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VAPOR & GAS SAMPLING OF SST 241U107 USING THE
VAPOR SAMPLING SYSTEM

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**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz

9/15/95

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LIST OF TERMS

CGI	Combustible Gas Indicator
COC	Chain Of Custody
DOT	U.S. Department of Transportation
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	Nitric Oxide
H ₂ O	Water Vapor
OGIST	Oregon Graduate Institute of Science and Technology
OPC	Offsite Property Control
ORNL	Oak Ridge National Laboratory
OVN	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-U-107 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-U-107. This document presents sampling data resulting from the February 17, 1995 sampling of SST 241-U-107. 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-U-107 on February 17, 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 SUMMA¹ canister headspace samples from SST 241-U-107. 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.

¹SUMMA 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 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-U-107 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	Flow (stdcm ³ /min)	Error (%)
1	200	±0.7
3	200	±0.05

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 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 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 μ m 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 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-244, *Tank 241-U-107 Tank Characterization Plan* (Kunthara 1995). The Tank Characterization Plan (TCP) 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 S5-008.

3.2 OPERATIONS AND SAMPLING PERSONNEL

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

- E. A. Johnson, Field Scientist
- R. D. Mahon, VSS Lead Field Scientist
- T. B. Utecht, VSS Technician
- G. D. Caprio, VSS Technician.

The VSS was set up at SST 241-U-107 on February 16, 1995 and was allowed to warm up overnight. Sampling began shortly after 10:00 a.m. on February 15, 1995, and was completed by 4:00 p.m.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Prior to hooking up to SST 241-U-107 an industrial hygienist 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 technician verbally reported an LEL of 0.0% and a oxygen content of 20.5% using the CGI, and a TOC content of 18 ppm using the OVM. A Drager tube indicated that the ammonia content of the tank vapors was approximately 400 ppm.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, February 17, 1995 was cool and cloudy, with a chance of rain. Winds were from the south at approximately 15 miles per hour. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2 miles east of U Farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser 10 of SST 241-U-107. The probe length, from the sample inlet to the top of the riser flange, was 6.1 meters.

All zones of the VSS were heated to 60 °C during setup of the VSS at SST 241-U-107 on February 16, 1995. The team stabilized the VSS temperature zones by 9:30 a.m. on February 17, 1995, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-U-107 were 983 mbar (737.3 torr) and 22.6 °C, respectively. The sample log sheets (Appendix A) provide a complete chronology of the sample event including start and end times, flow rates, volumes, and specific sample identifiers.

Approximately 20.5 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. Prior to sampling tank vapors on February 17, 1995, the team collected two SUMMA™ canister samples of ambient air, one manually 10 meters upwind of the VSS connection with SST 241-U-107, 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 prior to opening the tank probe vapor sampling valve. The system was evacuated to 293 mbar (220 torr) and leakage of ambient air into the system was observed by monitoring system pressure for 15 minutes. Leakage resulted in an increase of 6.27 mbar (4.7 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 14.24 mL/min at a 293 mbar (220.0 torr). This leak rate was then estimated for average SUMMA™, TST, and sorbent sampling pressures. It was found that for the SUMMA™ canisters, dilution by ambient air was approximately 0.2%, for TST traps sampled at 50 mL/min the dilution was approximately 0.7%, for TST traps 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-U-107 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.

Two analytical laboratories provided sample media. Oak Ridge National Laboratory (ORNL) provided triple sorbent traps (TSTs) for organic vapors; and Pacific Northwest Laboratory (PNL) provided SUMMA™ canisters and sorbent traps for organic vapors, ammonia (NH₃), nitrogen dioxide (NO₂), nitric oxide (NO), and water vapor (H₂O).

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 $\pm 2\%$ NIST traceable. Table 2 displays the Field GC/FID results from the sampling of 241-U-107.

Table 2. TOC Results.

Number of Runs	Description	Average TOC Concentration (ppmC)	% Standard Deviation
6	Propane	6.00	1.20
3	Ambient	2.95	4.29
4	Tank Vapor	28.26	0.61

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 200 pCi/g of beta-gamma activity and 60 pCi/g of alpha activity. Samples exceeding these DOT limits may be shipped as radioactive material if the samples do not exceed the following laboratory acceptance criteria:

- ORNL: Beta-gamma activity <450 pCi/g of sample media. Alpha activity <135 pCi/g.
- 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 February 17, 1995, SST 241-U-107 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-U-107 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-U-107 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)	S5008-A32.OU1	Total Alpha = 1.45 Total Beta = 17.5 GEA = <detectable	=0.00 =0.05 =<detectable
Downstream HEPA filter (box)	S5008-A33.OD1	Total Alpha = <0.58 Total Beta = 3.21 GEA = <detectable	=<detectable =0.01 =<detectable
Upstream HEPA filter (VSS)	S5008-A34.OU2	Total Alpha = <0.69 Total Beta = 2.82 GEA = <detectable	=<detectable =0.01 =<detectable
Downstream HEPA filter (VSS)	S5008-A35.OD2	Total Alpha = <0.63 Total Beta = <2.93 GEA = <detectable	=<detectable =0.01 =<detectable
Tritium trap	S5008-A03.OT1	Total activity = <50.0	=<50.0 ^c

NOTES:

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

^aAll less than (<) values represent the minimum detection limits at Laboratory 222-S.

^bNumbers 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 364.1 L.

^cNumber 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 by SML 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.

TSTs are supplied by ORNL and ORNL initiates the chain-of-custody (COC) forms. The sample media is placed in 40-mL volatile organic analysis vials. Evidence tape is applied to the vials, which are then placed in a shipping container along with the relinquished COC forms and shipped to SML. TSTs are shipped to SML in a cooler containing "blue" ice.

The TSTs were received, inventoried against the COC forms, and the "received by" block on the COC form was signed by SML. They were maintained at 4 ± 2 °C before and after the sampling event in the storage area refrigeration unit.

The TSTs were shipped to back to ORNL after the sampling event using offsite property control (OPC W95-0-0228-59). Table 4 lists the sample identifiers, sample types, and COC form numbers for all ORNL samples. The samples were delivered to shipping on March 2, 1995 with instructions to ship via Federal Express, next-day delivery.

Table 4. Oak Ridge National Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5008-A07.662	TST	006754
S5008-A08.635	TST	006754
S5008-A09.642	TST	006754
S5008-A10.774	TST field blank	006754
S5008-A11.656	TST	006754
S5008-A12.661	TST	006754
S5008-A13.369	TST	006754
S5008-A14.484	TST	006754
S5008-A15.611	TST	006754
S5008-A16.739	TST	006754
S5008-A17.412	TST field blank	006754
S5008-A18.752	TST	006754
S5008-A19.825	TST	006754
S5008-A20.850	TST	006754
S5008-A21.588	TST trip blank	006754
S5008-A22.772	TST trip blank	006754

PNL supplied sorbent chain traps and SUMMA™ canisters, including COC forms. These Sampling devices were picked up from PNL by SML and transported in a government vehicle to a custody locked storage area. The sorbent trains were maintained at 4 ± 2 °C before and after the sampling event in storage area refrigeration unit.

After sampling, the PNL sorbent traps and SUMMA™ canisters were transported by government vehicle directly to PNL and delivered to J. A. Edwards on March 1, 1995. Table 5 lists the sample identifiers, sample types, and COC form numbers for all PNL samples.

Table 5. Pacific Northwest Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5008-A01.111	Ambient upwind SUMMA™	008100
S5008-A02.112	Ambient SUMMA™ (VSS)	008100
S5008-A04.082	SUMMA™	008100
S5008-A05.083	SUMMA™	008100
S5008-A06.084	SUMMA™	008100
S5008-A23.V81	NH ₃ /NO _x /NO/H ₂ O sorbent	008101
S5008-A24.V82	NH ₃ /NO _x /NO/H ₂ O sorbent	008101
S5008-A25.V83	NH ₃ /NO _x /NO/H ₂ O sorbent	008101
S5008-A26.V84	NH ₃ /NO _x /NO/H ₂ O sorbent	008101
S5008-A27.V85	NH ₃ /NO _x /NO/H ₂ O sorbent	008101
S5008-A28.V86	NH ₃ /NO _x /NO/H ₂ O sorbent	008101
S5008-A29.V87	NH ₃ /NO _x /NO/H ₂ O trip blank	008101
S5008-A30.V88	NH ₃ /NO _x /NO/H ₂ O trip blank	008101
S5008-A31.V89	NH ₃ /NO _x /NO/H ₂ O trip blank	008101

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 prior to sampling of SST 241-U-107, the VSS manifold and vapor sample transfer tubing was heated to 60 °C and ambient air was purged through the system for 20.5 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 contaminants were 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 C of LO-080-450/A0 (WHC 1993c) and the project-specific file located with SML.

In compliance with the *Vapor Space Probe Cleaning Procedure* (WHC 1993) the team cleaned the hot-water-jacketed probe before it was installed in SST 241-U-107. 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 via 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 6. According to the calibration schedule shown in Table 6, all instrumentation was within its calibration period during the SST 241-U-107 sampling event.

Table 6. Calibration Data.

System	Calibration Date	Expiration Date	WHC Standards Laboratory Code
Temperature Control System	04/21/94	04/21/95	804-67-74-009
Mass Flow System	12/08/94	12/08/95	804-28-03-001
Pressure System	12/07/94	12/07/95	804-67-89-001

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, including mounting on the sampling port for one minute, but no tank vapors are drawn through the field blanks.

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 prior to sampling operations.

Tables 4 and 5 also list sample blanks used during the sampling of SST 241-U-107.

6.0 ANOMALIES

All samples were collected in accordance with the TCP and WHC-IP-1127-4.5, *Collection of SUMMA Canisters and Sorbent Tube Samples Using the Vapor Sampling System* (WHC 1995b). No anomalies were observed while collecting samples from tank SST 241-U-107. Further details are available in the project-specific file maintained by SML.

7.0 REFERENCES

- 49 CFR 100-177, 1992, "Transportation," *Code of Federal Regulations*, as amended.
- Kunthara, T. J., 1995, *Tank 241-U-107 Tank Characterization Plan*, WHC-SD-WM-TP-244, Westinghouse Hanford Company, Richland, Washington.
- 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 SUMMA Canisters and Sorbent Tube Samples Using the Vapor Sampling System (VSS)*, Procedure WHC-IP-1127-4.5, 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-U-107

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

Date: 2/17/95

Ensure HEPA filters are installed

VSS Personnel: R. Mahon T. Utecht

Ensure connection to sample probe

E. Johnson

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

Trailer Personnel: G. Caprio

Tank Temperature 22.6 °C

PNL				Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
OGI/ORNL Port Description				Flow	Duration	Total	Flow	Start	End	Total	Total
WHC Sample ID	Sample ID	Valve #		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
Group # 1						SCCM	SCCM	2/16/95	2/17/95	(min.)	Liters
Purge with ambient air for 30 min.				5450	30	163500	5461	13:00	09:40	1240	6,772
S5008- A01. 111	111		AMBIENT #1 (PNL)		1			09:50	09:51	1	
GC Run #1	Ambient air/Cleanliness check							10:21:28			
S5008- A02. 112	112	15	AMBIENT #2 (PNL)		1			10:32	10:33	1	
GC Run #2	Ambient air							10:38			
Leak check (Appendix A)	Leak Rate: 18.8 Torr / Hr.										
Purge with tank air for 30 min.				5450	30	163500	5460	11:09	11:39	30.0	163.80
Measure tank pressure	PE-1 = 737.3 Torr										
S5008- A03. 0T1 T1803(222S)	8		Tritium Trap	200	5	1000	200.30	12:03	12:08	5.0	1.00
GC Run # 3 (Tank run #1)								12:13			
S5008- A04. 082	082	11	SUMMA #3		1			11:49	11:50	1	6.00
S5008- A05. 083	083	13	SUMMA #4		1			11:53	11:54	1	6.00
S5008- A06. 084	084	15	SUMMA # 5		1			11:58	11:59	1	6.00
GC Run # 4 (Tank run # 2)								12:25			

Waste Tank
241-U-107

WHC-SD-WM-RPT-152, Rev. 0													
WHC Sample ID	PNL		Port	Description	Desired		Desired		Actual		Actual		
	OGI/ORNL	Sample ID			Flow	Duration	Total	Flow	Rate	Start	End	Total	Flow
			Valve #		Rate	(min.)			Time	Time	Time	Flow	
S5008-A07.662	TST#662	9	TST #1		50	4		200	50.50	12:30	12:34	4.0	0.20
S5008-A08.635	TST#635	10	TST #2		50	4		200	50.50	12:30	12:34	4.0	0.20
S5008-A09.642	TST#642	8	TST #3		50	4		200	50.20	12:45	12:49	4.0	0.20
S5008-A11.656	TST#656	10	TST #4		50	4		200	50.20	12:45	12:49	4.0	0.20
S5008-A10.774	TST#774		TST FIELD BLANK #1							12:58	12:59	1.0	
S5008-A12.661	TST#661	9	TST #5		200	5		1000	200.40	13:04	13:09	5.0	1.00
S5008-A13.369	TST#369	10	TST #6		200	5		1000	200.40	13:04	13:09	5.0	1.00
S5008-A14.484	TST#484	8	TST #7		200	5		1000	200.40	13:28	13:33	5.0	1.00
S5008-A15.611	TST#611	10	TST #8		200	5		1000	200.40	13:28	13:33	5.0	1.00
S5008-A16.739	TST#739	9	TST #9		200	20		4000	200.40	13:41	14:01	20.0	4.01
S5008-A18.752	TST#752	10	TST #10		200	20		4000	200.40	13:41	14:01	20.0	4.01
S5008-A17.412	TST#412		TST FIELD BLANK #2							13:42	13:43	1.0	
S5008-A19.825	TST#825	8	TST #11		200	20		4000	200.40	14:12	14:32	20.0	4.01
S5008-A20.850	TST#850	10	TST #12		200	20		4000	200.40	14:12	14:32	20.0	4.01
GC Run # 5 (Tank run #3)										14:41			
S5008-A23.V81	V81	9	NH3/NOx/H2O #1		200	15		3000	200.40	14:46	15:01	15.0	3.01
S5008-A24.V82	V82	10	NH3/NOx/H2O #2		200	15		3000	200.40	14:46	15:01	15.0	3.01
S5008-A25.V83	V83	8	NH3/NOx/H2O #3		200	15		3000	200.40	15:07	15:22	15.0	3.01
S5008-A26.V84	V84	10	NH3/NOx/H2O #4		200	15		3000	200.40	15:07	15:22	15.0	3.01
S5008-A27.V85	V85	9	NH3/NOx/H2O #5		200	15		3000	200.40	15:30	15:45	15.0	3.01
S5008-A28.V86	V86	10	NH3/NOx/H2O #6		200	15		3000	200.40	15:30	15:45	15.0	3.01
GC Run # 6 (Tank run # 4)										15:52			
TOTAL TANK GAS USED DURING SAMPLING RUNS												57.88	

Waste Tank
241-U-107

WHC Sample ID	PNL		Description	Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
	OGI/ORNL	Port		Flow	Duration	Total	Flow	Start	End	Total	Total
	Sample ID	Valve #		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
S5008- A32. 0U1	T1804(222S)		Upstream HEPA(box)						16:15		
S5008- A33. 0D1	T1805(222S)		Downstream HEPA(box)						16:15		
S5008- A34. 0U2	T1806(222S)		Upstream HEPA (VSS)						16:15		
S5008- A35. 0D2	T1807(222S)		Downstream HEPA (VSS)						16:15		

Trip Blanks (DO NOT EXPOSE)

S5008- A21. 588	TST#588		TST TRIP #1
S5008- A22. 772	TST#772		TST TRIP #1
S5008- A29. V87	V87		NH3/NOx/H2O TRIP #1
S5008- A30. V88	V88		NH3/NOx/H2O TRIP #2
S5008- A31. V89	V89		NH3/NOx/H2O TRIP #3

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U-107
TOTAL TANK VAPOR USED

	NUMBER	TIME	VOLUME	TOTAL	
	OF	IN	IN	VOLUME,	
	EVENTS	MINUTES	SCCM	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	163.80	
GC PURGES	4	3	5000	60.00	
SUMMA PURGES	6	2	5000	60.00	
ALL SAMPLES COLLECTED				57.88	
TOTAL FOR TANK SAMPLING RUN				364.08	

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VSS SAMPLING RADIOLOGICAL SCREENING RESULTS
U-107

HEPA BOX UPSTREAM FILTER	Liters	pCi / filter	pCi / liter	HEPA BOX DOWNSTREAM FILTER	Liters	pCi / filter	pCi / liter
TOTAL VOLUME	364.08			TOTAL VOLUME	364.08		
BETA		18	0.05	BETA		3.21	0.01
ALPHA		1	0.00	ALPHA		< .584	< Detectable
GEA - Am-243		ND	< Detectable	GEA - Am-243		ND	< Detectable
- Bi-212		ND	< Detectable	- Bi-212		ND	< Detectable
- Np-237		ND	< Detectable	- Np-237		ND	< Detectable
- Pb-212		ND	< Detectable	- Pb-212		ND	< Detectable
- Th-229		ND	< Detectable	- Th-229		ND	< Detectable
- TL-208		ND	< Detectable	- TI-208		ND	< Detectable
- Cd-109		ND	< Detectable				
VSS UPSTREAM FILTER	Liters	pCi / filter	pCi / liter	VSS DOWNSTREAM FILTER	Liters	pCi / filter	pCi / liter
TOTAL VOLUME	364.08			TOTAL VOLUME	0 364.08		
BETA		2.82	0.01	BETA		2.93	0.008
ALPHA		0.69	0.002	ALPHA		0.631	0.002
GEA - Am-243		ND	< Detectable	GEA - Am-243		ND	< Detectable
- Bi-212		ND	< Detectable	- Bi-212		ND	< Detectable
- Np-237		ND	< Detectable	- Np-237		ND	< Detectable
- Pb-212		ND	< Detectable	- Pb-212		ND	< Detectable
- Th-229		ND	< Detectable	- Th-229		ND	< Detectable
- TL-208		ND	< Detectable	- TI-208		ND	< Detectable
TRITIUM TRAP	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 < 0.01 pCi/Liter, ALPHA < 0.01 pCi/Liter, GEA not detected							
SORBENT SAMPLING				TST'S			
TOTAL VOLUME PER SAMPLE	3.00 Liters			TOTAL VOLUME PER SAMPLE	Liters	Alpha and Beta per sample	
ALPHA AND BETA PER SAMPL	< 0.01 pCi			TST 662, 635, 642, 656	0.2	< 0.01	pCi
INDIVIDUAL SORBENTS				TST 661, 369, 484, 611	1	< 0.01	pCi
NH3 (0.75 gram)	< 0.01 pCi per gram			TST 739, 752, 825, 850	4.01	< 0.04	pCi
NO2 (0.60 gram)	< 0.02 pCi per gram						
H2O (0.45 gram)	< 0.03 pCi per gram						
SUMMA SAMPLING							
TOTAL VOLUME PER CANISTER	6 Liters						
ALPHA AND BETA PER SAMPLE	< 0.06 pCi						

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APPENDIX B
AMBIENT CONDITIONS

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WEATHER DURING VSS SAMPLING OF 241-U-107

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APPENDIX C
CHAIN-OF-CUSTODY FORMS

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WHC-SD-WM-RPT-152, Rev. 0

Westinghouse
Hanford Company

CHAIN OF CUSTODY

ORNL-006754

Custody Form Initiator Amy Dindal

Company Contact Roger Jenkins

Telephone (615) 576-8594

Project Designation/Sampling Locations 241-U-107 (VSS)

Collection Date 17 FEB 95

Ice Chest No.

Field Logbook No. WHC-N-647-4

Bill of Lading/Airbill No.

Offsite Property No.

Method of Shipment Federal Express

Shipped to Rick Mahon

Possible Sample Hazards/Remarks NONE

Sample Identification

✓S5008-A7.662	TST# 662 ✓	ORNL Triple Sorbent Trap
✓S5008-A8.635	TST# 635 ✓	ORNL Triple Sorbent Trap
✓S5008-A9.842	TST# 642 ✓	ORNL Triple Sorbent Trap
✓S5008-A11.656	TST# 656 ✓	ORNL Triple Sorbent Trap
✓S5008-A12.661	TST# 661 ✓	ORNL Triple Sorbent Trap
✓S5008-A13.359	TST# 369 ✓	ORNL Triple Sorbent Trap
✓S5008-A14.484	TST# 484 ✓	ORNL Triple Sorbent Trap
✓S5008-A15.611	TST# 611 ✓	ORNL Triple Sorbent Trap
✓S5008-A16.739	TST# 739 ✓	ORNL Triple Sorbent Trap
✓S5008-A18.752	TST# 752 ✓	ORNL Triple Sorbent Trap
✓S5008-A19.825	TST# 825 ✓	ORNL Triple Sorbent Trap
✓S5008-A20.850	TST# 850 ✓	ORNL Triple Sorbent Trap
✓S5008-A21.588	TST# 588 ✓	ORNL Trip Blank
✓S5008-A22.772	TST# 772 ✓	ORNL Trip Blank
✓S5008-A10.774	TST# 774 ✓	ORNL Field Blank
✓S5008-A17.412	TST# 412 ✓	ORNL Field Blank

Temperature Not on Bag containing samples
 Temp Inspected upon arrival
 All-OK Roger Jenkins

[] Field Transfer of Custody

Chain of Possession

(Sign and Print Names)

Relinquished By	Date	Time	Received By	Date	Time
AB Dindal / Amy Dindal	2/12/95	10:03am	Rick Mahon / Rick Mahon	3 FEB 95	11:33
Rick Mahon / Rick Mahon	2-17-95	0850	Glenn Caprio / Glenn Caprio	2 Feb. 95	0:850
Glenn Caprio / Glenn Caprio	3-2-95	0845	T.B. CATECH / T.B. CATECH	3-2-95	0845
T.B. CATECH / T.B. CATECH	03-02-95	1000	ROGER JENKINS / Roger Jenkins	3/3/95	2:20pm EST

Temperature (°C)	Min	Max
When shipped (ORNL)	-2	4°
When received (WHC)	1°	3°
When shipped (WHC)	1°	3
When received (ORNL)	0°	7°C

Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 008100

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-U-107 Tank Vapor Sample SAF S5-008
(VSS Truck)

Collection date 02 - 17 - 95

Preparation date 02 - 06 - 95

Ice Chest No.

Field Logbook No. WHC-11-647-4

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

S5-008 - A01 . 111

Ambient Air SUMMA #1 Upwind of U-107 (PNL)

S5-008 - A02 . 112

Ambient Air SUMMA #2 Through Port 15 (PNL)

S5-008 - A04 . 082

SUMMA #3 Port 11 (PNL)

S5-008 - A05 . 083

SUMMA #4 Port 13 (PNL)

S5-008 - A06 . 084

SUMMA #5 Port 15 (PNL)

Field Transfer of Custody			Chain of Possession (Sign and Print Names)		
Relinquished By	Date	Time	Received By	Date	Time
J. A. Edwards <i>JAE</i>	02-06-95	1210	T. B. Utecht <i>TBU</i>	02-06-95	1210
T. B. Utecht <i>TBU</i>	02-12-95	0850	J. P. Burchler <i>JPB</i>	2-12-95	0850
J. P. Burchler <ijpb< i=""></ijpb<>	3-1-95	1115	J. A. Edwards <i>JAE</i>	3-1-95	1115

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	
COC info/signatures complete?	☒ Y / ☒ N	
Sorbents shipped on ice?	☒ 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/A	
POC <i>JPB</i>	POC	

(Revised 10/17/94 PNL)

Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 008101

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-U-107 Tank Vapor Sample SAF S5-008
(VSS Truck)

Collection date 02 - 17 - 95

Preparation date 02 - 03 - 95

Ice Chest No.

Field Logbook No. WHC- N - 677-4

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

S5-008 - A23 . V81 -	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 1)	Line # 9
S5-008 - A24 . V82 -	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 2)	Line # 10
S5-008 - A25 . V83 -	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 3)	Line # 8
S5-008 - A26 . V84 -	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 4)	Line # 10
S5-008 - A27 . V85 -	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 5)	Line # 9
S5-008 - A28 . V86 -	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 6)	Line # 10
S5-008 - A29 . V87 -	NH ₃ /NO _x /H ₂ O a-b-c (Trap Trip Blank # 1)	
S5-008 - A30 . V88 -	NH ₃ /NO _x /H ₂ O a-b-c (Trap Trip Blank # 2)	
S5-008 - A31 . V89 -	NH ₃ /NO _x /H ₂ O a-b-c (Trap Trip Blank # 3)	

[] Field Transfer of Custody			[] Chain of Possession (Sign and Print Names)		
Relinquished By	Date	Time	Received By	Date	Time
G. W. Dennis <i>G.W. Dennis</i>	02-06-95	1100	J. A. Edwards <i>JA Edwards</i>	02-06-95	1100
J. A. Edwards <i>JA Edwards</i>	02-06-95	1200	T. B. Utecht <i>T.B. Utecht</i>	02-06-95	1200
<i>T.B. Utecht</i> <i>T.B. Utecht</i>	02-17-95	0850	<i>T.B. Utecht</i> <i>T.B. Utecht</i>	2-17-95	0850
<i>JA Edwards</i> <i>JA Edwards</i>	3-1-95	1115	<i>JA Edwards</i> <i>JA Edwards</i>	3-1-95	1115

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	
COC info/signatures complete?	☒ Y / ☒ N	
Sorbents shipped on ice?	☒ 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/A	
POC ☒ <i>JA Edwards</i>	POC ☒ <i>JA Edwards</i>	

(Revised 10/17/94 PNL)

COPY

Westinghouse Hanford
Company

CHAIN OF CUSTODY

008548.

Custody Form Initiator T.B. UTECHCompany Contact R.D. MahanTelephone 373-2881Project Designation/Sampling Locations 241-U107 200 WestCollection Date 2-17-95Ice Chest No. N/AField Logbook No. WKC-N-647-4Bill of Lading/Airbill No. N/AOffsite Property No. N/AMethod of Shipment Gov't vehicle # 929Shipped to 222-S1A63 200 West AreaPossible Sample Hazards/Remarks NONE

Sample Identification

5008-0T1

T- 1803

35008-0A1

T- 1804

55008-0D1

T- 1805

35008-0A2

T- 1806

55008-0D2

T- 1807

☒ Field Transfer of Custody

CHAIN OF POSSESSION

(Sign and Print Name)

Relinquished By	Date	Time	Received By	Date	Time
<u>T.B. Utecht</u>	<u>2-21-95</u> <u>2:22 PM</u> <u>T84-2-21-95</u>	<u>0915</u>	<u>M. Lapins</u>	<u>2-21-95</u>	<u>0915</u>

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

Comments: