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VAPOR & GAS SAMPLING OF SST 241TX105 USING THE
VAPOR SAMPLING SYSTEM

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SEP 20 1995

ENGINEERING DATA TRANSMITTAL

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VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-TX-105 USING THE VAPOR SAMPLING SYSTEM

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Signature

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7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE DECEMBER 20, 1994, SAMPLING OF SST 241-TX-105 USING THE VAPOR SAMPLING SYSTEM.

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Using the Vapor Sampling System

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CONTENTS

1.0	SCOPE	1
2.0	SAMPLING EQUIPMENT DESCRIPTION	1
2.1	VAPOR SAMPLING SYSTEM	1
3.0	SAMPLING EVENT DESCRIPTION	3
3.1	SPECIFICATIONS	3
3.2	OPERATIONS AND SAMPLING PERSONNEL	3
3.3	AMBIENT CONDITIONS	3
3.4	SAMPLE COLLECTION	4
3.5	INDUSTRIAL HYGIENE FIELD RESULTS	4
3.6	FIELD GC/FID RESULTS	5
3.7	RADIATION SCREENING	5
4.0	SAMPLE CHAIN OF CUSTODY: RECEIPT, STORAGE, AND SHIPMENT	6
5.0	QUALITY ASSURANCE AND CONTROLS	9
5.1	VAPOR SAMPLING SYSTEM CLEANING	9
5.2	INSTRUMENT CALIBRATION	9
5.3	BLANK SAMPLES	10
6.0	ANOMALIES	11
7.0	REFERENCES	11
APPENDICES		
A	SAMPLE LOG SHEETS	A-1
B	AMBIENT CONDITIONS	B-1
C	CHAIN-OF-CUSTODY FORMS	C-1

LIST OF TABLES

1	Flow Control Calibration	2
2	TOC Results	5
3	Radionuclide Analysis Results	6
4	Oak Ridge National Laboratory Samples	7
5	Pacific Northwest Laboratory Samples	8
6	Calibration Data	9
7	Blank Samples	10

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
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-TX-105 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-TX-105. This document presents sampling data resulting from the December 20, 1994, sampling of SST 241-TX-105.

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-TX-105 on December 20, 1994. Mahon et al. (1994) describes in detail the VSS, its performance, and its operation. The team used the VSS to collect sorbent traps and SUMMA¹ canister headspace samples from SST 241-TX-105; subsequently, the team sent these samples to analytical laboratories for analysis.

The VSS comprises a mobile laboratory, a hot-water-jacketed stainless steel probe to insert 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 mass flow, and monitors sample vapor 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 contain vapor-adsorbing media. A known amount of sample vapor passes through the tube, which traps (by adsorption) virtually all the target analytes. An

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

analytical laboratory receives and analyzes the sorbet trap. Using the quantity of analyte found in the sorbent media and the volume of vapor passed through the sorbent trap, the laboratory calculates the analyte concentration.

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 water vapor from the vapor before metering the vapor. Westinghouse Hanford Company (WHC) Standards Laboratory determined the errors associated with the mass flow controllers before the SST 241-TX-105 sampling began (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 sampling manifold also has a station for sampling vapor with evacuated SUMMA™ canisters. The SUMMA™ process passivates active sites on stainless steel canister walls to minimize adsorption of gases and vapors. An analytical laboratory must clean and evacuate SUMMA™ canisters before use. The canister is filled with sample vapor through a valve, which is then closed to seal the sample inside. SUMMA™ canisters essentially allow collection and transfer of whole-air samples from location to an analytical laboratory for sample analysis. The standard capacity of each SUMMA™ canister is 6 liters.

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), 1 mL sample loop, 10 port injection valve, 2 meter chromatographic column, programmable oven, portable computer, and HP-Chemstation software to control the GC. The GC is plumbed to directly transfer the sample from the VSS manifold to the 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 the 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 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 approximately 70 °C per minute. Helium is the carrier gas, vapor and hydrogen the combustion gases, and nitrogen the make-up gas.

Prior to sampling a GC/FID is configured to quantitatively estimate concentrations of TOC. The GC/FID confirms sampling system cleanliness, sampling manifold performance, TOC of ambient air background levels during sampling, and TOC of tank vapor samples. The system is multi-point calibrated and has displayed a high degree of stability over a period of months. For further details, see Section 3.6, Field GC/FID Results.

3.0 SAMPLING EVENT DESCRIPTION

3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in WHC-SD-WM-TP-293, *Tank Characterization Plan for Vapor and Gas Sampling Tank 241-TX-105 Using Vapor Sampling System* (Carpenter 1994). The TCP also specifies the types and number of samples to be collected, flow rates, and durations. The sample log sheets summarize the key sampling parameters 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 S4-087.

3.2 OPERATIONS AND SAMPLING PERSONNEL

N. P. Buechler was the Tank Farm Operations person-in-charge while E. A. Tampos was the Tank Farm Operations assistant. The other SML vapor team members included:

- R. D. Mahon, SML Vapor Project Lead Scientist
- R. A. Westberg, Field Scientist
- E. A. Johnson, Field Scientist
- T. B. Utecht, Field Technician
- N. P. Buechlen, Field Technician.

The VSS was set up at SST 241-TX-105 at about 10:00 a.m. on December 19, 1994, and was allowed to warm up overnight. The team began sampling shortly after 9:30 a.m. on December 20, 1994, and completed the sampling by 3:30 p.m. the same day.

3.3 AMBIENT CONDITIONS

The day of the sampling event, December 20, 1994, was cool and partly cloudy with very little wind. Appendix B presents graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2 miles due east of 241-TX SST farm.

3.4 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was placed in Riser 11A of SST 241-TX-105. 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-TX-105 on December 19, 1994. The team stabilized the VSS temperature zones by 9:30 a.m. on December 20, 1994, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-TX-105 were 986 mbar (740 torr) and 24.8 °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.

At approximately 9:45 a.m. on December 20, 1994, the team collected two SUMMA™ canister samples of ambient air, one using the VSS sampling manifold and one manually 10 meters upwind of the VSS connection with SST 241-TX-105. The first was collected to establish the cleanliness of the sampling manifold and the second to establish background levels of trace organic vapors.

A leak check of the VSS sampling manifold and transfer tubing (up to the connection to the in-tank sampling probe) was performed. Leakage resulted in an increase of 6.93 mbar (5.2 torr) rise in pressure over the 15 minute test. Given a system volume of not more than 10 L, this pressure rise corresponds to a leak rate of approximately 15.96 mL/min at a 289 mbar (217.14 torr) system pressure. This leak rate was 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 0.6%, for TST traps sampled at 200 mL/min the dilution was approximately 0.6%, and for sorbent traps the dilution was approximately 0.5%.

3.5 INDUSTRIAL HYGIENE FIELD RESULTS

Before connecting to SST 241-TX-105, an industrial hygiene technician first 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 organic vapor meter (OVM). The technician verbally reported an LEL of 0.0%, and total organic carbon content of 1.5 ppm using the OVM. The technician also used a Dräger tube to estimate the ammonia content of the tank as 15 ppm.

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 a 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 shows the Field GC/FID results from the sampling of SST 241-TX-105.

Table 2. TOC Results.

Number of Runs	Description	Average TOC Concentration (ppmC)	% Standard Deviation
3	Propane	6.00	1.37
1	Ambient	2.67	-
4	Tank Vapor	4.56	1.47

3.7 RADIATION SCREENING

Samples are unconditionally released from the SST farm in accordance with DI-33300-93-004, *Release of Vapor Sampling Equipment* (1993b). 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 all sampling devices from radioactive particulates, all sample vapor for the December 20, 1994, SST 241-TX-105 vapor sampling 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 whenever headspace air, gases, and 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. SST 241-TX-105 filter sample results are shown in

Table 3. SML scientists use the activity results from Table 3 to calculate pCi/g of sample media. SML maintains this information in the project-specific file.

A water vapor sample was also collected through one of the sorbent station ports and analyzed for tritiated water. Table 3 presents SST 241-TX-105 tritium sample results. The results in Table 3 indicate that the samples collected from SST 241-TX-105 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)	S4087-A35.0U1	Total alpha = 1090 Total beta = 1610 GEA = 268(²⁰⁸ Tl) GEA = 851(²¹² Pb)	= 3.01 = 4.45 = 0.74 = 2.35
Downstream HEPA filter (box)	S4087-A36.0D1	Total alpha = <0.829 Total beta = 3.53 GEA = <detectable	= <0.002 = 0.01 = <detectable
Upstream HEPA filter (VSS)	S4087-A37.0U2	Total alpha = 17.9 Total beta = 0.182 GEA = <detectable	= 0.05 = 0.001 = <detectable
Downstream HEPA filter (VSS)	S4087-A38.0D2	Total alpha = <1.83 Total beta = <0.766 GEA = <detectable	Total alpha = <0.005 Total beta = <0.002 GEA = <detectable
Tritium trap	S4087-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.

^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 362 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 stored in a custody locker 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.

The TSTs are supplied by ORNL. 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 SML signed the "received by" block on the COC form. They were maintained at 4 ± 2 °C before and after the sampling event in a refrigeration unit.

The TSTs were shipped back to ORNL after the sampling event using offsite property control (OPC W95-0-0117-56). Table 4 lists the sample identifiers, sample types, and COC form numbers for all ORNL samples. The samples were delivered for transport on January 9, 1994, and shipped by Federal Express for next-day delivery.

Table 4. Oak Ridge National Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S4087-A10.555	TST	006747
S4087-A11.580	TST	006747
S4087-A12.652	TST	006747
S4087-A13.548	TST field blank	006747
S4087-A14.705	TST	006747
S4087-A15.707	TST	006747
S4087-A16.755	TST	006747
S4087-A17.775	TST	006747
S4087-A18.797	TST	006747
S4087-A19.706	TST	006747
S4087-A21.552	TST	006747
S4087-A22.553	TST	006747
S4087-A23.549	TST	006747
S4087-A24.550	TST trip blank	006747
S4087-A25.547	TST trip blank	006747
S4087-A20.522	TST field blank	006747

PNL supplied COC forms for the sorbent trains and SUMMA™ canister sampling devices. SML picked up sampling devices from PNL and took them to a custody locker using a government vehicle.

After sampling, SML took the PNL sorbent traps and SUMMA™ canisters directly to PNL and delivered them to J. A. Edwards on January 5, 1995. Table 5 lists the sample identifiers, sample types, and COC form numbers for all PNL samples. The sorbent trains were maintained at 4 ± 2 °C before and after the sampling event in a refrigeration unit.

Table 5. Pacific Northwest Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S4087-A01.013	Ambient upwind SUMMA™	008086
S4087-A02.116	Ambient SUMMA™ (VSS)	008086
S4087-A04.120	SUMMA™	008086
S4087-A05.122	SUMMA™	008086
S4087-A06.123	SUMMA™	008086
S4087-A07.152	SUMMA™	008086
S4087-A08.153	SUMMA™	008086
S4087-A09.255	SUMMA™	008086
S4087-A26.V18	NH ₃ /NO _x /H ₂ O sorbent	008087
S4087-A27.V19	NH ₃ /NO _x /H ₂ O sorbent	008087
S4087-A28.V20	NH ₃ /NO _x /H ₂ O sorbent	008087
S4087-A29.V21	NH ₃ /NO _x /H ₂ O sorbent	008087
S4087-A30.V22	NH ₃ /NO _x /H ₂ O sorbent	008087
S4087-A31.V23	NH ₃ /NO _x /H ₂ O sorbent	008087
S4087-A32.V24	NH ₃ /NO _x /H ₂ O trip blank	008087
S4087-A33.V25	NH ₃ /NO _x /H ₂ O trip blank	008087
S4087-A34.V26	NH ₃ /NO _x /H ₂ O trip blank	008087

Using a government truck, the SUMMA™ canisters were delivered to PNL on January 5, 1995. From the time that samples are received by SML until they are shipped back to the analytical laboratory, SML maintains COC in accordance with LO-090-443/A0, *Chain-of-Custody for RCRA and CERCLA Protocol Samples* (WHC 1992). Final COCs from this sampling event are in Appendix C.

5.0 QUALITY ASSURANCE AND CONTROLS

5.1 VAPOR SAMPLING SYSTEM CLEANING

Immediately prior to sampling of SST 241-TX-105, the VSS manifold was heated to 60 °C and ambient air was purged through the system for 20.5 hours. Throughout this purge, 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 by the FID. A second sample confirmed the VSS was free of organic remnants down to ambient levels. Thus, the system was ready to sample SST 241-TX-105. For further details, refer to Appendix C of WHC-IP-1127-4.5 and the project-specific file located with SML.

In compliance with LO-080-405/A0, *Vapor Space Probe Cleaning Procedure* (WHC 1993c), the team cleaned the hot-water-jacketed probe before installing it in SST 241-TX-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 heated to 90 °C and dry air passes through the probe to evaporate the solvents. Before the team releases the probes they use a hand-held organic vapor meter to ensure that the total organic concentration in the sample line is below 1 ppmv.

SUMMA™ canister ambient air samples were also collected to confirm that the VSS sampling manifold was free of trace organic contaminants (or to determine what contaminants were present). One SUMMA™ canister was filled with ambient air using the VSS sampling manifold, a second was filled with ambient air upwind of SST 241-TX-105. The canisters were shipped to PNL for analysis.

5.2 INSTRUMENT CALIBRATION

Instruments located in the VSS are calibrated on an annual basis at the WHC Standards Laboratory. Table 6 summarizes VSS instrumentation calibration data, which are maintained in files by SML. According to the calibration schedule shown in Table 6, all instrumentation was within its calibration period during the SST 241-TX-105 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. Analysis of trip blanks is used to assess cross-contamination of the sample media during transport and storage. Trip blanks are transported to the field with the sample collection media but remain unopened throughout the sampling event.

Spiked blanks are samples that are spiked with a known amount of analyte before shipment. These blanks are handled and analyzed with the other samples. 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 surrounding the sampling system or in the system itself prior to sampling.

Field blanks are sampling devices prepared and handled in the same manner as the samples, but no tank gases are drawn through them.

Table 7 lists the blank samples collected during the sampling of SST 241-TX-105.

Table 7. Blank Samples.

Sample Identifier	Blank Type	Sample Media
S4087-A01.013	Ambient Upwind	SUMMA™
S4087-A02.116	Ambient (VSS)	SUMMA™
S4087-A13.548	Field	TST
S4087-A20.522	Field	TST
S4087-A24.550	Trip	TST
S4087-A25.547	Trip	TST
S4087-A32.V24	Trip	NO ₃ /NO _x /H ₂ O
S4087-A33.V25	Trip	NO ₃ /NO _x /H ₂ O
S4087-A34.V26	Trip	NO ₃ /NO _x /H ₂ O

6.0 ANOMALIES

All samples were collected in accordance with the TCP and LO-080-450/A0, *Collection of SUMMA Canisters and Sorbent Tube Samples Using the Vapor Sampling System* (1993a). While collecting TST Samples 555 and 580, Flow Controller FICV-3 flowed at 200.1 stdcm³/min for 22 seconds before stabilizing at 50.0 stdcm³/min. A total flow of 0.25 L was reported to ORNL. No other anomalies to the TCP or the operating procedure were noted during the sampling of SST 241-TX-105. 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., 1994, *Tank Characterization Plan for Vapor and Gas Sampling Tank 241-TX-105 Using Vapor Sampling System*, WHC-WM-TP-293, 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, 1993a, *Collection of SUMMA Canisters and Sorbent Tube Samples Using the Vapor Sampling System (VSS)*, Procedure LO-080-450/A0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993b, *Release of Vapor Sampling Equipment*, Procedure DI-33300-93-004, Westinghouse Hanford Company, Richland, Washington.

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

WHC, 1992, *Chain-of-Custody for RCRA and CERCLA Protocol Samples*, Procedure LO-090-443/A0, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A
SAMPLE LOG SHEETS

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Waste Tank
241-TX-105

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

Date: 20 December, 1994

Ensure HEPA filters are installed

VSS Personnel: E. Johnson T. Utecht

Ensure connection to sample probe

R. Westberg

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

Trailer Personnel: N. Buechler

Tank Temperature 24.8 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	12/19/94	12/20/94	(min.)	Liters
Purge with ambient air for 30 min.				5450	30	163500		13:00	09:30	20.5 Hrs.	
S4087- A01 .013	013		AMBIENT #1 (PNL)		1			09:42	09:43	1	
GC Run #1 Ambient air/Cleanliness check								09:46			
S4087- A02 .116	116	15	AMBIENT #2 (PNL)		1			09:53	09:54	1	
GC Run #2 Standards Runs								09:56			
Leak check (Appendix A)		Leak Rate:		20.8 Torr/Hr.							
Purge with tank air for 30 min.				5450	30	163500	5460	10:37	11:07	30	163.80
Measure tank pressure			PE-1 740.3 Torr								
S4087- A03 .0T1	T1724(222S	8	Tritium Trap	200	5	1000	200.30	11:31	11:36	5	1.00
GC Run # 3 (Tank run #1)								11:41			
S4087- A04 .120	120	11	SUMMA #3 (OGI)		1			11:27	11:28	1	6.00
S4087- A05 .122	122	13	SUMMA #4 (OGI)		1			11:47	11:48	1	6.00
S4087- A06 .123	123	15	SUMMA # 5 (OGI)		1			11:51	11:52	1	6.00
S4087- A07 .152	152	12	SUMMA #6 (PNL)		1			11:55	11:56	1	6.00
S4087- A08 .153	153	14	SUMMA #7 (PNL)		1			11:59	12:00	1	6.00
S4087- A09 .255	255	16	SUMMA #8 (PNL)		1			12:03	12:04	1	6.00
GC Run # 4 (Tank run # 2)								12:08			

A-3

WHC-SD-WM-RPT-115, Rev. 0

Waste Tank
241-TX-105

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	Sample ID	Valve #		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
S4087- A10 .555	TST# 555	9	TST #1	50	4	200	63.75	12:24	12:28	4.0	0.26
S4087- A11 .580	TST# 580	10	TST #2	50	4	200	50.00	12:24	12:28	4.0	0.20
S4087- A12 .652	TST# 652	8	TST #3	50	4	200	50.00	12:35	12:39	4.0	0.20
S4087- A14 .705	TST# 705	10	TST #4	50	4	200	50.00	12:35	12:39	4.0	0.20
S4087- A13 .548	TST# 548		TST FIELD BLANK #1					12:37	12:38	1	
S4087- A15 .707	TST# 707	9	TST # 5	200	5	1000	200.30	12:46	12:51	5.0	1.00
S4087- A16 .755	TST# 755	10	TST # 6	200	5	1000	200.30	12:46	12:51	5.0	1.00
S4087- A17 .775	TST# 775	8	TST # 7	200	5	1000	200.30	12:58	13:03	5.0	1.00
S4087- A18 .797	TST# 797	10	TST # 8	200	5	1000	200.30	12:58	13:03	5.0	1.00
S4087- A19 .706	TST# 706	9	TST # 9	200	20	4000	200.30	13:10	13:30	20.0	4.01
S4087- A21 .552	TST# 552	10	TST # 10	200	20	4000	200.30	13:10	13:30	20.0	4.01
S4087- A20 .522	TST# 522		TST FIELD BLANK #1					13:13	13:14	1	
S4087- A22 .553	TST#553	8	TST # 11	200	20	4000	200.40	13:38	13:58	20.0	4.01
S4087- A23 .549	TST# 549	10	TST # 12	200	20	4000	200.40	13:38	13:58	20.0	4.01
GC Run # 5 (Tank run #3)								14:07			
S4087- A26 .V18	V18	9	NH3/NOx/H2O #1	200	15	3000	200.40	14:14	14:29	15.0	3.01
S4087- A27 .V19	V19	10	NH3/NOx/H2O #2	200	15	3000	200.40	14:14	14:29	15.0	3.01
S4087- A28 .V20	V20	8	NH3/NOx/H2O #3	200	15	3000	200.30	14:35	14:50	15.0	3.00
S4087- A29 .V21	V21	10	NH3/NOx/H2O #4	200	15	3000	200.30	14:35	14:50	15.0	3.00
S4087- A30 .V22	V22	9	NH3/NOx/H2O #5	200	15	3000	200.30	14:56	15:11	15.0	3.00
S4087- A31 .V23	V23	10	NH3/NOx/H2O #6	200	15	3000	200.30	14:56	15:11	15.0	3.00
GC Run # 6 (Tank run # 4)								15:17			
*** FICV-3 FLOWED @ 200.1 SCCM FOR 22 SECONDS BEFORE STABILIZING AT 50.0 SCCM.											
TOTAL TANK GAS USED DURING SAMPLING RUNS											75.92

Waste Tank
241-TX-105

WHC Sample ID	PNL OGI/ORNL Sample ID	Port Valve #	Description	Desired		Actual	
				Flow	Duration	Flow	Start
				Rate	(min.)	Rate	Time
S4087- A35 .0U1	T1725/222S		Upstream HEPA(box)				15:30
S4087- A36 .0D1	T1726/222S		Downstream HEPA(box)				15:30
S4087- A37 .0U2	T1727/222S		Upstream HEPA (VSS)				15:30
S4087- A38 .0D2	T1728/222S		Downstream HEPA (VSS)				15:30

Trip Blanks (DO NOT EXPOSE)

WHC Sample ID	PNL OGI/ORNL Sample ID	Port Valve #	Description	Desired		Actual	
				Flow	Duration	Flow	Start
				Rate	(min.)	Rate	Time
S4087- A24 .550	TST# 550		TST TRIP #1				15:30
S4087- A25 .547	TST# 547		TST TRIP #1				15:30
S4087- A32 .V24	V24		NH3/NOx/H2O TRIP #1				15:30
S4087- A33 .V25	V25		NH3/NOx/H2O TRIP #2				15:30
S4087- A34 .V26	V26		NH3/NOx/H2O TRIP #3				15:30

TX-105
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	2	5000	40.00		
SUMMA PURGES	6	2	5000	60.00		
ALL SAMPLES COLLECTED				75.92		
TOTAL FOR TANK SAMPLING RUN				362.12		

A-6

MHC-SD-WM-RPT-115, Rev. 0

HEPA BOX UPSTREAM FILTER	Liters	362.12	pci / filter		pci / liter	HEPA BOX DOWNSTREAM FILTER	Liters	362.12	pci / filter		pci / liter
TOTAL VOLUME						TOTAL VOLUME					
BETA		1.610		4.45		BETA			3.53		0.00974814
ALPHA		1.090		3.01		ALPHA			< 829		< Detectable
GEA - Am-243		ND				GEA - Am-243			ND		< Detectable
- Bi-212		ND				- Bi-212			ND		< Detectable
- Np-237		ND				- Np-237			ND		< Detectable
- Pb-212		851		2.35		- Pb-212			ND		< Detectable
- Th-229		ND				- Th-229			ND		< Detectable
- Tl-208		268		0.74		- Tl-208			ND		< Detectable
VSS UPSTREAM FILTER	Liters	362.12	pci / filter		pci / liter	VSS DOWNSTREAM FILTER	Liters	362.12	pci / filter		pci / liter
TOTAL VOLUME						TOTAL VOLUME					
BETA		0.18		0.00		BETA			< 0.766		< Detectable
ALPHA		17.90		0.05		ALPHA			< 1.83		< 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		- Tl-208			ND		< Detectable
TRITIUM TRAP											
TOTAL VOLUME	1.0		pci / filter		pci / liter						
TOTAL ACTIVITY											
SAMPLE EXPOSURE ANALYSIS, USING VSS DOWNSTREAM FILTER ANALYSIS AS POSSIBLE EXPOSURE LEVEL											
= BETA < 0.766 pci/liter, ALPHA < 1.83 pci/liter, GEA not detected											
SORBENT SAMPLING						TST'S					
TOTAL VOLUME PER SAMPLE	3.00	Liters				TOTAL VOLUME PER SAMPLE	Liters	1	Alpha/Beta per sample		
ALPHA/BETA PER SAMPLE	0.00	pci				TST 639, 659, 668, 669	0.1		0	pci	
INDIVIDUAL SORBENTS						TST 667, 852, 643, 782	0.5		0	pci	
NH3 (0.75 gram)	0.00	pci per gram				TST 801, 809, 666, 664	1		0	pci	
NO2 (0.60 gram)	0.00	pci per gram									
H2O (0.45 gram)	0.00	pci per gram									
SUMMA SAMPLING											
TOTAL VOLUME PER CANISTER	6	Liters									
ALPHA/BETA PER SAMPLE	0.00	pci									

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APPENDIX B
AMBIENT CONDITIONS

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WEATHER DURING VSS SAMPLING OF 241-TX-105

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APPENDIX C
CHAIN-OF-CUSTODY FORMS

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WHC-SD-WM-RPT-115, Rev. 0

Westinghouse
Hanford Company

CHAIN OF CUSTODY

ORNL-006747

Custody Form Initiator Amy Dindal

Company Contact Roger Jenkins

Telephone (615) 576-8594

Project Designation/Sampling Locations 241-TX-105 (VSS)

Collection Date 12-20-94

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

S4087-A10.555	TST# 555 ✓	ORNL Triple Sorbent Trap
S4087-A11.580	TST# 580 ✓	ORNL Triple Sorbent Trap
S4087-A12.652	TST# 652 ✓	ORNL Triple Sorbent Trap
S4087-A14.705	TST# 705 ✓	ORNL Triple Sorbent Trap
S4087-A15.707	TST# 707 ✓	ORNL Triple Sorbent Trap
S4087-A16.755	TST# 755 ✓	ORNL Triple Sorbent Trap
S4087-A17.775	TST# 775 ✓	ORNL Triple Sorbent Trap
S4087-A18.797	TST# 797 ✓	ORNL Triple Sorbent Trap
S4087-A19.706	TST# 706 ✓	ORNL Triple Sorbent Trap
S4087-A21.552	TST# 552 ✓	ORNL Triple Sorbent Trap
S4087-A22.553	TST# 553 ✓	ORNL Triple Sorbent Trap
S4087-A23.549	TST# 549 ✓	ORNL Triple Sorbent Trap
S4087-A24.550	TST# 550 ✓	ORNL Trip Blank
S4087-A25.547	TST# 547 ✓	ORNL Trip Blank
S4087-A13.548	TST# 548 ✓	ORNL Field Blank
S4087-A20.522	TST# 522 ✓	ORNL Field Blank

Inspected cooler/trap
OK
ABD 1/10/95

[] Field Transfer of Custody

Chain of Possession

(Sign and Print Names)

Relinquished By	Date	Time	Received By	Date	Time
AB Dindal	12/18/94	10:43am	Shannon J. Spencer	12-27-94	1410
Shannon J. Spencer	12-28-94	0900	NP Bussell	12-30-94	0500
NP Bussell	1-9-95	0930	T. Bussell / T. Bussell	1-9-95	0930
T. Bussell / T. Bussell	1-9-95	1100	AB Dindal / ABDindal	1/10/95	1527

C-3

Temperature (°C)	Min	Max
When shipped (ORNL)	4	24
When received (WHC)	-4	93
When shipped (WHC)	2.1	4
When received (ORNL)	-15	7

A-6000-407 (12/92)

Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 008086

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) 373-1101
Page 85-9656 / FAX 373-3193Project Designation/Sampling Locations 200 East Tank Farm
241-TX-105 Tank Vapor Sample SAF S4087
(VSS Truck)Collection date 12 - 20 - 94
Preparation date 12 - 12 - 94

Ice Chest No.

Field Logbook No. WHC- N-647-4

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to PNL

Sample Job # S4087

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S4087 - A01 . 013	Ambient Air SUMMA #1 Upwind TX-105 (PNL)
S4087 - A02 . 116	Ambient Air SUMMA #2 Through Port 15 (PNL)
S4087 - A04 . 120	SUMMA #3 Port 11 (OGI)
S4087 - A05 . 122	SUMMA #4 Port 13 (OGI)
S4087 - A06 . 123	SUMMA #5 Port 15 (OGI)
S4087 - A07 . 152	SUMMA #6 Port 12 (PNL)
S4087 - A08 . 153	SUMMA #7 Port 14 (PNL)
S4087 - A09 . 255	SUMMA #8 Port 16 (PNL)

[] Field Transfer of Custody			[] Chain of Possession			(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time		
J. A. Edwards <i>J. Edwards</i>	12-12-94	1325	NP Buchler <i>NP Buchler</i>	12-12-94	1325		
NP Buchler <i>NP Buchler</i>	1-5-95	1120	J. A. Edwards <i>J. Edwards</i>	1-5-95	1120		

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? <u>NA</u>	☒ 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

POC

C-5

(Revised 10/17/94 PNL)

**Westinghouse
Hanford Company****CHAIN OF CUSTODY****WHC 008087**

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) 373-1101
Page 85-9656 / FAX 373-3193Project Designation/Sampling Locations 200 East Tank Farm
241-TX-105 Tank Vapor Sample SAF S4087
(VSS Truck)Collection date 12 - 20 - 94
Preparation date 12 - 09 - 94

Ice Chest No.

Field Logbook No. WHC-WH-N-647-4

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to PNL

Sample Job # S4087

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S4087 - A26 . V18 NH₃/NO_x/H₂O (Trap # 1) Line # 9
 S4087 - A27 . V19 NH₃/NO_x/H₂O (Trap # 2) Line #10
 S4087 - A28 . V20 NH₃/NO_x/H₂O (Trap # 3) Line # 8
 S4087 - A29 . V21 NH₃/NO_x/H₂O (Trap # 4) Line #10
 S4087 - A30 . V22 NH₃/NO_x/H₂O (Trap # 5) Line # 9
 S4087 - A31 . V23 NH₃/NO_x/H₂O (Trap # 6) Line #10

S4087 - A32 . V23 V24' NH₃/NO_x/H₂O a-b-c (Trap Trip Blank# 1)
 S4087 - A33 . V24 V25' NH₃/NO_x/H₂O a-b-c (Trap Trip Blank# 2)
 S4087 - A34 . V25 V26' NH₃/NO_x/H₂O 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	12-12-94	1200	J. A. Edwards	12-12-94	1200
J. A. Edwards	12-12-94	1330	R. Brubaker	12-12-94	1330
R. Brubaker	1-5-95	1120	J. A. Edwards	1-5-95	1120

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	

POC

POC

(Revised 10/17/94 PNL)