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VAPOR & GAS SAMPLING OF SST 241C111 USING THE VAPOR SAMPLING SYSTEM

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7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE SEPTEMBER 13, 1994, SAMPLING OF SST 241-C-111 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_2O	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-111 USING THE VAPOR SAMPLING SYSTEM

1.0 SCOPE

The Vapor Issue Resolution Program tasked the Sampling and Mobile Laboratories (SML) to collect representative headspace samples from Hanford Site single-shell tank (SST) 241-C-111. This document presents sampling data resulting from the September 13, 1994, sampling of SST 241-C-111.

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-111 on September 13, 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 SUMMA[1] canister headspace samples from SST 241-C-111; subsequently, the team sent these samples to analytical laboratories for analysis.

The VSS comprises a mobile laboratory, a hot-water-jacketed stainless steel probe that is inserted into the tank headspace, and stainless steel transfer tubing that connects the mobile laboratory to the probe. A vacuum pump draws sample vapor from the tank headspace and through all transfer tubing and the sampling manifold. Electrically activated, pneumatically actuated valves direct sample flow within the VSS. Instrumentation housed in the mobile laboratory monitors and controls system temperature, monitors absolute and differential system pressure, meters and controls 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 is passed through the tube, which traps (by adsorption) virtually all the target

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

analytes. The sorbent trap is then sent to an analytical laboratory and analyzed. The concentration of analytes in the vapor sampled is calculated from the quantity of analyte found in the sorbent media and the volume of vapor passed through the sorbent trap.

The sorbent trap station uses highly accurate mass flow controllers to measure and control the flow rate of sample vapor through the sorbent traps. The controllers are located downstream of the sorbent trap station and the in-line driers, which remove water vapor from the vapor before the vapor is metered. Errors associated with the mass flow controllers were determined by the Westinghouse Hanford Company (WHC) Standards Laboratory before the SST 241-C-111 sampling (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. SUMMA™ canisters are stainless steel vessels with internal surfaces that have been prepared by the SUMMA™ process, which passivates active sites on the canister walls to minimize adsorption of gases and vapors. An analytical laboratory must clean and evacuate SUMMA™ canisters before use. The evacuated canister is filled with sample vapor through a 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 where the sample is analyzed. 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 Tanks 241-C-101, 241-C-102, 241-C-107, 241-C-108, 241-C-109, 241-C-110, 241-C-111, AND 241C-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. These key sampling parameters are summarized on the sample log sheets 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 S4-060.

3.2 OPERATIONS AND SAMPLING PERSONNEL

M. C. Jones was the Tank Farm Operations person-in-charge. The other SML vapor team members included:

E. A. Johnson, Field Scientist
T. B. Utecht, VSS Technician
N. P. Buechler, VSS Technician.

The VSS was set up at SST 241-C-111 on September 12, 1994, and was allowed to warm up overnight. Sampling began shortly after 9:00 a.m. on September 13, 1994, and was completed by 3:00 p.m. the same day.

3.3 AMBIENT CONDITIONS

The day of the sampling event, September 13, 1994, was sunny and hot with very little wind. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 5 miles due west of 241-C SST farm, are provided in Appendix C.

3.4 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser 6 of SST 241-C-111. 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-111 on September 12, 1994. The team stabilized the VSS temperature zones by 9:00 a.m. on September 13, 1994, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-C-111 were 988 mbar (741.3 torr) and 26.6 °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.

Approximately 18 hours before the first samples were collected, the team began heating the VSS transfer tubing and sampling manifold. During this warmup period, the team maintained the VSS sampling manifold at a partial vacuum of about 300 mbar (225 torr).

Approximately 16 hours after heating began, the team purged the sampling manifold with ambient air for 30 minutes. The team collected two SUMMA™ canister samples of ambient air, one manually 10 meters upwind of the VSS

connection with SST 241-C-111, and one using the VSS sampling manifold. The former was collected to establish background levels of trace organic vapors, and the latter was collected to establish the cleanliness of the sampling manifold.

A leak check of the VSS sampling manifold and transfer tubing (up to the connection to the in-tank sampling probe) was performed. Leakage resulted in an increase of 3.33 mbar (2.5 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 7.7 mL/min at a 290 mbar (217.8 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 100 mL/min the dilution was approximately 0.6%, for TST traps sampled at 200 mL/min the dilution was approximately 0.3%, and for sorbent traps the dilution was approximately 0.3%.

The VSS was purged with sample vapor from SST 241-C-111 for 30 minute at a total flow rate of 5.45 L/min. This purge was performed to flush ambient air from the system and saturate the system's active adsorption sites. Because the volume of transfer tubing and the sampling manifold upstream of the sampling devices is estimated to be no more than 10 L, this purge provided about 16.4 air turnovers in the system.

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 organic vapors, ammonia (NH_3), nitrogen dioxide (NO_2), nitric oxide (NO), and water vapor (H_2O).

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 September 13, 1994, SST 241-C-111 vapor sampling event was drawn through a series of four glass-fiber high-efficiency particulate air (HEPA) filters placed upstream of the sampling manifold. These four filters were in place any time tank headspace vapor, gases, and vapors were flowing through the system. When sampling was complete, the filters were removed and assigned unique sample identifiers. All four HEPA filters were submitted to Laboratory 222-S for total alpha, total beta, and gamma energy analysis (GEA). The HEPA filter closest to the sampling manifold was analyzed to determine if the samples met DOT shipping criteria and laboratory acceptance criteria. SST 241-C-111 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. SST 241-C-111 tritium sample results are shown in Table 2. The results in Table 2 indicate that the samples collected from SST 241-C-111 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 (box)	S4060-A31.0U1	Total Alpha = 23.8 Total Beta = 196 GEA = <detectable	= .008 = .664 = <detectable
Downstream HEPA filter (box)	S4060-A32.0D1	Total Alpha = 5.1 Total Beta = <.584 GEA = <detectable	= .02 = <.002 = <detectable
Upstream HEPA filter (VSS)	S4060-A33.0U2	Total Alpha = 3.38 Total Beta = <.807 GEA = <detectable	= .01 = <.003 = <detectable
Downstream HEPA filter (VSS)	S4060-A34.0D2	Total Alpha = <2.21 Total Beta = <5.84 GEA = <detectable	= 0.007 = <0.002 = <detectable
Tritium trap	S4060-A03.0T1	Total activity = <50	= <50.0[c]

NOTES:

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

[a]All less than (<) values represent the minimum detection limits at Laboratory 222-S.

[b]Numbers 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 295 L.

[c]Number 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 sample media was received, inventoried against the COC forms, and the "received by" block on the COC form was signed by SML. They were maintained at 4 ±2 °C before and after the sampling event in a refrigeration unit.

The TSTs were shipped back to ORNL after the sampling event using offsite property control (OPC W94-0-0944-4). Table 3 lists the sample identifiers, sample types, and COC form numbers for all ORNL samples. The samples were delivered for transport on September 15, 1994, and shipped by Federal Express for next-day delivery.

Table 3. Oak Ridge National Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S4060-A10.802	TST	006733
S4060-A11.824	TST	006733
S4060-A14.781	TST	006733
S4060-A15.844	TST	006733
S4060-A16.773	TST	006733
S4060-A17.826	TST	006733
S4060-A18.762	TST	006733
S4060-A19.857	TST	006733
S4060-A20.747	TST trip blank	006733
S4060-A21.776	TST trip blank	006733

Sorbent trains and SUMMA™ canister sampling devices were supplied with COC forms by PNL. Sampling devices were picked up from PNL by SML and transported in a government vehicle to a custody locker.

After sampling, the PNL sorbent traps and SUMMA™ canisters were transported by government vehicle directly to PNL and delivered to J. A. Edwards on September 13, 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
S4060-A01.213	Ambient upwind SUMMA™	007519
S4060-A02.214	Ambient SUMMA™ (VSS)	007519
S4060-A05.215	SUMMA™	007519
S4060-A07.216	SUMMA™	007519
S4060-A09.217	SUMMA™	007519
S4060-A22.22V	$NH_3/NO_2/NO/H_2O$ sorbent	007520
S4060-A23.23V	$NH_3/NO_2/NO/H_2O$ sorbent	007520
S4060-A24.24V	$NH_3/NO_2/NO/H_2O$ sorbent	007520
S4060-A25.25V	$NH_3/NO_2/NO/H_2O$ sorbent	007520
S4060-A26.26V	$NH_3/NO_2/NO/H_2O$ sorbent	007520
S4060-A27.27V	$NH_3/NO_2/NO/H_2O$ sorbent	007520
S4060-A28.28V	$NH_3/NO_2/NO/H_2O$ trip blank	007520
S4060-A29.29V	$NH_3/NO_2/NO/H_2O$ trip blank	007520
S4060-A30.30V	$NH_3/NO_2/NO/H_2O$ trip blank	007520

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 supplied by OGIST were shipped back to OGI using OPC W94-0-0944-3. Table 5 lists the sample identifiers, sample types, and COC form numbers for all OGIST samples. These samples were shipped on September 15, 1994, according to instructions from the Vapor Issue Resolution Program, by Federal Express for next-day delivery.

Table 5. Oregon Graduate Institute Samples.

Sample Identifier	Sample Type	COC Number
S4060-A04.H234	SUMMA™	007909
S4060-A06.H235	SUMMA™	007909
S4060-A08.H236	SUMMA™	007909

From the time that samples are received by SML until they are shipped back to the analytical laboratory, COC is maintained by SML 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-111, the VSS manifold was heated to 50 °C and ambient air was purged through the system for 1 hour. 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 1 hour 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-111. 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 it was installed in SST 241-C-111. This procedure requires a solvent rinse of all internal probe surfaces with acetone and methanol to clear the sample line of possible contamination remaining from the construction process. The probes are then heated to 90 °C and dry air is passed through the probe to evaporate the solvents. Before the probes are released, the team ensures, using a hand-held organic vapor meter, 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 upwind of SST 241-C-111 and a second canister was filled with ambient air using the VSS sampling manifold. 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. VSS instrumentation calibration data, maintained in files by SML, is summarized in Table 6. According to the calibration schedule shown in Table 6, all instrumentation was within its calibration period during the SST 241-C-111 sampling event.

Table 6. Calibration Data.

System	Calibration Date	Expiration Date	WHC Standards Laboratory Code
Temperature Control System	04/21/94	04/21/95	804-67-74-009
Mass Flow System	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.

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-111.

Table 7. Blank Samples.

Sample Identifier	Blank Type	Sample Media
S4060-A01.213	Ambient	SUMMA™
S4060-A02.214	Ambient through VSS	SUMMA™
S4060-A20.747	Trip	TST
S4060-A21.776	Trip	TST
S4060-A28.28V	Trip	$NH_3/NO_2/NO/H_2O$
S4060-A29.29V	Trip	$NH_3/NO_2/NO/H_2O$
S4060.A30.30V	Trip	$NH_3/NO_2/NO/H_2O$

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-111. 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.

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APPENDIX A

SAMPLING AND ANALYSIS PLAN

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Sampling and Analysis Plan for

Vapor and Gas Sampling Tanks

241-C-101, 241-C-102, 241-C-107, 241-C-108,

241-C-109, 241-C-110, 241-C-111, and 241-C-112

Using the Vapor Sampling System

Rev. 0 (July 29, 1994)

APPROVAL SIGN-OFF SHEET

Sampling and Analysis Plan for

Vapor and Gas Sampling Tanks

241-C-101, 241-C-102, 241-C-107, 241-C-108,

241-C-109, 241-C-110, 241-C-111, and 241-C-112

Using the Vapor Sampling System

Rev. 0 (July 29, 1994)

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Rick Mahon for Jeannette Hyatt

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1.0 Introduction

This document provides information for collection and subsequent analysis of vapor samples from waste tanks 241-C-101, 241-C-102, 241-C-107, 241-C-108, 241-C-109, 241-C-110, 241-C-111, and 241-C-112. 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 waste tanks 241-C-101, 241-C-102, 241-C-107, 241-C-108, 241-C-109, 241-C-110, 241-C-111, and 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 (NO_2)
  - Water vapor (H_2O)
  - Ammonia (NH_3)

- 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 probes installed in the tanks.

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:

  SXXXX-WYY.LLL, where:

  XXXX = unique number assigned to the sampling event
  = 4056 for tank 241-C-101
  = 4057 for tank 241-C-102
  = 4058 for tank 241-C-107
  = 4052 for tank 241-C-108
  = 4053 for tank 241-C-109

	=	4059 for tank 241-C-110
	=	4060 for tank 241-C-111
	=	4054 for tank 241-C-112
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
LLL	=	a special lab assigned code

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.

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:

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) Collect samples per Tables 2A, 2B, 2C, 2D, 2E, 2F, 2G, and 2H.

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.

Tables 2A, 2B, 2C, 2D, 2E, 2F, 2G, and 2H list the sampling conditions, flow rates, and sampling times to be followed during sorbent tube sampling of the 8 C-farm waste tanks.

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.

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. Tables 2A, 2B, 2C, 2D, 2E, 2F, 2G, and 2H specify 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 used to confirm that the SUMMA canisters meet all transportation and shipping requirements.

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;
- 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 that 10% of the amount found in the primary section. Alternatively breakthrough may be addressed by sampling over a range of sample volumes.

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
- 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.

Table 1 - Sampling Information

Analytes	Media	Sample Type	Number of Samples	Flow Rate (mL/min)	Sample Time (min)	Analysis
Organics H_2, N_2O, 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[3]	N/A	N/A	
NH_3, NO_2, NO, and H_2O	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.

[3] 6 TST trip blanks will be used for tank 241-C-108.

Table 2A - Tank 241-C-101
Sample Event S4056
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-101		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	100 mL/min	2 min
11	COLLECT TST #2	Sorbent line 10	100 mL/min	2 min
12	OPEN, CLOSE, & STORE TST FIELD BLANK #1			
13	COLLECT TST #3	Sorbent line 9	100 mL/min	2 min
14	COLLECT TST #4	Sorbent line 10	100 mL/min	2 min
15	COLLECT TST #5	Sorbent line 8	200 mL/min	5 min
16	COLLECT TST #6	Sorbent line 10	200 mL/min	5 min
17	OPEN, CLOSE, & STORE TST FIELD BLANK #2			
18	COLLECT TST #7	Sorbent line 9	200 mL/min	5 min

Tank Farm 241-C Vapor Sampling and Analysis Plan

SAMPLE CODE	SAMPLE/ACTIVITY DESCRIPTION	SAMPLE POSITION	FLOW RATE	SAMPLE TIME
19	COLLECT TST #8	Sorbent line 10	200 mL/min	5 min
20,21	STORE TST TRIP BLANKS #1 & 2			
22	COLLECT $NH_3/NO_x/H_2O$ TRAP #1	Sorbent line 8	200 mL/min	15 min
23	COLLECT $NH_3/NO_x/H_2O$ TRAP #2	Sorbent line 10	200 mL/min	15 min
24	COLLECT $NH_3/NO_x/H_2O$ TRAP #3	Sorbent line 9	200 mL/min	15 min
25	COLLECT $NH_3/NO_x/H_2O$ TRAP #4	Sorbent line 10	200 mL/min	15 min
26	COLLECT $NH_3/NO_x/H_2O$ TRAP #5	Sorbent line 8	200 mL/min	15 min
27	COLLECT $NH_3/NO_x/H_2O$ TRAP #6	Sorbent line 10	200 mL/min	15 min
28,29, 30	STORE $NH_3/NO_x/H_2O$ TRAP TRIP BLANKS #1, 2, & 3			
31	REMOVE UPSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
32	REMOVE DOWNSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
33	REMOVE UPSTREAM HEPA FILTER FROM VSS			
34	REMOVE DOWNSTREAM HEPA FILTER FROM VSS			

Table 2B - Tank 241-C-102
Sample Event S4057
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-102		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	50 mL/min	2 min
11	COLLECT TST #2	Sorbent line 10	50 mL/min	2 min
12	OPEN, CLOSE, & STORE TST FIELD BLANK #1			
13	COLLECT TST #3	Sorbent line 9	50 mL/min	2 min
14	COLLECT TST #4	Sorbent line 10	50 mL/min	2 min
15	COLLECT TST #5	Sorbent line 8	100 mL/min	5 min
16	COLLECT TST #6	Sorbent line 10	100 mL/min	5 min
17	OPEN, CLOSE, & STORE TST FIELD BLANK #2			
18	COLLECT TST #7	Sorbent line 9	100 mL/min	5 min

Tank Farm 241-C Vapor Sampling and Analysis Plan

SAMPLE CODE	SAMPLE/ACTIVITY DESCRIPTION	SAMPLE POSITION	FLOW RATE	SAMPLE TIME
19	COLLECT TST #8	Sorbent line 10	100 mL/min	5 min
20,21	STORE TST TRIP BLANKS #1 & 2			
22	COLLECT $NH_3/NO_x/H_2O$ TRAP #1	Sorbent line 8	200 mL/min	15 min
23	COLLECT $NH_3/NO_x/H_2O$ TRAP #2	Sorbent line 10	200 mL/min	15 min
24	COLLECT $NH_3/NO_x/H_2O$ TRAP #3	Sorbent line 9	200 mL/min	15 min
25	COLLECT $NH_3/NO_x/H_2O$ TRAP #4	Sorbent line 10	200 mL/min	15 min
26	COLLECT $NH_3/NO_x/H_2O$ TRAP #5	Sorbent line 8	200 mL/min	15 min
27	COLLECT $NH_3/NO_x/H_2O$ TRAP #6	Sorbent line 10	200 mL/min	15 min
28,29, 30	STORE $NH_3/NO_x/H_2O$ TRAP TRIP BLANKS #1, 2, & 3			
31	REMOVE UPSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
32	REMOVE DOWNSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
33	REMOVE UPSTREAM HEPA FILTER FROM VSS			
34	REMOVE DOWNSTREAM HEPA FILTER FROM VSS			

Table 2C - Tank 241-C-107
Sample Event S4058
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-107		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	100 mL/min	5 min
11	COLLECT TST #2	Sorbent line 10	100 mL/min	5 min
12	OPEN, CLOSE, & STORE TST FIELD BLANK #1			
13	COLLECT TST #3	Sorbent line 9	100 mL/min	5 min
14	COLLECT TST #4	Sorbent line 10	100 mL/min	5 min
15	COLLECT TST #5	Sorbent line 8	200 mL/min	10 min
16	COLLECT TST #6	Sorbent line 10	200 mL/min	10 min
17	OPEN, CLOSE, & STORE TST FIELD BLANK #2			
18	COLLECT TST #7	Sorbent line 9	200 mL/min	10 min

Tank Farm 241-C Vapor Sampling and Analysis Plan

SAMPLE CODE	SAMPLE/ACTIVITY DESCRIPTION	SAMPLE POSITION	FLOW RATE	SAMPLE TIME
19	COLLECT TST #8	Sorbent line 10	200 mL/min	10 min
20,21	STORE TST TRIP BLANKS #1 & 2			
22	COLLECT $NH_3/NO_x/H_2O$ TRAP #1	Sorbent line 8	200 mL/min	15 min
23	COLLECT $NH_3/NO_x/H_2O$ TRAP #2	Sorbent line 10	200 mL/min	15 min
24	COLLECT $NH_3/NO_x/H_2O$ TRAP #3	Sorbent line 9	200 mL/min	15 min
25	COLLECT $NH_3/NO_x/H_2O$ TRAP #4	Sorbent line 10	200 mL/min	15 min
26	COLLECT $NH_3/NO_x/H_2O$ TRAP #5	Sorbent line 8	200 mL/min	15 min
27	COLLECT $NH_3/NO_x/H_2O$ TRAP #6	Sorbent line 10	200 mL/min	15 min
28,29, 30	STORE $NH_3/NO_x/H_2O$ TRAP TRIP BLANKS #1, 2, & 3			
31	REMOVE UPSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
32	REMOVE DOWNSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
33	REMOVE UPSTREAM HEPA FILTER FROM VSS			
34	REMOVE DOWNSTREAM HEPA FILTER FROM VSS			

Table 2D - Tank 241-C-108
Sample Event S4052
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 TANK 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	100 mL/min	5 min
10	COLLECT TST #2	Sorbent line 10	100 mL/min	5 min
11	OPEN, CLOSE, & STORE TST FIELD BLANK #1			
12	COLLECT TST #3	Sorbent line 9	100 mL/min	5 min
13	COLLECT TST #4	Sorbent line 10	100 mL/min	5 min
14	COLLECT TST #5	Sorbent line 8	200 mL/min	10 min
15	COLLECT TST #6	Sorbent line 10	200 mL/min	10 min
16	OPEN, CLOSE, & STORE TST FIELD BLANK #2			

Tank Farm 241-C Vapor Sampling and Analysis Plan

SAMPLE CODE	SAMPLE/ACTIVITY DESCRIPTION	SAMPLE POSITION	FLOW RATE	SAMPLE TIME
17	COLLECT TST #7	Sorbent line 9	200 mL/min	10 min
18	COLLECT TST #8	Sorbent line 10	200 mL/min	10 min
19,20,21,22,37,38	STORE TST TRIP BLANKS #1, 2, 3, 4, 5 & 6			
23	COLLECT $NH_3/NO_x/H_2O$ TRAP #1	Sorbent line 8	200 mL/min	15 min
24	COLLECT $NH_3/NO_x/H_2O$ TRAP #2	Sorbent line 10	200 mL/min	15 min
25	COLLECT $NH_3/NO_x/H_2O$ TRAP #3	Sorbent line 9	200 mL/min	15 min
26	COLLECT $NH_3/NO_x/H_2O$ TRAP #4	Sorbent line 10	200 mL/min	15 min
27	COLLECT $NH_3/NO_x/H_2O$ TRAP #5	Sorbent line 8	200 mL/min	15 min
28	COLLECT $NH_3/NO_x/H_2O$ TRAP #6	Sorbent line 10	200 mL/min	15 min
29,30,31	STORE $NH_3/NO_x/H_2O$ 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			
35	REMOVE UPSTREAM HEPA FILTER FROM VSS			
36	REMOVE DOWNSTREAM HEPA FILTER FROM VSS			

Table 2E - Tank 241-C-109
Sample Event S4053
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-109		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	100 mL/min	5 min
11	COLLECT TST #2	Sorbent line 10	100 mL/min	5 min
12	OPEN, CLOSE, & STORE TST FIELD BLANK #1			
13	COLLECT TST #3	Sorbent line 9	100 mL/min	5 min
14	COLLECT TST #4	Sorbent line 10	100 mL/min	5 min
15	COLLECT TST #5	Sorbent line 8	200 mL/min	10 min
16	COLLECT TST #6	Sorbent line 10	200 mL/min	10 min
17	OPEN, CLOSE, & STORE TST FIELD BLANK #2			
18	COLLECT TST #7	Sorbent line 9	200 mL/min	10 min

SAMPLE CODE	SAMPLE/ACTIVITY DESCRIPTION	SAMPLE POSITION	FLOW RATE	SAMPLE TIME
19	COLLECT TST #8	Sorbent line 10	200 mL/min	10 min
20,21	STORE TST TRIP BLANKS #1 & 2			
22	COLLECT $NH_3/NO_x/H_2O$ TRAP #1	Sorbent line 8	200 mL/min	15 min
23	COLLECT $NH_3/NO_x/H_2O$ TRAP #2	Sorbent line 10	200 mL/min	15 min
24	COLLECT $NH_3/NO_x/H_2O$ TRAP #3	Sorbent line 9	200 mL/min	15 min
25	COLLECT $NH_3/NO_x/H_2O$ TRAP #4	Sorbent line 10	200 mL/min	15 min
26	COLLECT $NH_3/NO_x/H_2O$ TRAP #5	Sorbent line 8	200 mL/min	15 min
27	COLLECT $NH_3/NO_x/H_2O$ TRAP #6	Sorbent line 10	200 mL/min	15 min
28,29, 30	STORE $NH_3/NO_x/H_2O$ TRAP TRIP BLANKS #1, 2, & 3			
31	REMOVE UPSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
32	REMOVE DOWNSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
33	REMOVE UPSTREAM HEPA FILTER FROM VSS			
34	REMOVE DOWNSTREAM HEPA FILTER FROM VSS			

Table 2F - Tank 241-C-110
Sample Event S4059
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-110		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	100 mL/min	5 min
11	COLLECT TST #2	Sorbent line 10	100 mL/min	5 min
12	OPEN, CLOSE, & STORE TST FIELD BLANK #1			
13	COLLECT TST #3	Sorbent line 9	100 mL/min	5 min
14	COLLECT TST #4	Sorbent line 10	100 mL/min	5 min
15	COLLECT TST #5	Sorbent line 8	200 mL/min	10 min
16	COLLECT TST #6	Sorbent line 10	200 mL/min	10 min
17	OPEN, CLOSE, & STORE TST FIELD BLANK #2			
18	COLLECT TST #7	Sorbent line 9	200 mL/min	10 min

Tank Farm 241-C Vapor Sampling and Analysis Plan

SAMPLE CODE	SAMPLE/ACTIVITY DESCRIPTION	SAMPLE POSITION	FLOW RATE	SAMPLE TIME
19	COLLECT TST #8	Sorbent line 10	200 mL/min	10 min
20,21	STORE TST TRIP BLANKS #1 & 2			
22	COLLECT $NH_3/NO_x/H_2O$ TRAP #1	Sorbent line 8	200 mL/min	15 min
23	COLLECT $NH_3/NO_x/H_2O$ TRAP #2	Sorbent line 10	200 mL/min	15 min
24	COLLECT $NH_3/NO_x/H_2O$ TRAP #3	Sorbent line 9	200 mL/min	15 min
25	COLLECT $NH_3/NO_x/H_2O$ TRAP #4	Sorbent line 10	200 mL/min	15 min
26	COLLECT $NH_3/NO_x/H_2O$ TRAP #5	Sorbent line 8	200 mL/min	15 min
27	COLLECT $NH_3/NO_x/H_2O$ TRAP #6	Sorbent line 10	200 mL/min	15 min
28,29, 30	STORE $NH_3/NO_x/H_2O$ TRAP TRIP BLANKS #1, 2, & 3			
31	REMOVE UPSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
32	REMOVE DOWNSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
33	REMOVE UPSTREAM HEPA FILTER FROM VSS			
34	REMOVE DOWNSTREAM HEPA FILTER FROM VSS			

Table 2G - Tank 241-C-111
Sample Event S4060
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-111		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	100 mL/min	5 min
11	COLLECT TST #2	Sorbent line 10	100 mL/min	5 min
12	OPEN, CLOSE, & STORE TST FIELD BLANK #1			
13	COLLECT TST #3	Sorbent line 9	100 mL/min	5 min
14	COLLECT TST #4	Sorbent line 10	100 mL/min	5 min
15	COLLECT TST #5	Sorbent line 8	200 mL/min	10 min
16	COLLECT TST #6	Sorbent line 10	200 mL/min	10 min
17	OPEN, CLOSE, & STORE TST FIELD BLANK #2			
18	COLLECT TST #7	Sorbent line 9	200 mL/min	10 min

Tank Farm 241-C Vapor Sampling and Analysis Plan

SAMPLE CODE	SAMPLE/ACTIVITY DESCRIPTION	SAMPLE POSITION	FLOW RATE	SAMPLE TIME
19	COLLECT TST #8	Sorbent line 10	200 mL/min	10 min
20,21	STORE TST TRIP BLANKS #1 & 2			
22	COLLECT $NH_3/NO_x/H_2O$ TRAP #1	Sorbent line 8	200 mL/min	15 min
23	COLLECT $NH_3/NO_x/H_2O$ TRAP #2	Sorbent line 10	200 mL/min	15 min
24	COLLECT $NH_3/NO_x/H_2O$ TRAP #3	Sorbent line 9	200 mL/min	15 min
25	COLLECT $NH_3/NO_x/H_2O$ TRAP #4	Sorbent line 10	200 mL/min	15 min
26	COLLECT $NH_3/NO_x/H_2O$ TRAP #5	Sorbent line 8	200 mL/min	15 min
27	COLLECT $NH_3/NO_x/H_2O$ TRAP #6	Sorbent line 10	200 mL/min	15 min
28,29, 30	STORE $NH_3/NO_x/H_2O$ TRAP TRIP BLANKS #1, 2, & 3			
31	REMOVE UPSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
32	REMOVE DOWNSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
33	REMOVE UPSTREAM HEPA FILTER FROM VSS			
34	REMOVE DOWNSTREAM HEPA FILTER FROM VSS			

Table 2H - Tank 241-C-112
Sample Event S4054
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	100 mL/min	5 min
11	COLLECT TST #2	Sorbent line 10	100 mL/min	5 min
12	OPEN, CLOSE, & STORE TST FIELD BLANK #1			
13	COLLECT TST #3	Sorbent line 9	100 mL/min	5 min
14	COLLECT TST #4	Sorbent line 10	100 mL/min	5 min
15	COLLECT TST #5	Sorbent line 8	200 mL/min	10 min
16	COLLECT TST #6	Sorbent line 10	200 mL/min	10 min
17	OPEN, CLOSE, & STORE TST FIELD BLANK #2			
18	COLLECT TST #7	Sorbent line 9	200 mL/min	10 min

Tank Farm 241-C Vapor Sampling and Analysis Plan

SAMPLE CODE	SAMPLE/ACTIVITY DESCRIPTION	SAMPLE POSITION	FLOW RATE	SAMPLE TIME
19	COLLECT TST #8	Sorbent line 10	200 mL/min	10 min
20,21	STORE TST TRIP BLANKS #1 & 2			
22	COLLECT $NH_3/NO_x/H_2O$ TRAP #1	Sorbent line 8	200 mL/min	15 min
23	COLLECT $NH_3/NO_x/H_2O$ TRAP #2	Sorbent line 10	200 mL/min	15 min
24	COLLECT $NH_3/NO_x/H_2O$ TRAP #3	Sorbent line 9	200 mL/min	15 min
25	COLLECT $NH_3/NO_x/H_2O$ TRAP #4	Sorbent line 10	200 mL/min	15 min
26	COLLECT $NH_3/NO_x/H_2O$ TRAP #5	Sorbent line 8	200 mL/min	15 min
27	COLLECT $NH_3/NO_x/H_2O$ TRAP #6	Sorbent line 10	200 mL/min	15 min
28,29, 30	STORE $NH_3/NO_x/H_2O$ TRAP TRIP BLANKS #1, 2, & 3			
31	REMOVE UPSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
32	REMOVE DOWNSTREAM HEPA FILTER FROM HEPA TRANSFER BOX			
33	REMOVE UPSTREAM HEPA FILTER FROM VSS			
34	REMOVE DOWNSTREAM HEPA FILTER FROM VSS			

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_2O (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

Table 4 - Quality Control Samples

Samples to be Collected	Number and Type of QC Samples
SUMMA Canisters	1 Cleanliness sample 1 Ambient sample
$NH_3/NO_x/H_2O$ sorbent tubes	3 Trip Blanks/analyte
TSTs	2 Trip blanks[4] 2 Field Blanks

[4] 6 trip blanks will be used for tank 241-C-108.

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APPENDIX B

SAMPLE LOG SHEETS

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Waste Tank
241-C-111

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

Ensure HEPA filters are installed

Ensure connection to sample probe

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

Date: 13 Sept. '94

VSS Personnel: E.A. Johnson

T. Utecht

Trailer Personnel: N. Beuchler

WHC Sample ID	OGI/ORNL SAP Referenc Sample ID	Number	Description	Desired Flow Rate	Desired Duration (min.)	Actual Start Time	Actual End Time	Actual Total Time	Desired Total Flow	Port Valve #
Group # 1										
Purge with ambient air for 30 min.					30 min	09:25	09:55	30 min		
S4060- A01 .213	213	1	AMBIENT #1 (PNL)		1	10:00	10:01	1 min		upwind
GC Run #1						10:16				
S4060- A02 .214	214	2	AMBIENT #2 (PNL)		1	10:22	10:23	1 min		15
Leak check (Appendix A)		Leak Rate	10.0 Torr/Hr.							
Purge with tank air for 30 min.					30 min	10:55	11:25	30 min		
Measure tank pressure			PE-1 = 741.3 Torr							
S4060- A03 ,0T1	T1319(222S)	3	Tritium Trap	210.2	5	11:33	11:38	5 min	1051	9
GC Run # 2						11:45				
S4060- A04 .H234	H-234	4	SUMMA #3 (OGI)		1	11:53	11:54	1 min		11
S4060- A05 .215	215	5	SUMMA #4 (PNL)		1	11:58	11:59	1 min		12
S4060- A06 .H235	H-235	6	SUMMA #5 (OGI)		1	12:03	12:04	1 min		13
S4060- A07 .216	216	7	SUMMA #6 (PNL)		1	12:08	12:09	1 min		14
S4060- A08 .H236	H-236	8	SUMMA #7 (OGI)		1	12:13	12:14	1 min		15
S4060- A09 .217	217	9	SUMMA #8 (PNL)		1	12:18	12:19	1 min		16

Waste Tank
241-C-111

WHC Sample ID	OGI/ORNL SAP Referenc Sample ID	Number	Description	Desired Flow Rate	Desired Duration (min.)	Actual Start Time	Actual End Time	Actual Total Time	Desired Total Flow	Port Valve #
S4060- A10 .802	TST# 802	10	TST #1	100	5	12:30	12:35	5 min	500	8
S4060- A11 .824	TST# 824	11	TST #2	100	5	12:30	12:35	5 min	500	10
GC Run # 3	(An extra GC r					12:54				
S4060- A12 .244	TST# 244	12	TST FIELD BLANK #1			12:57	12:58	1 min		ambient
S4060- A13 .835	TST# 835	13	TST #3	100	5	13:05	13:10	5 min	500	9
S4060- A14 .781	TST# 781	14	TST #4	100	5	13:05	13:10	5 min	500	10
S4060- A15 .844	TST# 844	15	TST #5	200	10	13:17:17	13:27:17	10 min	2000	8
S4060- A16 .773	TST# 773	16	TST #6	200	10	13:17:18	13:27:18	10 min	2000	10
S4060- A17 .826	TST# 826	17	TST FIELD BLANK #2			13:32:30	13:33:30	1 min		ambient
S4060- A18 .762	TST# 762	18	TST #7	200	10	13:36	13:46	10 min	2000	9
S4060- A19 .857	TST# 857	19	TST #8	200	10	13:36	13:46	10 min	2000	10
S4060- A22 .22V	22V	22	NH3/NOx/H2O #1	200	15	13:55	14:10	15 min	3000	8
S4060- A23 .23V	23V	23	NH3/NOx/H2O #2	200	15	13:55	14:10	15 min	3000	10
S4060- A24 .24V	24V	24	NH3/NOx/H2O #3	200	15	14:16	14:31	15 min	3000	9
S4060- A25 .25V	25V	25	NH3/NOx/H2O #4	200	15	14:16	14:31	15 min	3000	10
S4060- A26 .26V	26V	26	NH3/NOx/H2O #5	200	15	14:35	14:50	15 min	3000	8
S4060- A27 .27V	27V	27	NH3/NOx/H2O #6	200	15	14:35	14:50	15 min	3000	10

Waste Tank
241-C-111

WHC Sample ID	OGI/ORNL SAP Referenc Sample ID	Number	Description	Desired Flow Rate	Desired Duration (min.)	Actual Start Time	Actual End Time	Actual Total Time	Desired Total Flow	Port Valve #
S4060- A31 .0U1	T1320(222S)	31	Upstream HEPA(box)				15:10			
S4060- A32 .0D1	T1321(222S)	32	Downstream HEPA(box)				15:10			
S4060- A33 .0U2	T1322(222S)	33	Upstream HEPA (VSS)				15:10			
S4060- A34 .0D2	T1323(222S)	34	Downstream HEPA (VSS)				15:10			

Trip Blanks (DO NOT EXPOSE)

S4060- A20 .747	TST# 747	20	TST TRIP #1							
S4060- A21 .776	TST# 776	21	TST TRIP #2							
S4060- A28 .28V	28V	28	NH3/NOx/H2O TRIP #1							
S4060- A29 .29V	29V	29	NH3/NOx/H2O TRIP #2							
S4060- A30 .30V	30V	30	NH3/NOx/H2O TRIP #3							

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APPENDIX C

AMBIENT CONDITIONS

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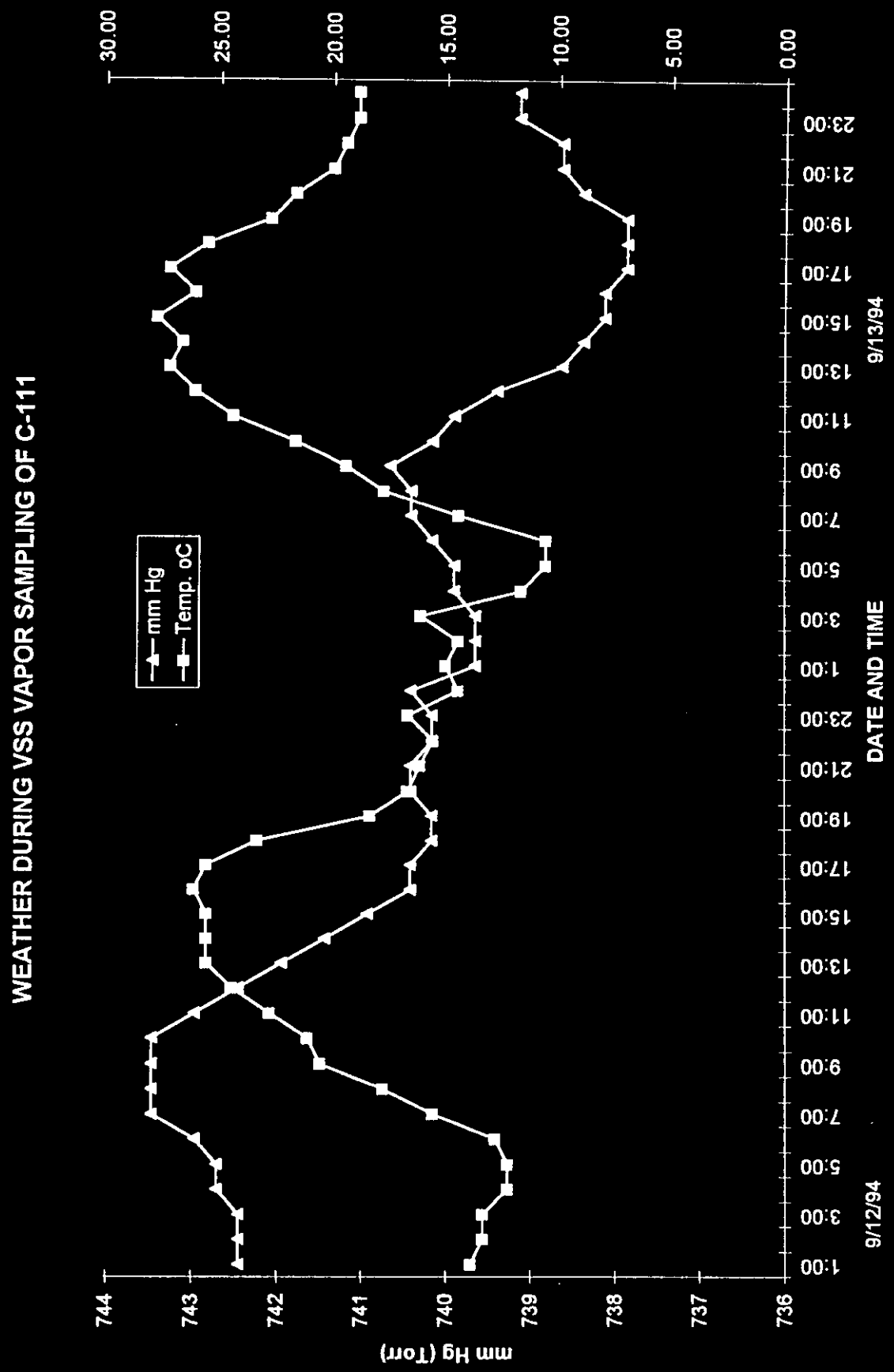
WEATHER DURING VSS VAPOR SAMPLING OF C-111
mm Hg
Temp. oC
mm Hg (Torr)
744
743
742
741
740
739
738
737
736
30.00
25.00
20.00
15.00
10.00
5.00
0.00
1:00
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7:00
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9/12/94
9/13/94
DATE AND TIME

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APPENDIX D

CHAIN-OF-CUSTODY FORMS

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Westinghouse Hanford Company | **CHAIN OF CUSTODY** | **WHC 007519**

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-111 Tank Vapor Sample SAF S4060
Ice Chest No. (VSS. Truck)

Collection Date: 08- 13 -94
Preparation Date: 08- 2 9 -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

S4060 - A01 - 213	SAP Ref ____	Ambient air SUMMA #1, Upwind VSS (PNL)
S4060 - A02 - 214	SAP Ref ____	Ambient air SUMMA #2, Through VSS (PNL)
S4060 - A05 - 215	SAP Ref ___	SUMMA #4 (PNL)
S4060 - A07 - 216	SAP Ref ___	SUMMA #6 (PNL)
S4060 - A09 - 217	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	08-29-94	1400	Tim Utecht	08-29-94	1400
[illegible]	9/13/94	1055	[illegible]	9/13/94	1055

(Revised 02/28/94)

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

A-6000-407 (12/92) WEF061

Westinghouse Hanford Company	CHAIN OF CUSTODY	WHC 007520

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-111 Tank Vapor Sample SAF S4060
Ice Chest No. (VSS Truck)

Collection Date: 09- 13 -94
Preparation Date: 08- 2 5 -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: WHC

Possible Sample Hazards/Remarks: Unknown at time of sampling

Sample Identification

S4060 - A22 . 22V	$NH_3/NO_x/H_2O$ (Trap # 1) Line # 8
S4060 - A23 . 23V	$NH_3/NO_x/H_2O$ (Trap # 2) Line #10
S4060 - A24 . 24V	$NH_3/NO_x/H_2O$ (Trap # 3) Line # 9
S4060 - A25 . 25V	$NH_3/NO_x/H_2O$ (Trap # 4) Line #10
S4060 - A26 . 26V	$NH_3/NO_x/H_2O$ (Trap # 5) Line # 8
S4060 - A27 . 27V	$NH_3/NO_x/H_2O$ (Trap # 6) Line #10
S4060 - A28 . 28V	$NH_3/NO_2/H_2O$ a-b-c (Trip Blank# 1)
S4060 - A29 . 29V	$NH_3/NO_2/H_2O$ a-b-c (Trip Blank# 2)
S4060 - A30 . 30V	$NH_3/NO_2/H_2O$ 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 / J. A. Edwards	08-29-94	1400	Tim Utecht / T. R. Utecht	08-29-94	1400
T. R. Utecht / T. R. Utecht	9/13/94	1055	J. A. Edwards / J. A. Edwards	9/13/94	1055

(Revised 02/28/94)

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

A-6000-407 (12/92) WEF061

Westinghouse Hanford Company

CHAIN OF CUSTODY

ORNL-006733

Custody Form Initiator: Amy Dindal
Company Contact: Roger Jenkins
Project Designation/Sampling Locations: VSS Sampling (C-111)
Ice Chest No.
Bill of Lading/Airbill No.
Method of Shipment: Federal Express
Shipped to: Rick Mahon
Possible Sample Hazards/Remarks: NONE

Telephone: (615) 576-8594
Collection Date
Field Logbook No.
Offsite Property No.

Sample Identification

- TST# 802 ORNL Triple Sorbent Trap
- TST# 824 ORNL Triple Sorbent Trap
- TST# 835 ORNL Triple Sorbent Trap
- TST# 781 ORNL Triple Sorbent Trap
- TST# 844 ORNL Triple Sorbent Trap
- TST# 773 ORNL Triple Sorbent Trap
- TST# 762 ORNL Triple Sorbent Trap
- TST# 857 ORNL Triple Sorbent Trap
- TST# 747 ORNL Trip Blank
- TST# 776 ORNL Trip Blank
- TST# 244 ORNL Field Blank
- TST# 826 ORNL Field Blank

[ ] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

Relinquished By	Date	Time	Received By	Date	Time
A B Dindal	8/29/94	7:41 AM	E. A. Johnson	8/30/94	15:30
E A Johnson	9/13/94	16:35	T B Utsatt	9/13/94	1635
T B Utsatt	9/15/94	1000	A B Dindal	9/16/94	1448

Final Sample Disposition

Disposal Method: | Disposed by: | Date/Time:

Comments:

Temp @ Receipt 4.6°C

A-6000-407 (12/92) WEF061

Westinghouse Hanford Company	CHAIN OF CUSTODY

COPY 007900

Custody Form Initiator T. B Uttcht

Company Contact R. D. Mahon — Telephone 373-1101

Project Designation/Sampling Locations 241-C Tank 111 — Collection Date 9-13-94

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 200 west area

Possible Sample Hazards/Remarks NONE

Sample Identification

S4060-0T1	T1319
S4060-0U1	T-1320
S4060-0D1 (T34 9-12-94)	T-1321
S4060-0U2	T-1322
S4060-0D2	T-1323

☑ Field Transfer of Custody — CHAIN OF POSSESSION — (Sign and Print Name)

Relinquished By	Date	Time	Received By	Date	Time
T. B Uttcht	9/13/94	1715	[signature]	9-13-94	1715

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:

Comments:

A-6000-407 (12/92)