	Detectable			
TOTAL VOLUME PER SAMPLE	3.00	Liters								
ALPHA and BETA per SAMPLE	< Detectable	pCi								
ALL SORBENTS										
NH3 (0.75 gram)	< Detectable	pCi per gram								
NO2 (0.60 gram)	< Detectable	pCi per gram								
H2O (0.45 gram)	< Detectable	pCi per gram								
SUMMA SAMPLING										
TOTAL VOLUME PER CANISTER	6	Liters								
ALPHA AND BETA PER SAMPLE	< Detectable	pCi								

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APPENDIX B

AMBIENT CONDITIONS

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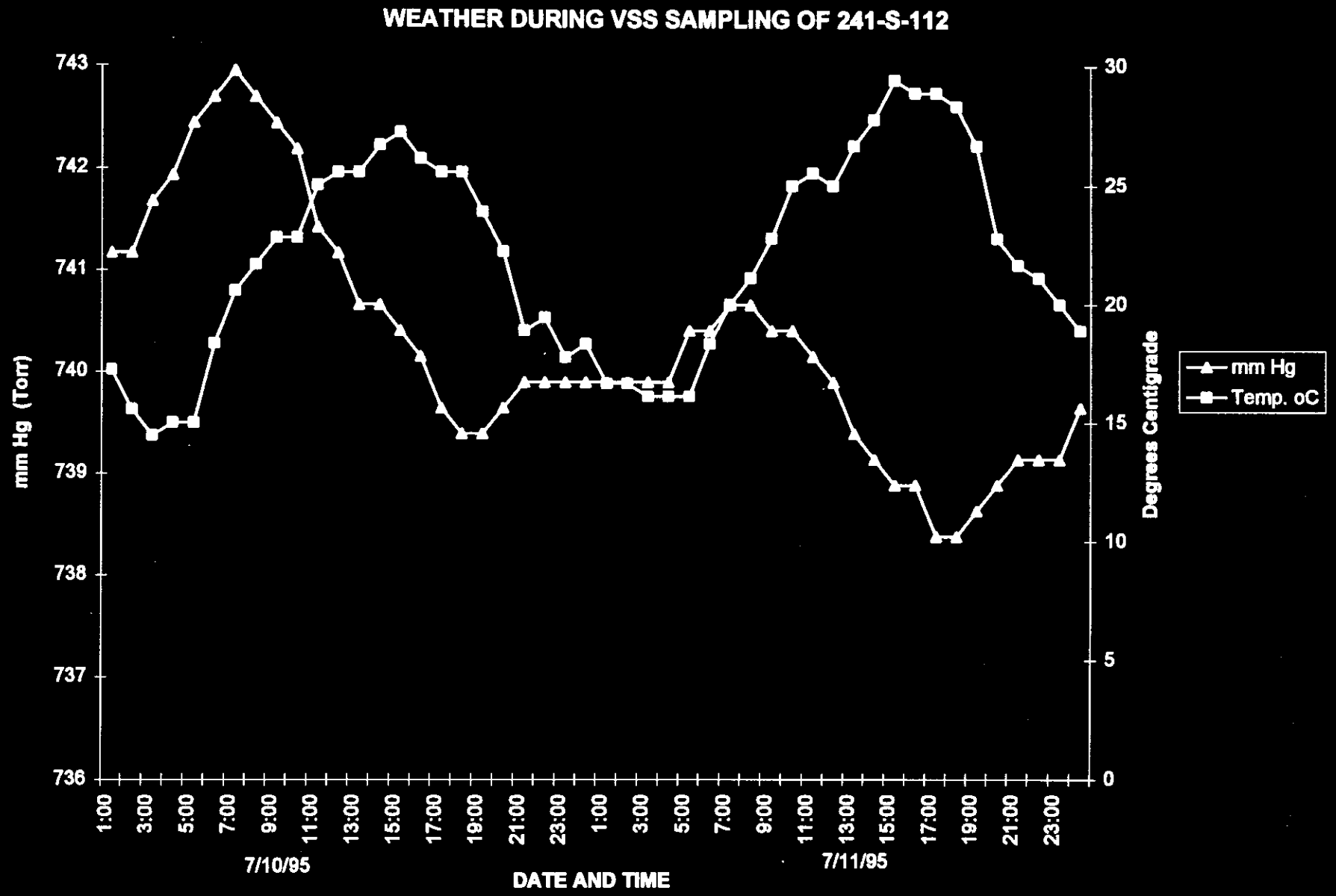
WEATHER DURING VSS SAMPLING OF 241-S-112
743
742
741
740
739
738
737
736
mm Hg (Torr)
30
25
20
15
10
5
0
Degrees Centigrade
mm Hg
Temp. oC
1:00
3:00
5:00
7:00
9:00
11:00
13:00
15:00
17:00
19:00
21:00
23:00
1:00
3:00
5:00
7:00
9:00
11:00
13:00
15:00
17:00
19:00
21:00
23:00
7/10/95
7/11/95
DATE AND TIME

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APPENDIX C

CHAIN-OF-CUSTODY FORMS

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Battelle Pacific Northwest Laboratory | **CHAIN OF CUSTODY** | **WHC 008909**

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

Company Contact R. D. Mahon - WHC — Telephone (509) 373-2891, Page 85-3152 / FAX 373-3793

Project Designation/Sampling Locations 200 West Tank Farm
241-S-112 Tank Vapor Sample SAF S5044 (VSS Truck)

Collection date 07 - 11 - 95
Preparation date 06 - 29 - 95

Ice Chest No.

Field Logbook No. WHC-N-647-10

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to WHC

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S5044 - A08 . U72	$NH_3/NO_x/H_2O$	(INORG Sorbent Trap # 1)	Line # 5
S5044 - A09 . U73	$NH_3/NO_x/H_2O$	(INORG Sorbent Trap # 2)	Line # 6
S5044 - A10 . U74	NO_x/H_2O	(INORG Sorbent Trap # 3)	Line # 7
S5044 - A11 . U75	$NH_3/H_2O/H_2O$	(INORG Sorbent Trap # 4)	Line # 8
S5044 - A16 . U76	$NH_3/NO_x/H_2O$	(IINORG Sorbent Trap # 5)	Line # 5
S5044 - A17 . U77	$NH_3/NO_x/H_2O$	(INORG Sorbent Trap # 6)	Line # 6
S5044 - A18 . U78	NO_x/H_2O	(INORG Sorbent Trap # 7)	Line # 7
S5044 - A19 . U79	$NH_3/H_2O/H_2O$	(INORG Sorbent Trap # 8)	Line # 8
S5044 - A25 . U80	$NH_3/NO_x/H_2O$	(INORG Field Blank # 1))	
S5044 - A26 . U81	$NH_3/NO_x/H_2O$	(INORG Field Blank # 2)	
S5044 - A27 . U82	$NH_3/NO_x/H_2O$	(INORG Field Blank # 3))	

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

Relinquished By	Date	Time	Received By	Date	Time
G W Dennis (signature)	07-05-95	0940	J A Edwards (signature)	07-05-95	0940
J A Edwards (signature)	07-05-95	1050	G S Caprio (signature)	07-05-95	1050
GS Caprio (signature)	07-11-95	0630	(signature) / T Blake	07-11-95	0630
T Blake / (signature)	7-27-95	1320	J A Edwards (signature)	7-27-95	1330

Final Sample Disposition

Comments:

PNL (only) Checklist	Pick-up / Delivery	Comments:
◊ Media labeled and checked?	(Y)/N	
◊ Letter of instruction?	(Y)/N	
◊ Media in good condition?	(Y)/N / (Y)/N	
◊ COC info/signatures complete?	(Y)/N / (Y)/N	
◊ Sorbents shipped on ice? (<10°C)	(Y)/N / (Y)/N	
◊ Rad release stickers on samples?	/ (Y)/N	
◊ Activity report from 222S?	/ (Y)/N	
◊ COC copy for LRB, RIDS filed?	/ (Y)/N	
◊ COC copy for sorbent follow-on?	/ (Y)/N	Original COC follows sorbent media
POC (initials)	POC (initials)	

(Revised 05/10/95 PNL)

A-6000-407 (12/92) WEF061

Battelle Pacific Northwest Lab | **CHAIN OF CUSTODY** | **WHC 008910**

Custody Form Initiator	J. A. Edwards - PNL	Telephone Page	(509) 373-0141 85-3009 / FAX 376-0418
Company Contact	R. D. Mahon - WHC	Telephone Page	(509) 373-2891 85-3152 / FAX 373-3793
Project Designation/Sampling Locations	200 West Tank Farm 241-S-112 Tank Vapor Sample SAF S5044 (VSS Truck)	Collection date Preparation date	07 - 11 - 95 06 - 30 - 95
Ice Chest No.		Field Logbook No.	WHC-N-617-10
Bill of Lading/Airbill No.	N/A	Offsite Property No.	N/A
Method of Shipment	Government Truck		
Shipped to	PNL		
Possible Sample Hazards/Remarks	Unknown at time of sampling		

Sample Identification

S5044 - A01 . 237	Ambient Air SUMMA #1 Upwind of S-112
S5044 - A02 . 238	Ambient Air SUMMA #2 Through Port # 15
S5044 - A04 . 244	SUMMA #3 Port # 15
S5044 - A12 . 245	SUMMA #4 Port # 15
S5044 - A20 . 246	SUMMA #5 Port # 13

[ ] Field Transfer of Custody			[ ] Chain of Possession (Sign and Print Names)		
Relinquished By	Date	Time	Received By	Date	Time
J A Edwards JA Edwards	07-05-95	1100	G S Cappio RA Westberg RA Westberg	07-05-95	1105
RA Westberg RA Westberg	07-11-95	0630	TB Ulteit TB Ulteit	07-11-95	0630
TB Ulteit TB Ulteit	7-27-95	1315	J A EDWARDS JA Edwards	7-27-95	1315

Final Sample Disposition

Comments:

	PNL (only) Checklist	Pick-up	/ Delivery	Comments:
◊	Media labeled and checked?	(Y) N		
◊	Letter of instruction?	(Y) N		
◊	Media in good condition?	(Y) N	/ (Y) N	
◊	COC info/signatures complete?	(Y) N	/ (Y) N	
◊	Rad release stickers on samples?		/ (Y) N	
◊	Activity report from 222S?		/ (Y) N	
◊	COC copy for LRB, RIDS filed?		/ (Y) N	
		POC (Y)	POC (Y)	

(Revised 10/17/94 PNL)

Battelle Pacific Northwest Laboratory | **CHAIN OF CUSTODY** | **WHC 008911**

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

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

Project Designation/Sampling Locations 200 West Tank Farm
241-S-112 Tank Vapor Sample SAF S5044 (VSS Truck)
Collection date 07-11-95
Preparation date 06-30-95

Ice Chest No.
Field Logbook No. WHC-N-477-10

Erco Hi/Lo thermometer No. PNL-T-~~002~~ 001 7-5-95

Bill of Lading/Airbill No. N/A
Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to WHC

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S5044 - A05 . 519	PNL Triple Sorbent Trap (TST) Sample # 1	Line # 1
S5044 - A06 . 520	PNL TST Sample # 2	Line # 2
S5044 - A07 . 521	PNL TST Sample # 3	Line # 3
S5044 - A13 . 522	PNL TST Sample # 4	Line # 1
S5044 - A14 . 523	PNL TST Sample # 5	Line # 2
S5044 - A15 . 524	PNL TST Sample # 6	Line # 3
S5044 - A21 . 525	Open, close & store PNL TST Field Blank # 1	In VSS truck
S5044 - A22 . 526	Open, close & store PNL TST Field Blank # 2	In VSS truck
S5044 - A23 . 527	Store PNL TST Trip Blank # 1	None
S5044 - A24 . 528	Store PNL TST Trip Blank # 2	None

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

Relinquished By	Date	Time	Received By	Date	Time
J A Edwards [signature]	07-05-95	1055	G S Caprio [signature]	07-05-95	1055
G.S. Caprio [signature]	7-11-95	0630	TB Ulrich / TB Ulrich	07-11-95	0630
TB Ulrich / TB Ulrich	7-27-95	1330	J A Edwards [signature]	7-27-95	1330

Final Sample Disposition

Comments:

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

Comments:

Cooler Temperature Status
Hi 4 °C / Lo -6 °C (pick up at PNL to WHC)
Hi ____°C / Lo ____°C (delivery at WHC from PNL)
Hi ____°C / Lo ____°C (at return to PNL from WHC)
Hi 16 °C / Lo -13 °C (at delivery from WHC to PNL)

(Revised 06/21/95 PNL)

A-6000-407 (12/92) WEF061

1 of 1

008324

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

COPY

Normal

Collector: T.B Utecht	Company Contact: R.D Mahon	Telephone No.: 373-7437
Project Designation: S-112	Sampling Location: 241-S-112	SAF No.: S5044
Ice Chest No.: N/A	Field Logbook No.: WHC-N-647-10	Method of Shipment: Govt Vehicle #930
Shipped To: 222-S Labs	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A
Possible Sample Hazards/Remarks: NONE	Preservative: None	
	Type of Container: Petri Dish / silica tube	
	No. of Container(s): (5)	
Special Handling and/or Storage	Volume: 47mL	

SAMPLE ANALYSIS

Sample No.	Matrix*	Date Sampled	Time Sampled	
S5044-OT1	Silica tube	7-11-95	1445	T- 2174
S5044-OU1	HEPA filter	↓	↓	T- 2175
S5044-OD1	HEPA			T- 2176
S5044-OU2	HEPA			T- 2177
S5044-OD2	HEPA			T- 2178

C-9

WHC-SD-WM-RPT-176, Rev. 0

CHAIN OF POSSESSION	Sign/Print Names			
Relinquished By: T.B. Utecht / T B Utecht	Date/Time: 7-11-95 1505	Received By: T Lopez	Date/Time: 1505 7-11-95	
Relinquished By	Date/Time	Received By	Date/Time	
Relinquished By	Date/Time	Received By	Date/Time	
Relinquished By	Date/Time	Received By	Date/Time	

SPECIAL INSTRUCTIONS: Please fax info to Tim Utecht at 373-7076

Thanks

Matrix*

S	=	Soil
SE	=	Sediment
SO	=	Solid
SL	=	Sludge
W	=	Water
O	=	Oil
A	=	Air
DS	=	Drum Solids
DL	=	Drum Liquids
T	=	Tissue
WI	=	Wipe
L	=	Liquid
V	=	Vegetation
X	=	Other

LABORATORY USE ONLY: Received By | Title | Date/Time

WASTE SAMPLE DISPOSAL: Disposal Method | Disposed By | Date/Time

DISTRIBUTION: Original - Sample Yellow - Sampler

EC-6000-828 (12/92)