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VAPOR & GAS SAMPLING OF SST 241U111 USING THE
VAPOR SAMPLING SYSTEM

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7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE FEBRUARY 28, 1995, SAMPLING OF SST 241-U-111 USING THE VAPOR SAMPLING SYSTEM.

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Using the Vapor Sampling System

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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
OPC	Offsite Property Control
ORNL	Oak Ridge National Laboratory
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-U-111 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-111. This document presents data resulting from the February 28, 1995 sampling of SST 241-U-111. 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-111 on February 28, 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-111. 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 with 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.

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

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

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-111 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 total organic carbon. 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 total organic carbon. 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-249, *Tank 241-U-111 Tank Characterization Plan* (Carpenter 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 S5-009.

3.2 OPERATIONS AND SAMPLING PERSONNEL

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

- R. A. Westberg, Field Scientist
- E. A. Johnson, Field Scientist
- T. B. Utecht, VSS Technician
- N. P. Beuchler, VSS Technician.

The VSS was set up at SST 241-U-111 on February 27, 1995 and was allowed to warm up overnight. While all zones were warming up, the sample tubing and manifolds was purged with ambient air. Sampling began shortly after 9:00 a.m. and was completed by 3:15 p.m. on February 28, 1995.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Prior to hooking up to SST 241-U-111 an Industrial Hygiene technician field tested tank vapors. The vapor probe sample tube was purged for five minutes and then the vapor stream contents were field measured using a combustible gas indicator (CGI) and an organic vapor meter (OVM). The Industrial Hygiene technician verbally reported an LEL of 1.0% and a oxygen content of 21.0%

using the GCI., and a total organic carbon content of 39.5 ppm using the OVM. The use of Dräger tubes indicated an ammonia content of 700 ppm but hydrogen, nitrous oxides, and HCN were not detected.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, February 28, 1995 was sunny but cool. Winds varied from southwest to east at approximately 10 miles per hour. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2 miles east U-Farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser 4 of SST 241-U-111. 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-111 on February 27, 1995. The team stabilized the VSS temperature zones by 9:00 a.m. on February 28, 1995, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-U-111 were 1,004 mbar (753.0 torr) and 20 °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 19 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 28, 1995, the team collected two SUMMA™ canister samples of ambient air, one manually 10 meters upwind of the VSS connection with SST 241-U-111, 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 287 mbar (215.1 torr) and leakage of ambient air into the system was observed by monitoring system pressure for 15 minutes. Leakage resulted in an increase of 1.33 mbar (1.0 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 3.09 mL/min at a 287 mbar (215.1 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 0.01%, for TST traps sampled at 50 mL/min the dilution was approximately 0.1%, for TST traps sampled at 200 mL/min the dilution was approximately 0.1%, and for sorbent traps the dilution was approximately 0.1%.

The tank probe vapor sampling valve was opened and the VSS was purged with sample vapor from SST 241-U-111 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-111.

Table 2. TOC Results

Number of Runs	Description	Average TOC Concentration (ppmC)	% Standard Deviation
3	Propane	6.00	0.56
4	Ambient	2.83	0.01
4	Tank Vapor	24.75	0.94

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 28, 1995, SST 241-U-111 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-111 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-111 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)	S5009-A32.OU1	Total Alpha = 15.8 Total Beta = 68.0 GEA = <detectable	= 0.05 = 0.20 = <detectable
Downstream HEPA filter (box)	S5009-A33.OD1	Total Alpha = <0.64 Total Beta = 4.16 GEA = <detectable	= <0.002 = 0.01 = <detectable
Upstream HEPA filter (VSS)	S5009-A34.OU2	Total Alpha = <0.64 Total Beta = <2.56 GEA = <detectable	= <0.002 = <0.008 = <detectable
Downstream HEPA filter (VSS)	S5009-A35.OD2	Total Alpha = <0.79 Total Beta = <2.89 GEA = <detectable	= <0.002 = <0.009 = <detectable
Tritium trap	S5009-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 334.1 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 back to ORNL after the sampling event using offsite property control (OPC W95-0-0228-081). Table 4 lists the sample identifiers, sample types, and COC form numbers for all ORNL samples. The samples were delivered to shipping on March 13, 1995 with instructions to ship via Federal Express, next-day delivery.

Table 4. Oak Ridge National Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5009-A07.345	TST	006755
S5009-A08.350	TST	006755
S5009-A09.479	TST	006755
S5009-A10.631	TST field blank	006755
S5009-A11.473	TST	006755
S5009-A12.297	TST	006755
S5009-A13.771	TST	006755
S5009-A14.845	TST	006755
S5009-A15.832	TST	006755
S5009-A16.296	TST	006755
S5009-A17.248	TST field blank	006755
S5009-A18.748	TST	006755
S5009-A19.243	TST	006755
S5009-A20.302	TST	006755
S5009-A21.475	TST trip blank	006755
S5009-A22.855	TST trip blank	006755

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 10, 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
S5009-A01.139	Ambient upwind SUMMA™	008102
S5009-A02.142	Ambient SUMMA™ (VSS)	008102
S5009-A04.120	SUMMA™	008102
S5009-A05.122	SUMMA™	008102
S5009-A06.123	SUMMA™	008102
S5009-A23.V90	NH ₃ /NO _x /NO/H ₂ O sorbent	008103
S5009-A24.V91	NH ₃ /NO _x /NO/H ₂ O sorbent	008103
S5009-A25.V92	NH ₃ /NO _x /NO/H ₂ O sorbent	008103
S5009-A26.V93	NH ₃ /NO _x /NO/H ₂ O sorbent	008103
S5009-A27.V94	NH ₃ /NO _x /NO/H ₂ O sorbent	008103
S5009-A28.V95	NH ₃ /NO _x /NO/H ₂ O sorbent	008103
S5009-A29.V96	NH ₃ /NO _x /NO/H ₂ O trip blank	008103
S5009-A30.V97	NH ₃ /NO _x /NO/H ₂ O trip blank	008103
S5009-A31.V98	NH ₃ /NO _x /NO/H ₂ O trip blank	008103

SUMMA™ canisters were also supplied by OGIST. The sample media is shipped to SML without a COC form. The sample media is inventoried at SML, where the COC is initiated.

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

Before the February 28, 1995 sampling of SST 241-U-111, the VSS manifold and vapor sample transfer tubing was heated to 60 °C and ambient air was purged through the system for 19.0 hours. Also, various system valves were actuated to release any contaminants hung up 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 C of WHC-IP-1127-4.5 (WHC 1995b) and the project-specific file located with SML.

The hot-water-jacketed probe was initially clean in compliance with the *Vapor Space Probe Cleaning Procedure* (WHC 1993) before it was installed in SST 241-BY-105. 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. Following the sampling of SST 241-BY-105, the probe was removed and transferred to U Farm. Before installation in SST 241-U-111, the probe was recleaned in accordance with Appendix C of WHC-IP-1127-4.5 (WHC 1995a).

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-111 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 1 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-111.

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* (1995b). No sampling anomalies occurred while collecting samples from tank SST 241-U-111 and PNL and ORNL were so informed. 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.
- Carpenter, B. C., 1995, *Tank 241-U-111 Tank Characterization Plan*, WHC-SD-WM-TP-249, 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, 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-111

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 20°C

PNL

OGI/ORNL Port Description

WHC Sample ID Sample ID Valve #

Group # 1

Purge with ambient air for 30 min.

(Overnight)

S5009- A01. 139 139 AMBIENT #1

GC Run #1 Ambient air/Cleanliness check

S5009- A02. 142 142 AMBIENT #2

GC Run #2 Ambient air

Leak check (Appendix A) Leak Rate: 4.0 Torr / Hour

Purge with tank air for 30 min.

Measure tank pressure PE-1 = 753.0 Torr

S5009- A03. 0T1 T1823(222S) 8 Tritium Trap

GC Run # 3 (Tank run #1)

S5009- A04. 120 120 SUMMA #3

S5009- A05. 122 122 SUMMA #4

S5009- A06. 123 123 SUMMA # 5

GC Run # 4 (Tank run # 2)

Date: February 28, 1995

VSS Personnel: R. Westberg E. Johnson

T. Urecht N. Buechler

Trailer Personnel: N. Buechler, T. Urecht

Desired Flow Rate	Desired Total Flow	Actual Flow Rate	Actual Start Time	Actual End Time	Actual Total Time
5450	163500	5460	2/27/95 14:00	2/28/95 09:00	1140
30	30	30	09:23	09:24	1

6,224

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Waste Tank
241-U-111

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
S5009- A07. 345	TST#345	9	TST #1	50	4	200	50.10	11:19	11:23	4.0	0.20
S5009- A08. 350	TST#350	10	TST #2	50	4	200	50.10	11:19	11:23	4.0	0.20
S5009- A09. 479	TST#479	8	TST #3	50	4	200	50.15	11:29	11:33	4.0	0.20
S5009- A11. 473	TST#473	10	TST #4	50	4	200	50.15	11:29	11:33	4.0	0.20
S5009- A10. 631	TST#631		TST FIELD BLANK #1					11:32	11:33		
S5009- A12. 297	TST#297	9	TST # 5	200	5	1000	200.40	11:38	11:43	5.0	1.00
S5009- A13. 771	TST#771	10	TST # 6	200	5	1000	200.40	11:38	11:43	5.0	1.00
S5009- A14. 845	TST#845	8	TST # 7	200	5	1000	200.40	11:53	11:58	5.0	1.00
S5009- A15. 832	TST#832	10	TST # 8	200	5	1000	200.40	11:53	11:58	5.0	1.00
S5009- A16. 296	TST#296	9	TST # 9	200	20	4000	200.40	12:05	12:25	20.0	4.01
S5009- A18 748	TST#748	10	TST # 10	200	20	4000	200.40	12:05	12:25	20.0	4.01
S5009- A17 248	TST#248		TST FIELD BLANK #2					12:07	12:08		
S5009- A19. 243	TST#243	8	TST # 11	200	20	4000	200.40	12:35	12:55	20.0	4.01
S5009- A20. 302	TST#302	10	TST # 12	200	20	4000	200.40	12:35	12:55	20.0	4.01
GC Run # 5 (Tank run #3)								13:01			
S5009- A23. V90	V90	9	NH3/NOx/H2O #1	200	15	3000	200.30	13:10	13:25	15.0	3.00
S5009- A24. V91	V91	10	NH3/NOx/H2O #2	200	15	3000	200.30	13:10	13:25	15.0	3.00
S5009- A25. V92	V92	8	NH3/NOx/H2O #3	200	15	3000	200.25	13:31	13:46	15.0	3.00
S5009- A26. V93	V93	10	NH3/NOx/H2O #4	200	15	3000	200.35	13:31	13:46	15.0	3.01
S5009- A27. V94	V94	9	NH3/NOx/H2O #5	200	15	3000	200.40	13:52	14:07	15.0	3.01
S5009- A28. V95	V95	10	NH3/NOx/H2O #6	200	15	3000	200.40	13:52	14:07	15.0	3.01
GC Run # 6 (Tank run # 4)											
TOTAL TANK GAS USED DURING SAMPLING RUNS											57.87

				Waste Tank 241-U-111							
PNL			Description	Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
OGI/ORNL	Port			Flow	Duration	Total	Flow	Start	End	Total	Total
WHC Sample ID	Sample ID	Valve #		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
S5009- A32. 0U1	T1824(222S)		Upstream HEPA(box)						14:50		
S5009- A33. 0D1	T1825(222S)		Downstream HEPA(box)						14:50		
S5009- A34. 0U2	T1826(222S)		Upstream HEPA (VSS)						14:50		
S5009- A35. 0D2	T1827(222S)		Downstream HEPA (VSS)						14:50		

Trip Blanks (DO NOT EXPOSE)

S5009- A21. 475	TST#475	TST TRIP #1
S5009- A22. 855	TST#855	TST TRIP #1
S5009- A29. V96	V96	NH3/NOx/H2O TRIP #1
S5009- A30. V97	V97	NH3/NOx/H2O TRIP #2
S5009- A31. V98	V98	NH3/NOx/H2O TRIP #3

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APPENDIX B
AMBIENT CONDITIONS

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WEATHER DURING VSS SAMPLING OF 241-U-111

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APPENDIX C
CHAIN-OF-CUSTODY FORMS

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Westinghouse
Hanford Company

CHAIN OF CUSTODY

ORNL-006755

Custody Form Initiator Amy Dindal

Company Contact Roger Jenkins

Project Designation/Sampling Locations 241-U-111 (VSS)

Ice Chest No.

Bill of Lading/Airbill No.

Method of Shipment Federal Express

Shipped to Rick Mahon

Possible Sample Hazards/Remarks NONE

Telephone (615) 576-8594

Collection Date 2-28-95

Field Logbook No. WHCN 647-4

Offsite Property No.

Sample Identification

✓ S5009-A7.345	TST# 345✓	ORNL Triple Sorbent Trap
✓ S5009-A8.350	TST# 350✓	ORNL Triple Sorbent Trap
✓ S5009-A9.479	TST# 479✓	ORNL Triple Sorbent Trap
✓ S5009-A11.473	TST# 473✓	ORNL Triple Sorbent Trap
✓ S5009-A12.297	TST# 297✓	ORNL Triple Sorbent Trap
✓ S5009-A13.771	TST# 771✓	ORNL Triple Sorbent Trap
✓ S5009-A14.845	TST# 845✓	ORNL Triple Sorbent Trap
✓ S5009-A15.832	TST# 832✓	ORNL Triple Sorbent Trap
✓ S5009-A16.296	TST# 296✓	ORNL Triple Sorbent Trap
✓ S5009-A18.748	TST# 748✓	ORNL Triple Sorbent Trap
✓ S5009-A19.243	TST# 243✓	ORNL Triple Sorbent Trap
✓ S5009-A20.302	TST# 302✓	ORNL Triple Sorbent Trap
✓ S5009-A21.476	TST# 475✓	ORNL Trip Blank
✓ S5009-A22.855	TST# 855✓	ORNL Trip Blank
✓ S5009-A10.631	TST# 631✓	ORNL Field Blank
✓ S5009-A17.248	TST# 248✓	ORNL Field Blank

Inspected cooler &
traps OK ABD

[] Field Transfer of Custody

Chain of Possession

(Sign and Print Names)

Relinquished By	Date	Time	Received By	Date	Time
AB Dindal / ABD	2/2/95	10:04am	Rick Mahon / Rick Mahon	3 Feb 95	1425
Rick Mahon / Rick Mahon	3/7/95	0800	T-Burchett / T-Burchett	3-7-95	0800
T-Burchett / T-Burchett	3-9-95	0800	W-Burchett / W-Burchett	3-9-95	0800
W-Burchett / W-Burchett	3-13-95	0900	AB Dindal / ABD	3/14/95	1347

Temperature (°C)	Min	Max
When shipped (ORNL)	-2°	4°
When received (WHC)	1°	3°
When shipped (WHC)	4°	10°
When received (ORNL)	-15°	9°

Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 008102

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-111 Tank Vapor Sample SAF S5-009
(VSS Truck)

Collection date 02 - 20 - 95

Preparation date 02 - 06 - 95

Ice Chest No.

Field Logbook No. WHC-1-467-4

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

S5-009 - A01 . 139~

S5-009 - A02 . 142~

Ambient Air SUMMA #1 Upwind of U-111 (PNL)

Ambient Air SUMMA #2 Through Port 15 (PNL)

S5-009 - A04 . 120~

S5-009 - A05 . 122~

S5-009 - A06 . 123~

SUMMA #3 Port 11 (PNL)

SUMMA #4 Port 13 (PNL)

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
<i>TBU</i>	3-07-95	1100	<i>JP Buckler</i>	3-7-95	1100
<i>JP Buckler</i>	3-10-95	0930	<i>JAE</i>	3-10-95	0930

Final Sample Disposition

Comments:

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

Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 008103

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-111 Tank Vapor Sample SAF S5-009
(VSS Truck)

Collection date 02 - 20 - 95

Preparation date 02 - 03 - 95

Ice Chest No.

Field Logbook No. WHC-11-467-4

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

S5-009 - A23 . V90	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 1)	Line # 9
S5-009 - A24 . V91	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 2)	Line # 10
S5-009 - A25 . V92	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 3)	Line # 8
S5-009 - A26 . V93	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 4)	Line # 10
S5-009 - A27 . V94	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 5)	Line # 9
S5-009 - A28 . V95	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 6)	Line # 10
S5-009 - A29 . V96	NH ₃ /NO _x /H ₂ O a-b-c (Trap Trip Blank # 1)	
S5-009 - A30 . V97	NH ₃ /NO _x /H ₂ O a-b-c (Trap Trip Blank # 2)	
S5-009 - A31 . V98	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
T. B. Utecht <i>T.B. Utecht</i>	3-9-95	1100	JP Buechler <i>JP Buechler</i>	3-9-95	1100
JP Buechler <i>JP Buechler</i>	3-10-95	0930	JA Edwards <i>JA Edwards</i>	3-10-95	0930

Final Sample Disposition

Comments:

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

(Revised 10/17/94 PNL)

CHAIN OF CUSTODY/SAMPLE ANALYSIS

REALIST

Telephone 373-5531
Sampling Location 241-001
Offsite Property No. N/A
Field Logbook No. N/A

Company Contact R. D. McLean
Project Designation N/A
Bill of Lading/Airbill No. N/A

Method of Shipment	6001 DEL. #329
Shipped to	398 J Labz 970 West Ave.
Possible Sample Hazards/Remarks	NONE
Special Handling and/or Storage	NONE

Special Handling and/or Storage ALONE

Westinghouse
Hanford Company

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