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VAPOR & GAS SAMPLING OF SST 241C108 USING THE
VAPOR SAMPLING SYSTEM

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-C-108 USING THE VAPOR SAMPLING SYSTEM

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7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE AUGUST 5, 1994, SAMPLING OF SST 241-C-108 USING THE VAPOR SAMPLING SYSTEM.

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APPROVALS

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Using the Vapor Sampling System

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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 of Science and Technology
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-108 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-108. This document presents sampling data resulting from the August 5, 1994, sampling of SST 241-C-108.

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-108 on August 5, 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-108; 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-108 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-108 Using the Vapor Sampling System*, provided as Appendix A. The 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 S4-052.

3.2 OPERATIONS AND SAMPLING PERSONNEL

M. C. Jones was the Tank Farm Operations person-in-charge. 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 (in training)
- D. L. Bowers, VSS Technician
- T. B. Utecht, Sample Technician.

The VSS was set up at SST 241-C-108 about 11:30 p.m. on August 4, 1994, and was allowed to warm up overnight. The team began sampling shortly after 3:00 a.m. on August 5, 1994, and completed the sampling by 8:00 a.m. the same day.

3.3 AMBIENT CONDITIONS

The day of the sampling event, August 5, 1994, was mild with a western wind. Appendix C presents graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 5 miles due west of 241-C SST farm.

3.4 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was placed in Riser 4 of SST 241-C-108. The probe length, from the sample inlet to the top of the riser flange, was 7.9 m.

All zones of the VSS were heated to 50 °C during setup of the VSS at SST 241-C-108 on August 4, 1994. The team stabilized the VSS temperature zones by 12:00 a.m. on August 5, 1994, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-C-108 were 742 torr and 24.7 °C, respectively. The sample log sheets (Appendix B) provide a complete chronology of the sample event including start and end times, flow rates, volumes, and specific sample identifiers.

At approximately 2:39 a.m., the team purged the sampling manifold with ambient air for 30 minutes. The team collected two SUMMA™ canister samples of ambient air, one using the VSS sampling manifold and one manually approximately 10 meters upwind of the VSS connection with SST 241-C-108. 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. System pressure remained steady at 300 mbar (225 torr) during the 15 minute test. Thus, leakage should not have been a factor in sample consistency regardless of system pressure at the time of collection.

Three analytical laboratories provided sample media. Oak Ridge National Laboratory (ORNL) provided triple sorbent tubes (TSTs) for organic vapors; Oregon Graduate Institute of Science and Technology (OGIST) supplied 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 5, 1994, SST 241-C-108 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 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-C-108 filter sample results are given 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-108 tritium sample results. The results in Table 2 indicate that the samples collected from SST 241-C-108 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)	S4052-A33.0U1	Total alpha = 6760 Total beta = 9490 GEA = 4110 (¹⁰⁹ Cd) GEA = 1110 (²⁰⁸ Tl) GEA = 3680 (²¹² Bi) GEA = 3390 (²¹² Pb) GEA = 1240 (²³⁷ Np) GEA = 646 (²⁴³ Am)	= 19.9 = 28.0 = 12.1 = 3.0 = 10.9 = 10.0 = 3.7 = 1.9
Downstream HEPA filter (outside VSS)	S4052-A34.0D1	Total alpha = <1.28 Total beta = 6.29 GEA = ND	= <0.004 = 0.02 = <detectable
Upstream HEPA filter (inside VSS)	S4052-A35.0U2	Total alpha = <0.71 Total beta = <2.94 GEA = ND	= <0.002 = <0.009 = <detectable
Downstream HEPA filter (inside VSS)	S4052-A36.0D2	Total alpha = 0.72 Total beta = 6.15 GEA = ND	= 2.1 = 0.02 = <detectable
Tritium Trap	S4052-A32.0T1	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 339 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
S4052-A09.479	TST	006726
S4052-A10.347	TST	006726
S4052-A11.252	TST field blank	006726
S4052-A12.485	TST	006726
S4052-A13.442	TST	006726
S4052-A14.296	TST	006726
S4052-A15.484	TST	006726
S4052-A16.294	TST field blank	006726
S4052-A17.369	TST	006726
S4052-A18.338	TST	006726
S4052-A19.366	TST trip blank	006726
S4052-A20.229	TST trip blank	006726
S4052-A21.242	TST trip blank	006726
S4052-A22.476	TST trip blank	006726
S4052-A37.421	TST trip blank	006726
S4052-A38.433	TST trip blank	006726

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 to PNL and delivered them to J. A. Edwards on August 8, 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
S4052-A01.014	Ambient upwind SUMMA™ (air)	007487
S4052-A02.015	Ambient through SUMMA™ (VSS)	007487
S4052-A04.016	SUMMA™	007487
S4052-A06.017	SUMMA™	007487
S4052-A08.018	SUMMA™	007487
S4052-A23.07W	NO ₃ /NO _x /H ₂ O	007486
S4052-A24.08W	NO ₃ /NO _x /H ₂ O	007486
S4052-A25.09W	NO ₃ /NO _x /H ₂ O	007486
S4052-A26.10W	NO ₃ /NO _x /H ₂ O	007486
S4052-A27.11W	NO ₃ /NO _x /H ₂ O	007486
S4052-A28.13W	NO ₃ /NO _x /H ₂ O	007486
S4052-A29.13W	NO ₃ /NO ₂ /H ₂ O	007486
S4052-A30.14W	NH ₃ /NO ₂ /H ₂ O	007486
S4052-A31.15W	NH ₃ /NO ₂ /H ₂ O	007486

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.

The OGIST SUMMA™ canisters were delivered to PNL for storage. Table 5 lists the sample identifiers and sample types for all OGIST samples. The samples were delivered on August 8, 1994. 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
S4052-A03.011	SUMMA™	007488
S4052-A05.012	SUMMA™	007488
S4052-A07.013	SUMMA™	007488

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-108, the VSS manifold was heated to 50 °C and ambient air was purged through the system for 30 minutes. 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 30 minute 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-108. 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-108. 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-108. 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-108 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-108.

Table 7. Blank Samples.

Sample Identifier	Blank Type	Sample Media
S4052-A01.014	Ambient (upwind)	SUMMA™
S4052-A02.015	Ambient (VSS)	SUMMA™
S4052-A11.252	Field	TST
S4052-A16.294	Field	TST
S4052-A19.366	Trip	TST
S4052-A20.229	Trip	TST
S4052-A21.242	Trip	TST
S4052-A22.476	Trip	TST
S4052-A29.13W	Trip	NO ₃ /NO _x /H ₂ O
S4052-A30.14W	Trip	NO ₃ /NO _x /H ₂ O
S4052-A31.15W	Trip	NO ₃ /NO _x /H ₂ O
S4052-A37.421	Trip	TST
S4052-A38.433	Trip	TST

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-108. 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.
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- 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.
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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-108
Using the Vapor Sampling System
Rev. 1 (July 28, 1994)

APPROVAL SIGN-OFF SHEET

Sampling and Analysis Plan
for Vapor and Gas Sampling Tank 241-C-108
Using the Vapor Sampling System
Rev. 1 (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-108 Vapor Sampling and Analysis Plan

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241-C-108 Vapor Sampling and Analysis Plan

1.0 Introduction

This document provides information for vapor sampling waste tank 241-C-108, 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-108.

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-108 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-108.

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:

S4052-WYY.LLL, where:

4052	=	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	6	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.

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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-108.

- 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.

241-C-108 Vapor Sampling and Analysis Plan

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.

241-C-108 Vapor Sampling and Analysis Plan

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-108		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			
	COLLECT GC SAMPLE AND INITIATE GC RUN			
03	COLLECT SUMMA #3 (OGI)	SUMMA station		1 min
04	COLLECT SUMMA #4 (PNL)	SUMMA station		1 min
05	COLLECT SUMMA #5 (OGI)	SUMMA station		1 min
06	COLLECT SUMMA #6 (PNL)	SUMMA station		1 min
07	COLLECT SUMMA #7 (OGI)	SUMMA station		1 min
08	COLLECT SUMMA #8 (PNL)	SUMMA station		1 min
09	COLLECT TST #1	Sorbent line 8	200 mL/min	5 min
10	COLLECT TST #2	Sorbent line 10	200 mL/min	5 min
11	OPEN, CLOSE, & STORE TST FIELD BLANK #1			
12	COLLECT TST #3	Sorbent line 9	200 mL/min	5 min

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13	COLLECT TST #4	Sorbent line 10	200 mL/min	5 min
14	COLLECT TST #5	Sorbent line 8	200 mL/min	20 min
15	COLLECT TST #6	Sorbent line 10	200 mL/min	20 min
16	OPEN, CLOSE, & STORE TST FIELD BLANK #2			
17	COLLECT TST #7	Sorbent line 9	200 mL/min	20 min
18	COLLECT TST #8	Sorbent line 10	200 mL/min	20 min
19,20, 21,22, 37,38	STORE TST TRIP BLANKS #1, 2, 3, 4, 5 & 6			
23	COLLECT NH ₃ /NO _x /H ₂ O TRAP #1	Sorbent line 8	200 mL/min	15 min
24	COLLECT NH ₃ /NO _x /H ₂ O TRAP #2	Sorbent line 10	200 mL/min	15 min
25	COLLECT NH ₃ /NO _x /H ₂ O TRAP #3	Sorbent line 9	200 mL/min	15 min
26	COLLECT NH ₃ /NO _x /H ₂ O TRAP #4	Sorbent line 10	200 mL/min	15 min
27	COLLECT NH ₃ /NO _x /H ₂ O TRAP #5	Sorbent line 8	200 mL/min	15 min
28	COLLECT NH ₃ /NO _x /H ₂ O TRAP #6	Sorbent line 10	200 mL/min	15 min
29,30, 31	STORE NH ₃ /NO _x /H ₂ O TRAP TRIP BLANKS #1, 2, & 3			
32	COLLECT TRITIUM TRAP	Sorbent line 9	200 mL/min	5 min
33	REMOVE UPSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
34	REMOVE DOWNSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			

241-C-108 Vapor Sampling and Analysis Plan

35	REMOVE UPSTREAM HEPA FILTER FROM VSS			
36	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-108 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;

241-C-108 Vapor Sampling and Analysis Plan

- 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	6 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

241-C-108 Vapor Sampling and Analysis Plan

- 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-108

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

Date: 08/05/94

Ensure HEPA filters are installed

Ensure connection to sample probe

VSS Personnel: Rich Westberg, Rick Mahon, Andy Johnson, and Doug Bowers

Leak check (Appendix A)

Leak Rate:

0 torr/hr

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

Trailer Personnel: Tim Utecht

WHC Sample ID	OGI/ORNL Sample ID	SAP Reference Number	Description	Desired Flow Rate	Desired Duration (min.)	Actual Start Time	Actual End Time	Actual Total Time	Measured Total Flow	Port (Valve #)
Group #1										
Purge with ambient air for 30 min.						2:39	3:09	0:30		
S4052- A01 .014	S014	1	AMBIENT AIR #1 (PNL)		1	3:09	3:10	0:01		upwind
GC Run #1						3:16				
S4052- A02 .015	S015	2	AMBIENT #2 (PNL)		1	3:22	3:23	0:01		15
Purge with tank air for 30 min.						3:41	4:11	0:30		
Measure tank pressure		744				4:12				
GC Run #2						4:17				
S4052- A03 .011	S011	3	SUMMA #3 (OGI)		1	4:25	4:26	0:01		11
S4052- A04 .016	S016	4	SUMMA #4 (PNL)		1	4:30	4:31	0:01		12
S4052- A05 .012	S012	5	SUMMA #5 (OGI)		1	4:35	4:36	0:01		13
S4052- A06 .017	S017	6	SUMMA #6 (PNL)		1	4:40	4:41	0:01		14
S4052- A07 .013	S013	7	SUMMA #7 (OGI)		1	4:50	4:51	0:01		16
S4052- A08 .018	S018	8	SUMMA #8 (PNL)		1	4:45	4:46	0:01		15
S4052- A09 .479	TST#479	9	TST #1	200	5	5:08	5:13	0:05	1000	8
S4052- A10 .347	TST#347	10	TST #2	200	5	5:08	5:13	0:05	1000	10
S4052- A11 .252	TST#252	11	TST FIELD BLANK #1			5:10	5:11	0:01		ambient
S4052- A12 .485	TST#485	12	TST #3	200	5	5:28	5:33	0:05	1000	9
S4052- A13 .442	TST#442	13	TST #4	200	5	5:28	5:33	0:05	1000	10
S4052- A14 .296	TST#296	14	TST #5	200	20	5:41	6:01	0:20	4000	8
S4052- A15 .484	TST#484	15	TST #6	200	20	5:41	6:01	0:20	4000	10
S4052- A16 .294	TST#294	16	TST FIELD BLANK #2			5:43	5:44	0:01		ambient
S4052- A17 .369	TST#369	17	TST #7	200	20	6:07	6:27	0:20	4000	9
S4052- A18 .338	TST#338	18	TST #8	200	20	6:07	6:27	0:20	4000	10
S4052- A23 .07W	.07W	23	NH3/NOx/H2O #1	200	15	6:39	6:54	0:15	3000	8
S4052- A24 .08W	.08W	24	NH3/NOx/H2O #2	200	15	6:39	6:54	0:15	3000	10

B-3

MHC-SD-MM-RPT-110, Rev. 0

Waste Tank
241-C-108

WHC Sample ID	OGL/ORNL Sample ID	SAP Reference Number	Description	Desired Flow Rate	Desired Duration (min.)	Actual Start Time	Actual End Time	Actual Total Time	Measured Total Flow	Port (Valve #)
S4052- A25 .09W	.09W	25	NH3/NOx/H2O #3	200	15	7:00	7:15	0:15	3000	9
S4052- A26 .10W	.10W	26	NH3/NOx/H2O #4	200	15	7:00	7:15	0:15	3000	10
S4052- A27 .11W	.11W	27	NH3/NOx/H2O #5	200	15	7:21	7:36	0:15	3000	8
S4052- A28 .12W	.12W	28	NH3/NOx/H2O #6	200	15	7:21	7:36	0:15	3000	10
S4052- A32 .0T1	T-1197(222S lab)	32	Tritium Trap	200	5	7:42	7:47	0:05	1000	9
S4052- A33 .0U1	T-1193(222S lab)	33	Upstream HEPA(box)							
S4052- A34 .0D1	T-1194(222S lab)	34	Downstream HEPA(box)							
S4052- A35 .0U2	T-1195(222S lab)	35	Upstream HEPA(truck)							
S4052- A36 .0D2	T-1196(222S lab)	36	Downstream HEPA(truck)							

Trip Blanks (DO NOT EXPOSE)

S4052- A19 .386	TST#366	19	TST TRIP #1							
S4052- A20 .229	TST#229	20	TST TRIP #2							
S4052- A21 .242	TST#242	21	TST TRIP #3							
S4052- A22 .476	TST#476	22	TST TRIP #4							
S4052- A37 .421	TST#421	37	TST TRIP #5							
S4052- A38 .433	TST#433	38	TST TRIP #6							
S4052- A29 .13W	.13W	29	NH3/NOx/H2O TRIP #1							
S4052- A30 .14W	.14W	30	NH3/NOx/H2O TRIP #2							
S4052- A31 .15W	.15W	31	NH3/NOx/H2O TRIP #3							

APPENDIX C
AMBIENT CONDITIONS

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WEATHER FOR VSS VAPOR SAMPLING OF C-108

Time on 8/5/94

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APPENDIX D
CHAIN-OF-CUSTODY FORMS

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Westinghouse Hanford Company	CHAIN OF CUSTODY	ORNL-006726
Custody Form Initiator Amy Dindal		
Company Contact Roger Jenkins		Telephone (615) 576-8594
Project Designation/Sampling Locations 241-C-108		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#479 ORNL Triple Sorbent Trap ✓	-TST#366 ORNL Trip Blank ✓
-TST#347 ORNL Triple Sorbent Trap ✓	-TST#229 ORNL Trip Blank ✓
-TST#485 ORNL Triple Sorbent Trap ✓	-TST#242 ORNL Trip Blank ✓
-TST#442 ORNL Triple Sorbent Trap ✓	-TST#476 ORNL Trip Blank ✓
-TST#296 ORNL Triple Sorbent Trap ✓	-TST#421 ORNL Trip Blank ✓
-TST#484 ORNL Triple Sorbent Trap ✓	-TST#433 ORNL Trip Blank ✓
-TST#369 ORNL Triple Sorbent Trap ✓	-TST#252 ORNL Field Blank ✓
-TST#338 ORNL Triple Sorbent Trap ✓	-TST#294 ORNL Field Blank ✓

[] Field Transfer of Custody			Chain of Possession			(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time		
<i>Amy B Dindal</i>	7/25/94	8:40AM	<i>T. B. C. Clark</i>	7-26-94	1530		
<i>T. B. C. Clark</i>	8-5-94	0845	<i>RA Worthing</i>	8-5-94	0845		
<i>RA Worthing</i>	8-5-94	0900	<i>T. B. C. Clark</i>	8-5-94	0900		
<i>T. B. C. Clark</i>	8-15-94	1320	<i>J. T. Skorn</i>	8-16-94	1351		
Final Sample Disposition							
Disposal Method:		Disposed by:			Date/Time:		
Comments:							

Westinghouse Hanford
Company

CHAIN OF CUSTODY

COPY

007671

Custody Form Initiator T.B. Utecht

Company Contact R.D. Mahon

Telephone 373-1101

Project Designation/Sampling Locations 241-C-108

Collection Date _____

Ice Chest No. N/A

Field Logbook No. N/A

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Gov't Vehicle #

Shipped to 222-S Labs ZOO WEST AREA

Possible Sample Hazards/Remarks NONE

Sample Identification

S4052041

T-1193

8-5-94 TB4

S4052042 S4052021

T-1194

S4052042

T-1195

S40520D2

T-1196

S40520T1

T-1197

☒ Field Transfer of Custody

CHAIN OF POSSESSION

(Sign and Print Name)

Relinquished By	Date	Time	Received By	Date	Time
<u>T.B. Utecht</u>	<u>8-5-94</u>	<u>0945</u>	<u>M. Leguis</u>	<u>8-5-94</u>	<u>0945</u>

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

Comments:

Westinghouse Hanford Company	CHAIN OF CUSTODY	WHC 007487
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Custody Form Initiator	J. A. Edwards	Telephone	(509)373 -0141
		Pager	85-3009
Company Contact	H. A. Westberg	Telephone	(509) 373-5734
Project Designation/Sampling Locations	200 East Tank Farm	Collection Date	07- - -94
241-C-108 Tank	Vapor Sample SAF S4052	Preparation Date	07- 2 5 -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

S4052 - A01 - 014	SAP Ref _____	Ambient air SUMMA #1, <u>Upwind VSS</u> (PNL)
S4052 - A02 - 015	SAP Ref _____	Ambient air SUMMA #2, <u>Through VSS</u> (PNL)
S4052 - A04 - 016	SAP Ref _____	SUMMA #4 (PNL)
S4052 - A06 - 017	SAP Ref _____	SUMMA #6 (PNL)
S4052 - A08 - 018	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 <i>J. A. Edwards</i>	07-26-94	0840	T. Urecht <i>T. B. Urecht</i>	07-26-94	0840	
<i>T. B. Urecht / T. B. Urecht</i>	08-5-94	0845	<i>H. Westberg / H. Westberg</i>	08-5-94	0845	
<i>H. A. Westberg / H. A. Westberg</i>	08-5-94	0900	<i>T. B. Urecht / T. B. Urecht</i>	08-5-94	0900	
<i>T. B. Urecht / T. B. Urecht</i>	08-5-94	1135	<i>J. A. Edwards / J. A. Edwards</i>	08-5-94	1135	

(Revised 02/28/94)

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

D-5

Final Sample Disposition

(Revised 02/28/94)

Field Transfer of Custody		Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
J. A. Edwards	07-26-94	944P	T. Uechi	07-26-94	0740
J. R. White	08-02-94	0830	K. A. White	8-5-94	0845
J. A. White	8-5-94	0900	J. A. White	8-5-94	0900
J. A. White	8-5-94	1135	J. A. White	8-5-94	1135

S4052 - A23	07W	✓	SAP Ref	—
S4052 - A24	08W	✓	SAP Ref	—
S4052 - A25	09W	✓	SAP Ref	—
S4052 - A26	10W	✓	SAP Ref	—
S4052 - A27	11W	✓	SAP Ref	—
S4052 - A28	12W	✓	SAP Ref	—
S4052 - A29	13W	✓	SAP Ref	—
S4052 - A30	14W	✓	SAP Ref	—
S4052 - A31	15W	✓	SAP Ref	—

NH ₃ /NO ₂ /H ₂ O (Trap # 1)	Line # 8
NH ₃ /NO ₂ /H ₂ O (Trap # 2)	Line # 10
NH ₃ /NO ₂ /H ₂ O (Trap # 3)	Line # 9
NH ₃ /NO ₂ /H ₂ O (Trap # 4)	Line # 10
NH ₃ /NO ₂ /H ₂ O (Trap # 5)	Line # 8
NH ₃ /NO ₂ /H ₂ O (Trap # 6)	Line # 10
NH ₃ /NO ₂ /H ₂ O (Trap Blank# 1)	
NH ₃ /NO ₂ /H ₂ O (Trap Blank# 2)	
NH ₃ /NO ₂ /H ₂ O (Trap Blank# 3)	

Sample Identification

Possible Sample Hazards/Remarks	Unknown at time of sampling

Shipped to

IND

Method of Shipment	Government Truck
1. By Air	1. By Air
2. By Sea	2. By Sea
3. By Land	3. By Land
4. By Rail	4. By Rail
5. By Road	5. By Road
6. By Water	6. By Water
7. By Pipeline	7. By Pipeline
8. By Cable	8. By Cable
9. By Balloon	9. By Balloon
10. By Rocket	10. By Rocket
11. By Helicopter	11. By Helicopter
12. By Submarine	12. By Submarine
13. By Satellite	13. By Satellite
14. By Drone	14. By Drone
15. By Space Shuttle	15. By Space Shuttle
16. By Rocket Ship	16. By Rocket Ship
17. By Space Station	17. By Space Station
18. By Spacecraft	18. By Spacecraft
19. By Space Probe	19. By Space Probe
20. By Space Telescope	20. By Space Telescope
21. By Space Station	21. By Space Station
22. By Spacecraft	22. By Spacecraft
23. By Space Probe	23. By Space Probe
24. By Space Telescope	24. By Space Telescope
25. By Space Station	25. By Space Station
26. By Spacecraft	26. By Spacecraft
27. By Space Probe	27. By Space Probe
28. By Space Telescope	28. By Space Telescope
29. By Space Station	29. By Space Station
30. By Spacecraft	30. By Spacecraft
31. By Space Probe	31. By Space Probe
32. By Space Telescope	32. By Space Telescope
33. By Space Station	33. By Space Station
34. By Spacecraft	34. By Spacecraft
35. By Space Probe	35. By Space Probe
36. By Space Telescope	36. By Space Telescope
37. By Space Station	37. By Space Station
38. By Spacecraft	38. By Spacecraft
39. By Space Probe	39. By Space Probe
40. By Space Telescope	40. By Space Telescope
41. By Space Station	41. By Space Station
42. By Spacecraft	42. By Spacecraft
43. By Space Probe	43. By Space Probe
44. By Space Telescope	44. By Space Telescope
45. By Space Station	45. By Space Station
46. By Spacecraft	46. By Spacecraft
47. By Space Probe	47. By Space Probe
48. By Space Telescope	48. By Space Telescope
49. By Space Station	49. By Space Station
50. By Spacecraft	50. By Spacecraft
51. By Space Probe	51. By Space Probe
52. By Space Telescope	52. By Space Telescope
53. By Space Station	53. By Space Station
54. By Spacecraft	54. By Spacecraft
55. By Space Probe	55. By Space Probe
56. By Space Telescope	56. By Space Telescope
57. By Space Station	57. By Space Station
58. By Spacecraft	58. By Spacecraft
59. By Space Probe	59. By Space Probe
60. By Space Telescope	60. By Space Telescope
61. By Space Station	61. By Space Station
62. By Spacecraft	62. By Spacecraft
63. By Space Probe	63. By Space Probe
64. By Space Telescope	64. By Space Telescope
65. By Space Station	65. By Space Station
66. By Spacecraft	66. By Spacecraft
67. By Space Probe	67. By Space Probe
68. By Space Telescope	68. By Space Telescope
69. By Space Station	69. By Space Station
70. By Spacecraft	70. By Spacecraft
71. By Space Probe	71. By Space Probe
72. By Space Telescope	72. By Space Telescope
73. By Space Station	73. By Space Station
74. By Spacecraft	74. By Spacecraft
75. By Space Probe	75. By Space Probe
76. By Space Telescope	76. By Space Telescope
77. By Space Station	77. By Space Station
78. By Spacecraft	78. By Spacecraft
79. By Space Probe	79. By Space Probe
80. By Space Telescope	80. By Space Telescope
81. By Space Station	81. By Space Station
82. By Spacecraft	82. By Spacecraft
83. By Space Probe	83. By Space Probe
84. By Space Telescope	84. By Space Telescope
85. By Space Station	85. By Space Station
86. By Spacecraft	86. By Spacecraft
87. By Space Probe	87. By Space Probe
88. By Space Telescope	88. By Space Telescope
89. By Space Station	89. By Space Station
90. By Spacecraft	90. By Spacecraft
91. By Space Probe	91. By Space Probe
92. By Space Telescope	92. By Space Telescope
93. By Space Station	93. By Space Station
94. By Spacecraft	94. By Spacecraft
95. By Space Probe	95. By Space Probe
96. By Space Telescope	96. By Space Telescope
97. By Space Station	97. By Space Station
98. By Spacecraft	98. By Spacecraft
99. By Space Probe	99. By Space Probe
100. By Space Telescope	100. By Space Telescope

Bill of Lading/Airbill No.

Y/N

Ice Chest No.

Ice Chest No. (VSS Truck)

Project Designation/Sampling Locations 200 East Tank Farm
241-C-108 Tank Vapor Sample SAF S4052

Custody Form Initiator

J. A. Edwards

Telephone
Hager

85-3008
373-0141 (609)

Company Contact

R. A. Westberg

Telephone

(509) 373-5734

Collection Date

07-04-

Field Logbook No.

WCH-

Offsite Property No. N/A

Y/N

Government Truck

Sample job _____

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Custody Form Initiator J. A. Edwards (PNL)

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-108 Tank Vapor Sample SAF S4052

Ice Chest No. (VSS Truck)

Collection Date 0 7- -9 4

Preparation Date 0 7- 2 5 -9 4

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 OGI

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S4052 - A03 . 011

SAP Ref _____

SUMMA #3 (OGI)

S4052 - A05 . 012

SAP Ref _____

SUMMA #5 (OGI)

S4052 - A07 . 013

SAP Ref _____

SUMMA #7 (OGI)

☒ Field Transfer of Custody

☐ Chain of Possession

(Sign and Print
Names)

Relinquished By	Date	Time	Received By	Date	Time
J. A. Edwards	07-26-94		S. M. Brown	07-26-94	

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