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VAPOR & GAS SAMPLING OF SST 241C112 USING THE
VAPOR SAMPLING SYSTEM

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7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE AUGUST 11, 1994, SAMPLING OF SST 241-C-112 USING THE VAPOR SAMPLING SYSTEM.

8.

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LIST OF TERMS

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
OPC	Offsite Property Control
ORNL	Oak Ridge National Laboratory
PNL	Pacific Northwest Laboratory
SAP	Sampling and Analysis Plan
SML	Sampling and Mobile Laboratories
SST	Single-Shell Tank
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-C-112 USING THE VAPOR SAMPLING SYSTEM

1.0 SCOPE

The Vapor Issue Resolution Program tasked the Sampling and Mobile Laboratories (SML) to collect representative headspace samples from Hanford Site single-shell tank (SST) 241-C-112. This document presents sampling data resulting from the August 11, 1994, sampling of SST 241-C-112.

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-C-112 on August 11, 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-C-112; 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-C-112 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	±0.15
3	200	±0.30

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.

Prior to sampling, a GC/FID confirms that the VSS is free of hydrocarbon contamination to the limit of detection. The GC/FID is part of the VSS and can be used during a sampling event to periodically monitor organic vapor concentrations in the vapor being sampled.

3.0 SAMPLING EVENT DESCRIPTION

3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in *Sampling and Analysis Plan for Vapor and Gas Sampling Tank 241-C-112 Using the Vapor Sampling System*, provided as Appendix A. The Sampling and Analysis Plan (SAP) 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 B. 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 S4-054.

3.2 OPERATIONS AND SAMPLING PERSONNEL

The SML vapor team members included:

- R. D. Mahon, SML Vapor Project Lead Scientist
- R. A. Westberg, Field Scientist
- E. A. Johnson, Field Scientist (in training)
- D. L. Bowers, VSS Technician
- T. B. Utecht, Sample Technician.

The VSS was set up at SST 241-C-112 at about 10:00 p.m. on August 10, 1994, and was allowed to warm up overnight. The team began sampling shortly after 2:00 a.m. on August 11, 1994, and completed the sampling by 6:30 a.m. the same day.

3.3 AMBIENT CONDITIONS

The day of the sampling event, August 11, 1994, was 23 °C with a slight breeze from the northwest. Ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 4 miles due west of 241-C SST farm, are provided in Appendix C.

3.4 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was placed in Riser 4 of SST 241-C-112. The probe length, from the sample inlet to the top of the riser flange, was 7.9 meters.

All zones of the VSS were heated to 50 °C during setup of the VSS at SST 241-C-112 on August 10, 1994. The team stabilized the VSS temperature zones by 2:00 a.m. on August 11, 1994, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-C-112 were 741 torr and 28 °C, respectively. The sample log sheets (see Appendix B) provide a complete chronology of the sample event including start and end times, flow rates, volumes, and specific sample identifiers.

The team purged the sampling manifold with ambient air for approximately 13 hours, starting on August 10, 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-C-112. 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 3.07 mbar (2.3 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 7.6 mL/min at a 289 mbar (217.1 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 0.1%, for TST traps sampled at 200 mL/min the dilution was approximately 0.3%, and for sorbent traps the dilution was approximately 0.2%.

Three analytical laboratories provided sample media. Oak Ridge National Laboratory (ORNL) provided triple sorbent traps (TSTs) for organic vapors; Oregon Graduate Institute of Science and Technology (OGIST) provided SUMMA™ canisters; and Pacific Northwest Laboratory (PNL) provided SUMMA™ canisters and sorbent traps for ammonia (NH₃), nitrogen dioxide (NO_x), and water vapor (H₂O).

3.5 RADIATION SCREENING

Samples are unconditionally released from the SST farm in accordance with DI-33300-93-004, *Release of Vapor Sampling Equipment* (WHC 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:

- OGIST: The laboratory has supplied no acceptance criteria for alpha-beta-gamma activity. Notify the laboratory if radioactive levels exceed the DOT limits specified above, or if >50 pCi/g tritium are found.
- 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 August 11, 1994, SST 241-C-112 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. The two HEPA filters located just upstream of the sampling manifold 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-C-112 filter sample results are shown in Table 2. SML scientists use the activity results from Table 2 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 2 presents SST 241-C-112 tritium sample results. The results in Table 2 indicate that the samples collected from SST 241-C-112 met the laboratory acceptance criteria and the DOT definition of a nonradioactive shipment.

Table 2. Radionuclide Analysis Results.

Filter	Sample Identifier	Activity Results ^a (pCi/sample)	Activity ^b (pCi/L of tank gas)
Upstream HEPA filter (outside VSS)	S4054-A31.0U1	Total alpha = 876 Total beta = 1250 GEA = 139 (²⁰⁸ Tl) GEA = 388 (²¹² Pb) GEA = 67.3 (²⁴³ Am) Note: Am high level of uncertainty	= 2.55 = 3.64 = 0.41 = 1.13 = 0.20
Downstream HEPA filter (outside VSS)	S4054-A32.0D1	Total alpha = <0.912 Total beta = 3.14 GEA = <detectable	= <0.03 = 0.009 = <detectable
Upstream HEPA filter (inside VSS)	S4054-A33.0U2	Total alpha = <0.746 Total beta = 8.86 GEA = <detectable	= <0.002 = 0.03 = <detectable
Downstream HEPA filter (inside VSS)	S4054-A34.0D2	Total alpha = <0.578 Total beta = 5.62 GEA = <detectable	= <0.002 = 0.02 = <detectable
Tritium Trap	S4054-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 B and the sample checksheets were used to estimate a total flow through the VSS of 343 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.

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 W94-0-0816-36). Table 3 lists the sample identifiers, sample types, and COC form numbers for all ORNL samples. The samples were delivered for transport on August 15, 1994, and shipped by Federal Express for next-day delivery.

Table 3. Oak Ridge National Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S4054-A10.409	TST	006728
S4054-A11.481	TST	006728
S4054-A12.388	TST field blank	006728
S4054-A13.411	TST	006728
S4054-A14.490	TST	006728
S4054-A15.472	TST	006728
S4054-A16.474	TST	006728
S4054-A17.376	TST field blank	006728
S4054-A18.463	TST	006728
S4054-A19.420	TST	006728
S4054-A20.466	TST trip blank	006728
S4054-A21.453	TST trip blank	006728

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.

Using a government truck, SML took the PNL sorbent traps and SUMMA™ canisters directly to PNL and delivered them to J. A. Edwards on August 12, 1994. Table 4 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 4. Pacific Northwest Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S4054-A01.080	Ambient upwind SUMMA™ (upwind)	007499
S4054-A02.081	Ambient through SUMMA™ (VSS)	007499
S4054-A05.088	SUMMA™	007499
S4054-A07.099	SUMMA™	007499
S4054-A09.114	SUMMA™	007499
S4054-A22.25W	NO ₃ /NO _x /H ₂ O	007498
S4054-A23.26W	NO ₃ /NO _x /H ₂ O	007498
S4054-A24.27W	NO ₃ /NO _x /H ₂ O	007498
S4054-A25.28W	NO ₃ /NO _x /H ₂ O	007498
S4054-A26.29W	NO ₃ /NO _x /H ₂ O	007498
S4054-A27.30W	NO ₃ /NO _x /H ₂ O	007498
S4054-A28.31W	NO ₃ /NO ₂ /H ₂ O trip blank	007498
S4054-A29.32W	NO ₃ /NO ₂ /H ₂ O trip blank	007498
S4054-A30.33W	NH ₃ /NO ₂ /H ₂ O trip blank	007498

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.

Three SUMMA™ canisters were shipped back to OGI using offsite property control (OPC W94-0-0816-37). The samples were delivered for transport on August 15, 1994, and shipped by Federal Express for next-day delivery. Table 5 lists the sample identifiers, sample types, and COC form numbers for all OGIST samples.

Table 5. Oregon Graduate Institute Samples.

Sample Identifier	Sample Type	COC Number
S4054-A04.155	SUMMA™	007500
S4054-A06.172	SUMMA™	007500
S4054-A08.173	SUMMA™	007500

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 D.

5.0 QUALITY ASSURANCE AND CONTROLS

5.1 VAPOR SAMPLING SYSTEM CLEANING

Immediately prior to sampling of SST 241-C-112, the VSS manifold was heated to 50 °C and ambient air was purged through the system for 15 min. After this purge, an ambient air sample was drawn through the VSS manifold and a GC/FID run was initiated. This first run showed that organic contaminants were still present in the manifold, so a second 15-min ambient air purge was started. Throughout this purge, all pertinent system valves were actuated to release any contaminants that may have collected in the VSS valves themselves. A second GC run was initiated and no contaminants were detected by the FID. A third sample confirmed the VSS was free of organic remnants down to the detection limits of the system and ready to sample SST 241-C-112. 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 1993c), the team cleaned the hot-water-jacketed probe before installing it in SST 241-C-112. This procedure requires a solvent rinse of all internal probe surfaces with acetone and methanol to clear the sample line of possible contamination remaining from the construction process. The probes are 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-C-112. 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-C-112 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	04/29/94	04/29/95	804-28-03-001
Pressure System	05/03/94	05/03/95	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.

Field blanks are samples that are used to determine if cross-contamination may have occurred during sample handling. Sorbent tube field blanks are collected by transporting the field blank to the field with the other sample media, uncapping the media and connecting it to the VSS sorbent connections, removing the field blank from the connections, and recapping the ends of the sorbent tubes.

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 sampler, but no tank gases are drawn through them.

Table 7 lists the blank samples collected during the sampling of SST 241-C-112.

Table 7. Blank Samples.

Sample Identifier	Blank Type	Sample Media
S4054-A01.080	Ambient	SUMMA™
S4054-A02.081	Ambient through VSS	SUMMA™
S4054-A12.388	Field	TST
S4054-A17.376	Field	TST
S4054-A20.466	Trip	TST
S4054-A21.453	Trip	TST
S4054-A28.31W	Trip	NO ₃ /NO _x /H ₂ O
S4054-A29.32W	Trip	NO ₃ /NO _x /H ₂ O
S4054-A30.33W	Trip	NO ₃ /NO _x /H ₂ O

6.0 ANOMALIES

All samples were collected in accordance with the SAP and LO-080-450/A0, *Collection of SUMMA Canisters and Sorbent Tube Samples Using the Vapor Sampling System* (WHC 1993a). No anomalies to the SAP or the operating procedure were noted during the sampling of SST 241-C-112. 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.
- 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-080-450/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
SAMPLING AND ANALYSIS PLAN

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Sampling and Analysis Plan for
Vapor and Gas Sampling Tank 241-C-112
Using the Vapor Sampling System
Rev. 0 (July 28, 1994)

APPROVAL SIGN-OFF SHEET

Sampling and Analysis Plan
for Vapor and Gas Sampling Tank 241-C-112
Using the Vapor Sampling System
Rev. 0 (July 28, 1994)

7/28/94
J. L. Huckaby, Ph.D., Lead Eng., Vapor Issue Resolution Program Date

7/28/94
J. W. Osborne, Manager, Vapor Issue Resolution Program Date

28 JUL 94
J. E. Hyatt, Manager, Date
Sampling and Special Analytical Services

241-C-112 Vapor Sampling and Analysis Plan

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241-C-112 Vapor Sampling and Analysis Plan

1.0 Introduction

This document provides information for vapor sampling waste tank 241-C-112, and subsequent sample analysis. Characterization of the gases and vapors is being conducted to resolve health and safety issues associated with this tank.

2.0 Objective

This sampling and analytical plan defines the responsibilities, sample collection methods and operational parameters, sample handling criteria, and sample analysis strategy for the headspace vapor characterization of tank 241-C-112.

3.0 Responsibilities

Responsibilities for Tank Farms Operations, Health Physics, and Field Analytical Services (FAS) are listed in laboratory operating procedure LO-080-450, "Collection of SUMMA Canisters and Sorbent Tube Samples Using Vapor Sampling System (VSS)". In addition, FAS shall provide sample ID label information to all sampling device suppliers.

3.1 Sandia National Laboratory and Oregon Graduate Institute

Sandia National Laboratory (SNL) in conjunction with the Oregon Graduate Institute (OGI) shall:

- Analyze SUMMA canisters by means of validated procedures and report data in accordance with letters of instruction from WHC;
- Report quantitative concentrations of positively identified compounds, and identify and estimate concentrations of tentatively identified compounds.

3.2 Pacific Northwest Laboratory

Pacific Northwest Laboratory (PNL) shall:

- Provide labeled, weighed sorbent tubes for the vapor sampling of
 - Nitric oxide (NO)
 - Nitrogen dioxide (NO₂)
 - Water vapor (H₂O)
 - Ammonia (NH₃)

241-C-112 Vapor Sampling and Analysis Plan

- Analyze collected samples for the above analytes in accordance with letters of instruction from WHC;
- Provide a quantitative analytical report of the above analyses for all transmitted samples.

3.3 Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) shall:

- Provide labeled triple sorbent traps (TST) for sampling of organic vapors, analyze collected TST samples and report data in accordance with letters of instruction from WHC;
- Provide labeled, surrogate spiked TST to FAS for sampling;
- Report quantitative concentrations of positively identified compounds, and identify and estimate concentrations of tentatively identified compounds.

4.0 Sampling

Sampling activities shall be performed in accordance with laboratory operating procedure LO-080-450, "Collection of SUMMA Canisters & Sorbent Tube Samples Using the Vapor Sampling System (VSS)".

4.1 Sample Location

Samples shall be collected from the water-jacketed vapor sampling probe installed in tank 241-C-112.

4.2 Sample Identification

Unique sample identification numbers shall be assigned by FAS. The number shall be assigned according to the following instructions:

- Each sample identification number shall have the following format:

S4054-WYY.LLL, where:

4054	=	unique number assigned to the sampling event
W	=	a letter code indicating the day of a multi-day sampling event
YY	=	a 2-digit sample code found in the SAP List of Sample and Activities (See Table 2)
LLL	=	a special lab assigned code

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4.3 Chain-of Custody

Chain-of custody forms shall be initiated or continued, as required, in accordance with the most current revision of laboratory operating procedure LO-090-443, "Chain-of-Custody for RCRA and CERCLA Protocol Samples".

4.4 Sampling Equipment

4.4.1 Vapor Sampling System

Vapor samples shall be collected using the vapor sampling system (VSS). The VSS includes a vapor sampling probe, transfer lines, a sampling manifold, an air pump, and associated equipment needed to conduct a sampling event. The probe, transfer lines, and sampling manifold are heated to prevent condensation of vapors in the system. Much of the equipment, including the sampling manifold and control equipment, is located in a mobile laboratory so that samples are collected in a climate-controlled environment.

4.4.2 Sample Collection Media

Table 1 lists the type of collection media to be used as well as the number of samples and the required sampling conditions.

4.4.3 Cleanliness

Cleanliness of the VSS sampling system shall be determined prior to this sampling event. The cleanliness check shall be performed in accordance with LO-080-450, Appendix B.

Cleanliness of the VSS shall also be addressed by collecting ambient air SUMMA samples prior to sampling the tanks 1) with the VSS manifold and transfer lines fully heated, and 2) without the VSS. These SUMMA canisters shall be analyzed by the EPA TO-14 methodology.

SUMMA canisters shall be pre-cleaned by the supplying laboratories. The SUMMA canisters shall be cleaned in accordance with EPA procedure TO-14, and be certified as clean by the originating laboratory.

Selective sorbent sampling media shall be provided by both PNL and ORNL. These laboratories shall provide collection media that is cleaned in accordance with supplier recommendations.

TABLE 1
Sampling Information

Analytes	Media	Sample Type	Number of Samples	Flow Rate (mL/min)	Sample Time (min)	Analysis
Organics H ₂ , N ₂ O, CO, CH ₄ , CO ₂	SUMMA	Tank Air	6	N/A	1	TO-12, TO-14, and standard methods
Contamination	SUMMA	Ambient	2 ¹	N/A	1	TO-14
Organics	TST	Tank Air	4/4 ²	200	5/20	GC/MS and GC/FID
		Field Blanks	2	N/A	N/A	
		Trip Blanks	2	N/A	N/A	
NH ₃ , NO ₂ , NO, and H ₂ O (see Table 2)	PNL Sorbent	Tank Air	6/analyte	200	15	Electrode, Ion Chromatography, & Gravimetric
		Trip Blanks	3/analyte	N/A	N/A	
Tritium	Silica gel	Tank Air	1	200	5	beta scan

¹ 1 ambient sample taken through the VSS, and 1 sample taken upwind of the tank.

² See Table 2.

241-C-112 Vapor Sampling and Analysis Plan

4.5 Sample Collection

The collection of samples shall be performed in accordance with the most current revision of LO-080-450, "Collection of SUMMA Canisters & Sorbent Tube Samples Using the Vapor Sampling System (VSS)".

4.5.1 Order of Sampling

The procedural steps for setup, operation, and shutdown of the VSS are found in LO-080-450. The following outline lists the order of sampling for tank 241-C-112.

- 1) Prior to scheduled sampling, perform the following in 241-C tank farm:
 - Set up the VSS equipment (LO-080-450, Section A);
 - Perform a leak test (LO-080-450, Appendix A);
 - Purge the heated vapor sampling system with ambient air for 30 minutes at the maximum flow rate;
 - Collect ambient air SUMMA samples with the VSS and without the VSS;
 - Purge the heated vapor sampling system with tank air for 30 minutes at the maximum flow rate;
 - Measure the pressure of the tank per LO-080-450, Appendix J.
 - 2) Perform the sampling activities per Table 2.
- NOTE: Preliminary data collected from in situ sampling may be used to eliminate or increase samples, and/or modify sampling parameters.
- 3) Shut down the VSS equipment per LO-080-450, Section C.

4.5.2 Operational Parameters

The sampling tubes, sampling transfer lines, and associated valves shall be heated to ensure that no condensation of vapors occurs in the sampling system. The set point temperature of all heated components shall be 50 °C.

Table 2 lists the sampling conditions of flow rate and sampling time to be followed during sorbent tube sampling.

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4.6 Sample Handling

The supplying laboratory shall originate the chain of custody for SUMMA canister samples. The samples shall be transported under this, or field initiated, chain of custody to the FAS cognizant scientist or designated assisting scientific technician. Once the cognizant scientist has received the sample collection media, the cognizant scientist or assisting scientific technician shall sign the "received by" block on the chain of custody. The sample collection media shall then be stored in a controlled locked area until sampling is to occur. Storage temperature shall comply with communicated supplier recommendations. The laboratory chain of custody shall be maintained in the project file. Good Laboratory Practice Standards (GLPS, see 40 CFR 160) shall be used in the handling and preparation of collected samples.

Once a vapor sample has been collected it must be in the physical control or view of the custodian, locked in an area where it can not be tampered with, or prepared for shipping with tamper evident tape applied. Physical control includes being in the sight of the custodian, being in a room which shall signal an alarm when entered, or locked in a cabinet. When more than one person is involved in sampling, one person shall be designated as the lead sampler and only that person signs as sampler. This person is the custodian until the samples are transferred to another location or group and shall sign the "relinquished by" block on the chain of custody when releasing the samples to the designated receiver.

The laboratory shall designate a sample custodian and a designated alternate responsible for receiving all samples. The sample custodian or his alternate shall sign and date all appropriate receiving documents at the time of receipt and at the same time initiate an internal chain of custody form using documented procedures. A continuous chain of custody shall be maintained from the time of sampling until final disposition of all samples.

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TABLE 2
List of Samples and Activities

SAMPLE CODE	SAMPLE/ACTIVITY DESCRIPTION	SAMPLE POSITION	FLOW RATE	SAMPLE TIME
	PERFORM VSS LEAK TEST			
	PURGE VSS WITH AMBIENT AIR			30 min
01	COLLECT AMBIENT AIR SAMPLE SUMMA #1 (PNL)	UPWIND OF 241-C-112		1 min
	COLLECT GC SAMPLE AND INITIATE GC RUN			
02	COLLECT AMBIENT AIR SUMMA #2 (PNL)	SUMMA station		1 min
	PURGE VSS WITH TANK AIR			30 min
	MEASURE TANK PRESSURE			
03	COLLECT TRITIUM TRAP	Sorbent line 9	200 mL/min	5 min
	COLLECT GC SAMPLE AND INITIATE GC RUN			
04	COLLECT SUMMA #3 (OGI)	SUMMA station		1 min
05	COLLECT SUMMA #4 (PNL)	SUMMA station		1 min
06	COLLECT SUMMA #5 (OGI)	SUMMA station		1 min
07	COLLECT SUMMA #6 (PNL)	SUMMA station		1 min
08	COLLECT SUMMA #7 (OGI)	SUMMA station		1 min
09	COLLECT SUMMA #8 (PNL)	SUMMA station		1 min
10	COLLECT TST #1	Sorbent line 8	200 mL/min	5 min
11	COLLECT TST #2	Sorbent line 10	200 mL/min	5 min
12	OPEN, CLOSE, & STORE TST FIELD BLANK #1			

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13	COLLECT TST #3	Sorbent line 9	200 mL/min	5 min
14	COLLECT TST #4	Sorbent line 10	200 mL/min	5 min
15	COLLECT TST #5	Sorbent line 8	200 mL/min	20 min
16	COLLECT TST #6	Sorbent line 10	200 mL/min	20 min
17	OPEN, CLOSE, & STORE TST FIELD BLANK #2			
18	COLLECT TST #7	Sorbent line 9	200 mL/min	20 min
19	COLLECT TST #8	Sorbent line 10	200 mL/min	20 min
20,21	STORE TST TRIP BLANKS #1 & 2			
22	COLLECT NH ₃ /NO _x /H ₂ O TRAP #1	Sorbent line 8	200 mL/min	15 min
23	COLLECT NH ₃ /NO _x /H ₂ O TRAP #2	Sorbent line 10	200 mL/min	15 min
24	COLLECT NH ₃ /NO _x /H ₂ O TRAP #3	Sorbent line 9	200 mL/min	15 min
25	COLLECT NH ₃ /NO _x /H ₂ O TRAP #4	Sorbent line 10	200 mL/min	15 min
26	COLLECT NH ₃ /NO _x /H ₂ O TRAP #5	Sorbent line 8	200 mL/min	15 min
27	COLLECT NH ₃ /NO _x /H ₂ O TRAP #6	Sorbent line 10	200 mL/min	15 min
28,29, 30	STORE NH ₃ /NO _x /H ₂ O TRAP TRIP BLANKS #1, 2, & 3			
31	REMOVE UPSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
32	REMOVE DOWNSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			

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33	REMOVE UPSTREAM HEPA FILTER FROM VSS			
34	REMOVE DOWNSTREAM HEPA FILTER FROM VSS			

5.0 Sample Analysis

5.1 On-line Monitoring

If operational and a significant response is detected, a gas chromatograph with flame ionization detection (GC/FID) shall be used to monitor organic vapors during the sampling event. The GC/FID shall be operated in accordance with LO-080-450, Appendix D and internal memorandum 12240-SAS93-039, "Configuration of Hewlett Packard (HP) 5890 Series II Gas Chromatograph(GC) for DML1", from T. H. Bellus to L. L. Lockrem dated July 10, 1993. The purpose of this monitoring is to provide field verification that the VSS equipment is operating properly and ready for vapor sampling. Table 2 specifies the field use of the GC/FID for final cleanliness verification and screening of the tank air, but subsequent GC/FID use shall be performed at the discretion of the sampling scientist.

5.2 Off-site Analysis

SUMMA canister and sorbent tube samples shall be analyzed using the methods in Table 3. Good Lab Practice Standards shall be used in the analysis of vapor characterization samples.

5.3 Radiation Screening

The HEPA filters used in the VSS shall be analyzed for total alpha, total beta, and gamma energy analysis (GEA) by the 222-S Laboratory prior to shipment of samples to comply with current Department of Transportation (DOT) shipping regulations and offsite laboratory acceptance criteria. For ORNL the acceptable Total Activity results shall be the picocuries/g value that correspond to the counting room background levels plus the 2-sigma counting error. For PNL the acceptable radiation screening values are (1) ≤ 100 picocuries/g of alpha and (2) ≤ 400 picocuries/g of beta/gamma.

Special, sacrificial Silica gel tubes shall be analyzed at the 222-S laboratory for tritium using liquid scintillation counting (i.e., total activity) to comply with off-site laboratory acceptance criteria for SUMMA canisters. The tritium and HEPA filter analysis results shall be

241-C-112 Vapor Sampling and Analysis Plan

used to confirm that the SUMMA canisters meet all transportation and shipping requirements.

TABLE 3
Analysis Methods by Analyte

Analyte	Method
Organics (SUMMA canister samples)	TO-12, TO-14
H ₂ and CO (SUMMA canisters)	GC/thermal conductivity detector, or GC/reduction gas detector
N ₂ O (SUMMA canisters)	GC/thermal conductivity detector, or GC/electron capture detector
CH ₄ and CO ₂ (SUMMA canisters)	GC/thermal conductivity detector, or GC/catalysis/FID
NO and NO ₂ (sorbent traps)	Water extraction followed by Ion Chromatography
Water (sorbent traps)	Gravimetric
NH ₃ (sorbent traps)	Water extraction followed by selective electrode
Organics (TST)	Thermal Desorption followed by GC and GC/MS

6.0 Quality Assurance/Quality Control (QA/QC) Requirements

6.1 Field Logbook

All sampling activities associated with the vapor characterization program shall be documented in controlled field logbooks maintained by Sampling and Mobile Laboratory personnel. Controlled logbooks shall contain, but are not limited to, the following:

- Identification number of the tank and riser number in which the sampling is conducted;
- Photographs of the sample location;
- Corresponding sample identification numbers, flowrates, pressures, temperatures, and other operational parameters;

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- Any conditions that the sampler may take into account during the sampling event (i.e. smells or odors, operation of machinery close by, etc.);
- Names and titles of personnel involved in the field activity and their responsibilities;
- Instrument calibration dates and equipment identification numbers.

6.2 QC Samples

Quality Control samples shall be collected in accordance with the Table 4. The purpose of these samples is to assure: (1) the lack of contamination of either the sampling device or the sorbent medium; (2) the operational readiness of analytical measurement equipment; or (3) provide accuracy and precision information.

Labeled blanks shall be provided by the off-site laboratories that are supplying samples. Trip blanks are sampling devices prepared and handled in the same manner as samples, except that they are never opened in the field. Field blanks are sampling devices prepared and handled in the same manner as samples, opened in the field as though they were real samples, but no tank samples are collected with them. Laboratories supplying blanks may opt to analyze only 1 trip blank unless it is determined to be contaminated, in which case all 3 trip blanks are to be analyzed.

Breakthrough tubes shall be collected for each primary sorbent tube collected during the sampling event. Sample validity requires that the amount of analyte on the breakthrough section of the sorbent tube shall be no more than 10% of the amount found in the primary section. Alternatively breakthrough may be addressed by sampling over a range of sample volumes.

TABLE 4
Quality Control Samples

Samples to be Collected	Number and Type of QC Samples
SUMMA Canisters	1 Cleanliness sample 1 Ambient sample
NH ₃ /NO _x /H ₂ O sorbent tubes	3 Trip Blanks/analyte
TSTs	2 Trip blanks 2 Field Blanks

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7.0 Reporting**7.1 Field Results****7.1.1 Radiation Screening**

The results from the radiation screening performed by the 222-S laboratory shall be evaluated by FAS and submitted to the analytical laboratories. The purpose of the evaluation is to ensure the samples meet the analytical laboratory's acceptance criteria. The cognizant scientist shall provide a report to each analytical laboratory that lists the number of picocuries per sample (pCi/g of sample) for each sample that is submitted for analysis. FAS shall discuss and resolve any question concerning the radioactivity of the samples with the appropriate laboratory personnel, before shipping samples.

7.1.2 Sampling Report to Analytical Laboratories

FAS shall prepare and submit a brief summary of the sampling conditions, sampling sequence, dates, times, recorded sampling flow rates (these need not be corrected for tank temperature), and sampling durations to accompany, if possible, the shipment of samples. Alternatively, this sampling report may be transmitted by FAX to the analytical laboratories within a reasonable period after samples have been shipped.

7.1.3 Internal Report

FAS shall submit a report to the WHC program manager to summarize the sampling event. This report shall include, but shall not be limited to, the following:

- Sampling Data
 - Sample identification numbers
 - Raw data (i.e. flowrates, tank pressure, tank temperature, etc.)
 - Sample volumes at standard temperature and pressure (0 °C and 760 torr)
 - Examples of all required calculations

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- GC/FID analysis report
 - Cleanliness check results and evaluation
 - Calibration check results and evaluation
 - Blank analysis results and evaluation
 - Sample analysis results and evaluation
 - Examples of all required calculations
 - Description of the quantitation process
- Copies of all Chain-of-Custodies

7.2 Laboratory Results

The off-site laboratory shall provide a analysis report for all vapor characterization samples received from this sampling effort. The content of this analytical report is described in separate Letters of Instruction. As a minimum, the analytical report should include:

- Cleanliness (of SUMMA or sorbent material) check results and evaluation;
- QC sample analysis results and evaluation;
- Sample analysis results and evaluation;
- Accuracy and precision data, where available;
- Chain-of-custody documentation.

APPENDIX B
SAMPLE LOG SHEETS

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Waste Tank
241-C-112

Date: 08/11/94

VSS Personnel: R. Westberg, A. Johnson, D. Bowers

Trailer Personnel: T. Utrecht

Set up VSS (Section A) (Temperature set point = 50C)

Ensure HEPA filters are installed

Ensure connection to sample probe

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

WHC Sample ID	OGI/ORNL	SAP Reference	Description	Flow	Rate	Duration (min.)	Actual	Start	Actual	End	Actual	Flow	Desired
Group #1													
Purged with ambient air all day													
S4054- A01 .080	S080	1	AMBIENT AIR #1 (PNL)	1		1:31	1:32					0:01	upwind
GC Run #1													
S4054- A02 .081	S081	2	AMBIENT #2 (PNL)	1		1:47	2:48					1:01	15
Leak check (Appendix A)		Leak Rate:	8 torr/hour			1:54	2:09					0:15	
Purge with tank air for 30 min.						2:22	2:52					0:30	
Measure tank pressure						2:53							
S4054- A03 .011	T-1207(222S lab)	3	Tritium Trap	200	5	2:56	3:01					0:05	1000
GC Run #2						3:06							9
S4054- A04 .155	S155	4	SUMMA #3 (OGI)	1		3:12	3:13					0:01	11
S4054- A05 .088	S088	5	SUMMA #4 (PNL)	1		3:17	3:18					0:01	12
S4054- A06 .172	S172	6	SUMMA #5 (OGI)	1		3:22	3:23					0:01	13
S4054- A07 .099	S099	7	SUMMA #6 (PNL)	1		3:27	3:28					0:01	14
S4054- A08 .173	S173	8	SUMMA #7 (OGI)	1		3:32	3:33					0:01	15
S4054- A09 .114	S114	9	SUMMA #8 (PNL)	1		3:37	3:38					0:01	16
S4054- A10 .409	TST #409	10	TST #1	200	5	3:52	3:57					0:05	1000
S4054- A11 .481	TST #481	11	TST #2	200	5	3:52	3:57					0:05	1000
S4054- A12 .388	TST #388	12	TST FIELD BLANK #1			3:53	3:54					0:01	ambient
S4054- A13 .411	TST #411	13	TST #3	200	5	4:04	4:09					0:05	1000
S4054- A14 .430	TST #490	14	TST #4	200	5	4:04	4:09					0:05	1000
S4054- A15 .472	TST #472	15	TST #5	200	20	4:19	4:39					0:20	4000
S4054- A16 .474	TST #474	16	TST #6	200	20	4:19	4:39					0:20	4000
S4054- A17 .376	TST #376	17	TST FIELD BLANK #2			4:47	4:48					0:01	ambient
S4054- A18 .463	TST #463	18	TST #7	200	20	4:46	5:06					0:20	4000
S4054- A19 .420	TST #420	19	TST #8	200	20	4:46	5:06					0:20	4000
S4054- A22 .25W	25W	22	NH3/NOx/H2O #1	200	15	5:19	5:34					0:15	3000
S4054- A23 .26W	26W	23	NH3/NOx/H2O #2	200	15	5:19	5:34					0:15	3000

C-112.XLS 8/16/94 10:12 AM

Waste Tank
241-C-112

WHC Sample ID	OG/JORNL Sample ID	SAP Reference Number	Description	Desired Flow Rate	Desired Duration (min.)	Actual Start Time	Actual End Time	Actual Total Time	Desired Total Flow	Port (Valve #)
S4054- A24 .27W	27W	24	NH3/NOx/H2O #3	200	15	5:40	5:55	0:15	3000	9
S4054- A25 .28W	28W	25	NH3/NOx/H2O #4	200	15	5:40	5:55	0:15	3000	10
S4054- A26 .29W	29W	26	NH3/NOx/H2O #5	200	15	6:01	6:16	0:15	3000	8
S4054- A27 .30W	30W	27	NH3/NOx/H2O #6	200	15	6:01	6:16	0:15	3000	10
S4054- A31 .001	T-1203(222S lab)	31	Upstream HEPA(box)							
S4054- A32 .001	T-1204(222S lab)	32	Downstream HEPA(box)							
S4054- A33 .002	T-1205(222S lab)	33	Upstream HEPA(truck)							
S4054- A34 .002	T-1206(222S lab)	34	Downstream HEPA(truck)							

Trip Blanks (DO NOT EXPOSE)

S4054- A20 .466	TST #466	20	TST TRIP #1							
S4054- A21 .453	TST #453	21	TST TRIP #2							
S4054- A28 .31W	31W	28	NH3/NOx/H2O TRIP #1							
S4054- A29 .32W	32W	29	NH3/NOx/H2O TRIP #2							
S4054- A30 .33W	33W	30	NH3/NOx/H2O TRIP #3							

APPENDIX C
AMBIENT CONDITIONS

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WEATHER FOR VSS VAPOR SAMPLING OF C-112

Time on 8/11/94

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APPENDIX D
CHAIN-OF-CUSTODY FORMS

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Westinghouse Hanford
Company

CHAIN OF CUSTODY

006383

COPY

Custody Form Initiator T.B. UtechtCompany Contact R. MAHONTelephone 373-1101Project Designation/Sampling Locations 241-C TANK 112Collection Date 8-11-94Ice Chest No. N/AField Logbook No. N/ABill of Lading/Airbill No. N/AOffsite Property No. N/AMethod of Shipment GOVERN VEHICLE 930Shipped to ZZZ-S 1A65 200 WEST AREAPossible Sample Hazards/Remarks NONE

Sample Identification

54054.041T-120354054.001T-120454054.042T-120554054.002T-120654054.011T-1207☒ Field Transfer of Custody

CHAIN OF POSSESSION

(Sign and Print Name)

Relinquished By	Date	Time	Received By	Date	Time
<u>T-B Utecht / T-B Utecht</u>	<u>8-11-94</u>	<u>0940</u>	<u>Shirley C. Cate</u>	<u>08-10-94</u>	<u>0745</u>

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

Comments:

Westinghouse Hanford Company	CHAIN OF CUSTODY	ORNL-006728
Custody Form Initiator	Amy Dindal	
Company Contact	Roger Jenkins	Telephone (615) 576-8594
Project Designation/Sampling Locations	241-C-112	Collection Date
Ice Chest No.		Field Logbook No.
Bill of Lading/Airbill No.		Offsite Property No.
Method of Shipment	Federal Express	
Shipped to	Rick Mahon	
Possible Sample Hazards/Remarks	NONE	

Sample Identification

TST# 409 ORNL Triple Sorbent Trap ✓
 TST# 481 ORNL Triple Sorbent Trap ✓
 TST# 411 ORNL Triple Sorbent Trap ✓
 TST# 490 ORNL Triple Sorbent Trap ✓
 TST# 472 ORNL Triple Sorbent Trap ✓
 TST# 474 ORNL Triple Sorbent Trap ✓
 TST# 463 ORNL Triple Sorbent Trap ✓
 TST# 420 ORNL Triple Sorbent Trap ✓
 TST# 466 ORNL Trip Blank ✓
 TST# 453 ORNL Trip Blank ✓
 TST# 388 ORNL Field Blank ✓
 TST# 376 ORNL Field Blank ✓

[] Field Transfer of Custody			Chain of Possession			(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time		
Andr. Palanski/Andr. Palanski	8/1/94	1:25 PM	T. Butcher/T. Butcher	8-3-94	1100		
T. Butcher/T. Butcher	8-11-94	0030	R. Westberg/R. Westberg	8-11-94	0030		
R. Westberg/R. Westberg	8-11-94	0730	T. Butcher/T. Butcher	8-11-94	0740		
T. Butcher/T. Butcher	8-15-94	1320	J.T. Skeen/J.T. Skeen	8-16-94	1351		
Final Sample Disposition							
Disposal Method:		Disposed by:			Date/Time:		
Comments:							

Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 007498

Custody Form Initiator J. A. Edwards Telephone (509) 373-0141
Pager 85-3009

Company Contact R. A. Westberg Telephone (509) 373-5734

Project Designation/Sampling Locations 200 East Tank Farm Collection Date 08- - - -94
241-C-112 Tank Vapor Sample SAF S4054 Preparation Date 08- 0 8 -94
Ice Chest No. (VSS Truck) Field Logbook No. WHC- - - - -

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

Method of Shipment Government Truck Sample Job _____

Shipped to PNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S4054 - A22 . 25W	NH ₃ /NO _x /H ₂ O (Trap # 1) Line # 8
S4054 - A23 . 26W	NH ₃ /NO _x /H ₂ O (Trap # 2) Line #10
S4054 - A24 . 27W	NH ₃ /NO _x /H ₂ O (Trap # 3) Line # 9
S4054 - A25 . 28W	NH ₃ /NO _x /H ₂ O (Trap # 4) Line #10
S4054 - A26 . 29W	NH ₃ /NO _x /H ₂ O (Trap # 5) Line # 8
S4054 - A27 . 30W	NH ₃ /NO _x /H ₂ O (Trap # 6) Line #10
S4054 - A28 . 31W	NH ₃ /NO ₂ /H ₂ O a-b-c (Trip Blank# 1)
S4054 - A29 . 32W	NH ₃ /NO ₂ /H ₂ O a-b-c (Trip Blank# 2)
S4054 - A30 . 33W	NH ₃ /NO ₂ /H ₂ O a-b-c (Trip Blank# 3)

[] Field Transfer of Custody		[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
J. A. Edwards	08-09-94		T. Utechy	08-09-94	0640
T. G. Utechy	08-11-94	0730	R. Westberg	08-11-94	0730
R. Westberg	08-11-94	0730	T. G. Utechy	08-11-94	0740
T. G. Utechy	08-12-94	1000	J. A. Edwards	08-12-94	1000

(Revised 02/28/94)

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

A-6000-407 (12/92) WEP061

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Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 007499

Custody Form Initiator J. A. Edwards

Telephone (509) 373 -0141
Pager 85-3009

Company Contact R. A. Westberg

Telephone (509) 373-5734

Project Designation/Sampling Locations 200 East Tank Farm
241-C-112 Tank Vapor Sample SAF S4054
Ice Chest No. (VSS Truck)Collection Date 08- - -94
Preparation Date 08- 0 8 -94
Field Logbook No. WHC- - - - -

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Sample Job _____

Shipped to PNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S4054 - A01 - 080	SAP Ref _____	Ambient air SUMMA #1, <u>Upwind VSS</u> (PNL)
S4054 - A02 - 081	SAP Ref _____	Ambient air SUMMA #2, <u>Through VSS</u> (PNL)
S4054 - A05 - 088	SAP Ref _____	SUMMA #4 (PNL)
S4054 - A07 - 099	SAP Ref _____	SUMMA #6 (PNL)
S4054 - A09 - 114	SAP Ref _____	SUMMA #8 (PNL)

[X] Field Transfer of Custody			[] Chain of Possession			(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time		
J. A. Edwards	08-08-94	1200	T. Utecht	08-08-94	1300		
T. B. Utecht / T. B. Utecht	8-11-94	0830	R. Westberg / R. Westberg	8-11-94	0030		
R. Westberg / R. Westberg	8-11-94	0730	T. B. Utecht / T. B. Utecht	8-11-94	0740		
T. B. Utecht / T. B. Utecht	8-12-94	1000	J. Edwards / J. Edwards	8-12-94	1000		

(Revised 02/28/94)

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

A-6000-407 (12/92) WEP061

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