

## RMIS View/Print Document Cover Sheet

This document was retrieved from the Documentation and Records Management (DRM) ISEARCH System. It is intended for Information only and may not be the most recent or updated version. Contact a Document Service Center (see Hanford Info for locations) if you need additional retrieval information.

Accession #: D195062007

Document #: SD-WM-RPT-183

Title/Desc:

VAPOR & GAS SAMPLING OF SST 241-T-110 USING THE  
VAPOR SAMPLING SYSTEM

Pages: 39

2. To: (Receiving Organization) DISTRIBUTION	3. From: (Originating Organization) SAMPLING AND MOBILE LABS 0M624	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: VAPOR/HTS/SAMPLING AND MOBILE LABS	6. Cog. Engr.: RICKY MAHON 3-7437	7. Purchase Order No.: N/A
8. Originator Remarks: 241-T-110, SAMPLING USING THE VAPOR SAMPLING SYSTEM		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: M0292/WSCF
11. Receiver Remarks:		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 27 OCTOBER 95

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-WM-RPT-183	ALL	0	VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-T-110 USING THE VAPOR SAMPLING SYSTEM	Q	2	1	

16. KEY		
Approval Designator (F) E, S, Q, D or N/A (see WHC-CM-3-5, Sec. 12.7)	Reason for Transmittal (G) 1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	Disposition (H) & (I) 1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G)	(H)	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp
2	1	Cog. Eng. R.D. MAHON	<i>Rich Mahon</i>	24 Oct 95	S3-27	RESOURCE CENTER		R2-12		3	
2	1	Cog. Mgr. J.D. DORIAN	<i>J. Dorian</i>	19 Oct 95	S3-27	JAMES L. HUCKABY		K6-80		3	
2	2	QA C.J. STEPHAN	<i>C. J. Stephan</i>	11/1/95	T6-03						
3		DAVE BRATZEL			S7-21						
3		JOHN DEICHMAN			T6-03						
3		RAMPUR VISWANATH			S3-90						
3		CENTRAL FILES			A3-88						

18. Signature of Originator <i>GLENN S. CABRILLO</i> Date: 10/24/95	19. Authorized Representative for Receiving Organization Date: _____	20. Cognizant manager <i>John J. Dorian</i> Date: 10/24/95	21. DOE APPROVAL (if required) Ctrl. No. _____ <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments
---	---	--	---

## RELEASE AUTHORIZATION

**Document Number:** WHC-SD-WM-RPT-183, REV 0

**Document Title:** Vapor and Gas Sampling of Single-Shell Tank 241-T-110 Using the Vapor Sampling System

**Release Date:** 11/6/95

**This document was reviewed following the procedures described in WHC-CM-3-4 and is:**

**APPROVED FOR PUBLIC RELEASE**

**WHC Information Release Administration Specialist:**

  
Kara Broz

  
11/6/95

**TRADEMARK DISCLAIMER.** Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy. Available in paper copy. Printed in the United States of America. To obtain copies of this report, contact:

Westinghouse Hanford Company - Document Control Services  
P.O. Box 1970, Mailstop H6-08, Richland, WA 99352  
Telephone: (509) 372-2420; Fax: (509) 376-4989

**SUPPORTING DOCUMENT**

1. Total Pages *36*

2. Title

VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-T-110 USING THE VAPOR SAMPLING SYSTEM

3. Number

WHC-SD-WM-RPT-183

4. Rev No.

0

5. Key Words

241-T-110  
VSS  
SUMMA  
TST  
SORBENT  
TANK

6. Author

Name: G.S. CAPRIO

*Glen S. Caprio*  
Signature

Organization/Charge Code 0M624/E61920

7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE AUGUST 31, 1995, SAMPLING OF SST 241-T-110 USING THE VAPOR SAMPLING SYSTEM.

8. RELEASE STAMP

OFFICIAL RELEASE  
BY WHC  
DATE NOV 07 1995  
*St 4*

APPROVALS

Document title: Vapor and Gas Sampling of Single-Shell Tank 241-T-110  
Using the Vapor Sampling System

Approved by: *R.A. Westberg* 10/6/95  
R. A. Westberg, Field Scientist  
Vapor Sampling Project  
Sampling and Mobile Laboratories  
Date

Approved by: *Rick Mahon* 17 OCT 95  
R. D. Mahon, Project Lead  
Vapor Sampling Project  
Sampling and Mobile Laboratories  
Date

Approved by: *D.L. Edwards* 10-24-95  
D. L. Edwards, Technical Lead  
Vapor Sampling Project  
Sampling and Mobile Laboratories  
Date

CONTENTS

1.0	SCOPE . . . . .	1
2.0	SAMPLING EQUIPMENT DESCRIPTION . . . . .	1
2.1	VAPOR SAMPLING SYSTEM . . . . .	1
3.0	SAMPLING EVENT DESCRIPTION . . . . .	3
3.1	SPECIFICATIONS . . . . .	3
3.2	OPERATIONS AND SAMPLING PERSONNEL . . . . .	4
3.3	INDUSTRIAL HYGIENE FIELD RESULTS . . . . .	4
3.4	AMBIENT CONDITIONS . . . . .	4
3.5	SAMPLE COLLECTION . . . . .	4
3.6	FIELD GC/FID RESULTS . . . . .	5
3.7	RADIATION SCREENING . . . . .	6
4.0	SAMPLE CHAIN OF CUSTODY: RECEIPT, STORAGE, AND SHIPMENT . . . . .	7
5.0	QUALITY ASSURANCE AND CONTROLS . . . . .	9
5.1	VAPOR SAMPLING SYSTEM CLEANING . . . . .	9
5.2	INSTRUMENT CALIBRATION . . . . .	9
5.3	BLANK SAMPLES . . . . .	10
6.0	ANOMALIES . . . . .	11
7.0	REFERENCES . . . . .	11
APPENDICES		
A	SAMPLE LOG SHEETS . . . . .	A-1
B	AMBIENT CONDITIONS . . . . .	B-1
C	CHAIN-OF-CUSTODY FORMS . . . . .	C-1

LIST OF TABLES

1	Flow Control Calibration . . . . .	2
2	TOC Results . . . . .	5
3	Radionuclide Analysis Results . . . . .	7
4	Pacific Northwest Laboratory Samples . . . . .	8
5	Calibration Data . . . . .	10

LIST OF TERMS

CGI	Combustible Gas Indicator
COC	Chain Of Custody
DOT	U.S. Department of Transportation
GC	Gas Chromatograph
GC/FID	Gas Chromatograph/Flame Ionization Detector
GEA	Gamma Energy Analysis
HEPA	High-Efficiency Particulate Air (filter)
NH <sub>3</sub>	Ammonia
NO <sub>2</sub>	Nitrogen Dioxide
NO	Nitric Oxide
H <sub>2</sub> O	Water Vapor
OPC	Offsite Property Control
OVM	Organic Vapor Meter
PNL	Pacific Northwest Laboratory
SML	Sampling and Mobile Laboratories
SST	Single-Shell Tank
TCP	Tank Characterization Plan
team	SML Vapor Team
TOC	Total Organic Carbon
TST	Triple Sorbent Trap
VSS	Vapor Sampling System
WHC	Westinghouse Hanford Company

This page intentionally left blank.

## VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-T-110 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-T-110. This document presents sampling data resulting from the August 31, 1995 sampling of SST 241-T-110. Analytical results will be presented in separate reports issued by the laboratories that supplied and analyzed the sampling media.

### 2.0 SAMPLING EQUIPMENT DESCRIPTION

#### 2.1 VAPOR SAMPLING SYSTEM

The SML vapor team (the team) used the vapor sampling system (VSS) to collect representative samples of the air, gases, and vapors from the headspace of SST 241-T-110 on August 31, 1995. Mahon et al. (1994) describes in detail the VSS, its performance, and its operation. The team used the VSS to collect sorbent trap and SUMMA<sup>1</sup> canister headspace samples from SST 241-T-110. The team then sent these samples to the analytical laboratories for analysis.

The VSS comprises a mobile laboratory and stainless-steel transfer tubing that connects the mobile laboratory to the vapor space. A vacuum pump draws sample vapor from the tank headspace and through all transfer tubing and the sampling manifold. Electrically activated, pneumatically actuated, valves direct sample flow within the VSS. Instrumentation housed in the mobile laboratory monitors and controls system temperature, monitors absolute and differential system pressure, meters and controls vapor mass flow, and monitors sample vapor total organic carbon (TOC) content using a gas chromatograph/flame ionization detector (GC/FID).

A key feature of the VSS is its use of heated transfer tubing and a heated sampling manifold. Maintaining the system temperature at an electronically controlled, elevated temperature prevents vapor condensation and reduces vapor adsorption on surfaces exposed to sample vapor. Mahon et al. (1994) describes various tests and observations that indicate the VSS sample transfer efficiency is consistently high.

---

<sup>1</sup>SUMMA is a registered trademark of Molectrics, Inc., Cleveland, Ohio.

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 analytes. The concentration of analytes in the vapor sampled is calculated from the quantity of analyte found in the sorbent media and the volume of vapor passed through the sorbent trap.

The sorbent trap station uses highly accurate mass flow controllers to measure and control the flow rate of sample vapor through the sorbent traps. The controllers FICV-1 through FICV-9 are mounted on top of the sorbent station between the inlet and outlet valves. Controllers FICV-10 and FICV-11 are located downstream of the sorbent trap station and the in-line driers, which remove moisture from the sample vapor before it is metered. Errors associated with the mass flow controllers were determined by the Westinghouse Hanford Company (WHC) Standards Laboratory before the SST 241-T-110 sampling event (see Table 1). Flow rates and the duration of flow are specified by the analytical laboratories that supply and analyze the sorbent traps.

Table 1. Flow Control Calibration.

Flow-indicating Control valve	Typically used Flow (stdcm <sup>3</sup> /min)	% Change from 647 to Actual	% Change from Datalogger to Actual
1	200	-0.7	-0.85
2	200	0.05	-0.10
3	200	-0.45	-0.60
4	200	0.05	-0.10
5	200	0.55	0.35
6	200	0.25	0.05
7	200	0.4	0.20
8	200	0.25	-1.81
9	50	-0.128	-0.27
10	200	-1.1	-1.20
11	5000	0.332	0.17

The VSS is also equipped with a gas chromatograph (GC). The Hewlett Packard 5890 Series II GC is equipped with a flame-ionization detector (FID), a 1 mL sample loop, a 10 port injection valve, a 2 meter chromatographic column, a programmable oven, and a portable computer loaded with the HP-Chemstation<sup>2</sup>

<sup>2</sup>HP-Chemstation is a registered trademark of the Hewlett Packard Company, Avondale, Pennsylvania.

software used to control the GC. The GC is plumbed to directly transfer sample from the VSS manifold to the GC sample loop. After the sample is transferred into the sample loop and reaches equilibrium, the run is initiated manually. HP-Chemstation™ software activates the 10 port valve to transfer the sample from the sample loop to the column. The sample passes through the column and the FID generates a signal for TOC. All data is then transmitted to the computer where it is stored for further analysis.

The GC is equipped with a HP-5 column which is 2 meters long, 0.25 mm inside diameter, and which contains a 0.25 um phenyl methyl silicone phase. The GC oven is programmed to heat from 50 °C to 270 °C at a rate of approximately 70 °C per minute. Helium is the carrier gas, air and hydrogen the combustion gases, and nitrogen the make-up gas.

The GC/FID is configured to quantitatively estimate concentrations of TOC. The GC/FID confirms sampling system cleanliness, ambient air background TOC concentrations during sampling, and TOC concentration of tank vapor samples. The system is multi-point calibrated at the weather station on a as available basis, the last time being January 1995. The GC/FID has displayed a high degree of stability over a period of months. For further details, see Section 3.6, Field GC/FID Results.

The sampling manifold also has a station for sampling vapor with evacuated SUMMA™ canisters. SUMMA™ canisters are stainless-steel vessels with internal surfaces that have been prepared by the SUMMA™ process, which passivates active sites on the canister walls to minimize adsorption of gases and vapors. An analytical laboratory must clean and evacuate SUMMA™ canisters before use. The evacuated canister is filled with sample vapor through a manually operated valve, which is then closed to seal the sample inside. SUMMA™ canisters essentially allow collection and transfer of whole-air samples from the sample site to an analytical laboratory where the sample is analyzed. The standard capacity of each SUMMA™ canister is 6 liters.

### 3.0 SAMPLING EVENT DESCRIPTION

#### 3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in WHC-SD-WM-TP-335, Rev. 0F, *Vapor Sampling and Analysis Plan* (Homi 1995). The Sampling and Analysis Plan also specifies the types and number of samples to be collected, flow rates, and durations. These key sampling parameters are summarized on the sample log sheets in Appendix A. In addition to the sample log sheets, checksheets for each individual sample help ensure correct sampling procedures. SML retains these documents in the project file. This sample event's project-specific number is S5-056.

### 3.2 OPERATIONS AND SAMPLING PERSONNEL

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

- G. S. Caprio, VSS Technician
- R. D. Mahon, VSS Lead Scientist
- T. B. Utecht, VSS Technician
- R. A. Westberg, Field Scientist.

The VSS was set up at SST 241-T-110 on August 30, 1995 and was allowed to warm up overnight. Sampling began shortly after 9:00 a.m. on August 31, 1995, and was completed by 12:00 p.m. the same day.

### 3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Before hooking up to SST 241-T-110, an industrial hygiene technician field tested tank vapors. The technician purged the instrument/vent header for 5 minutes and then field measured vapor stream contents using a combustible gas indicator (CGI) and an organic vapor meter (OVM). The measurements were verbally reported, LEL 1%, NH<sub>3</sub> 50 ppm, O<sub>2</sub> 20.8%, and TOC 0.0 ppm.

### 3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, August 31, 1995 was sunny and cool, with winds 10 to 15 miles per hour from the northwest. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2.5 miles northeast of T-Farm, are provided in Appendix B.

### 3.5 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser 3 of SST 241-T-110. The probe length, from the sample inlet to the top of the riser flange, was 6.7 meters.

All zones of the VSS were heated to 60 °C during setup of the VSS at SST 241-T-110 on August 30, 1995. The team stabilized the VSS temperature zones by 9:00 a.m. on August 31, 1995, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-T-110 were 993 mbar (744.5 torr) and 18.6 °C, respectively. The sample log sheets in Appendix A 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 began a purge of all vapor transfer tubing and the sampling manifold with ambient air. Before sampling tank vapors on August 31, 1995, the team collected two SUMMA™ canister samples of ambient air, one manually

10 meters upwind of the VSS connection with SST 241-T-110, and the other using the VSS sampling manifold. The former was collected to establish background levels of trace organic vapors, and the latter was collected to establish the cleanliness of the sampling manifold.

A leak check of the VSS sampling manifold and transfer tubing (up to the connection to the vent header) was performed. The system was evacuated to 292 mbar (219.2 torr) and leakage of ambient air into the system was observed by monitoring system pressure for 15 minutes. Leakage resulted in an increase of 11.33 mbar (8.5 torr) in system pressure during the 15 minute test. Given a system volume of not more than 10 L, this pressure increase corresponds to a leak rate of approximately 25.85 ml/min. This leak rate was then estimated for average SUMMA™, triple sorbent trap (TST), and sorbent sampling pressures. It was found that for the SUMMA™ canisters, dilution by ambient air was approximately 0.3%, for TST sampled at 200 mL/min the dilution was approximately 1.1%, and for sorbent traps the dilution was approximately 0.9%.

The sampling valve was opened and the VSS was purged with sample vapor from SST 241-T-110 for 30 minutes at a total flow rate of 5.46 L/min. This purge was performed to flush ambient air from the system and saturate the system's active adsorption sites. Because the volume of transfer tubing and the sampling manifold upstream of the sampling devices is estimated to be no more than 10 L, this purge provided about 16.4 air turnovers in the system.

One analytical laboratory provided sample media. Pacific Northwest Laboratory (PNL) provided SUMMA™ canisters, TSTs, and sorbent traps for organic vapors, ammonia (NH<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), and water vapor (H<sub>2</sub>O).

### 3.6 FIELD GC/FID RESULTS

The GC was single point calibrated on the day of sampling using 6.0 ppmC Propane standard by Scott Specialty Gas. The standard is an E.P.A. Protocol Gas that is ±2% NIST traceable.

Table 2 displays the Field GC/FID results from the sampling of SST 241-T-110.

Table 2. TOC Results.

Number of Runs	Description	Average TOC Concentration (ppmC)	% Standard Deviation
3	Propane	6.00	0.65
4	Ambient	2.73	0.08
4	Tank Vapor	3.21	2.27

### 3.7 RADIATION SCREENING

Samples are unconditionally released from the SST farm in accordance with 1995-33300-RSP-03, *Release of Vapor Sampling Equipment* (WHC 1995c).

Radiological screening results are used to determine (1) if the samples must be shipped as radioactive or nonradioactive in accordance with U.S. Department of Transportation (DOT) regulations and (2) if the samples meet the laboratory acceptance criteria.

The DOT limits for shipping a nonradioactive sample are 2,000 combined pCi/g of beta-gamma activity and alpha activity. Samples exceeding these DOT limits may be shipped as radioactive material if the samples do not exceed the following laboratory acceptance criteria:

PNL:           Beta-gamma activity <400 pCi/g of sample media. Alpha activity <100 pCi/g of sample media.

To protect the sampling manifold and sampling devices from radioactive particulates, all sample vapor for the August 31, 1995, SST 241-T-110 vapor sampling event was drawn through a series of four glass-fiber high-efficiency particulate air (HEPA) filters placed upstream of the sampling manifold. These four filters were in place any time tank vapors were flowing through the system. When sampling was complete, the filters were removed and assigned unique sample identifiers. All four HEPA filters were submitted to Laboratory 222-S for total alpha, total beta, and gamma energy analysis (GEA). The HEPA filter closest to the sampling manifold was analyzed to determine if the samples met DOT shipping criteria and laboratory acceptance criteria. Moisture from the tank vapors was collected in a silica gel trap through one of the sorbent station ports and analyzed for tritiated water. SST 241-T-110 filter and silica gel analysis results are shown in Table 3. SML scientists use the activity results in Table 3 to calculate pCi/g of sample media. SML maintains this information in the project-specific file. The results in Table 3 indicate that the samples collected from SST 241-T-110 met the laboratory acceptance criteria and the DOT definition of a nonradioactive shipment.

Table 3. Radionuclide Analysis Results.

Filter	Sample Identifier	Activity Results <sup>a</sup> (pCi/sample)	Activity <sup>b</sup> (pCi/L of tank gas)
Upstream HEPA filter (box)	S5056-A28.0U1	Total Alpha = 18.6 Total Beta = 28.2 GEA = 31.7 ( <sup>137</sup> Cs)	= 0.06 = 0.09 = 0.10
Downstream HEPA filter (box)	S5056-A29.0D1	Total Alpha = <0.865 Total Beta = <2.05 GEA = <detectable	= <0.003 = <0.007 = <detectable
Upstream HEPA filter (VSS)	S5056-A30.0U2	Total Alpha = <0.865 Total Beta = <2.05 GEA = <detectable	= <0.003 = <0.007 = <detectable
Downstream HEPA filter (VSS)	S5056-A31.0D2	Total Alpha = <0.865 Total Beta = <2.05 GEA = <detectable	= <0.003 = <0.007 = <detectable
Tritium trap	S5056-A03.0T1	Total activity = <50.0	= <50.0 <sup>c</sup>

Notes:

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

<sup>a</sup>All less than (<) values represent the minimum detection limits at Laboratory 222-S.

<sup>b</sup>Numbers based on an approximation of the total volume of tank vapor through the HEPA filters. Appendix A and the sample checksheets were used to estimate a total flow through the VSS of 306 L.

<sup>c</sup>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<sup>™</sup> canisters received from PNL are kept in a custody locked storage area maintained by SML. Sorbent trains and tubes were maintained at 4 ± 2 °C in a refrigeration unit. SUMMA<sup>™</sup> canisters were stored in the same locked storage area, but were not refrigerated. These sampling devices were picked up from PNL by SML and transported in a government vehicle to a custody locked storage area.

After sampling, the PNL sorbent tubes and SUMMA<sup>™</sup> canisters were transported by government vehicle directly to PNL and delivered to J. A. Edwards on September 1, 1995. Table 4 lists the sample identifiers, sample types, and COC form numbers for all PNL samples.

Table 4. Pacific Northwest Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5056-A01.061	Ambient upwind SUMMA™	009254
S5056-A02.069	Ambient SUMMA™ (VSS)	009254
S5056-A04.071	SUMMA™	009254
S5056-A12.088	SUMMA™	009254
S5056-A20.119	SUMMA™	009254
S5056-A08.88T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O sorbent	009256
S5056-A09.89T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O sorbent	009256
S5056-A10.90T	NO <sub>x</sub> /H <sub>2</sub> O sorbent	009256
S5056-A11.91T	NH <sub>3</sub> /H <sub>2</sub> O/H <sub>2</sub> O sorbent	009256
S5056-A16.92T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O sorbent	009256
S5056-A17.93T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O sorbent	009256
S5056-A18.94T	NO <sub>x</sub> /H <sub>2</sub> O sorbent	009256
S5056-A19.95T	NH <sub>3</sub> /H <sub>2</sub> O/H <sub>2</sub> O sorbent	009256
S5056-A25.96T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O field blank	009256
S5056-A26.97T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O field blank	009256
S5056-A27.98T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O field blank	009256
S5056-A05.662	PNL TST	009255
S5056-A06.663	PNL TST	009255
S5056-A07.664	PNL TST	009255
S5056-A13.665	PNL TST	009255
S5056-A14.666	PNL TST	009255
S5056-A15.667	PNL TST	009255
S5056-A21.668	PNL TST Field Blank	009255
S5056-A22.669	PNL TST Field Blank	009255
S5056-A23.670	PNL TST Trip Blank	009255
S5056-A24.671	PNL TST Trip Blank	009255

From the time that samples are received by SML until they are shipped back to the analytical laboratory, all COCs are maintained by SML in accordance with WHC-IP-1127-1.3, *Chain-of-Custody/Special Analysis Request for RCRA and CERCLA Protocol Samples* (WHC 1995a). Copies of the completed COC forms for this sampling event are included in Appendix C.

## 5.0 QUALITY ASSURANCE AND CONTROLS

### 5.1 VAPOR SAMPLING SYSTEM CLEANING

Immediately prior to sampling of SST 241-T-110, the VSS manifold and vapor sample transfer tubing was heated to 60 °C and ambient air was purged through the system for 18.5 hours. Also, all pertinent system valves were actuated to release any contaminants that may have collected in the VSS valves themselves. After this purge an ambient air sample was drawn through the VSS manifold and a GC/FID run was initiated. No significant level of contaminants was detected. A second ambient air GC/FID run confirmed that the VSS manifold and transfer tubing was free of organic remnant residue down to ambient levels. A SUMMA™ canister ambient air sample was then collected to confirm by laboratory analysis that the VSS sampling manifold was free of trace organic contaminants (or to determine which contaminants were present and at what concentration), as discussed in Section 3.5. For further details, refer to Appendix E of WHC-IP-1127-4.10 (WHC 1995b) and the project-specific file located with SML.

### 5.2 INSTRUMENT CALIBRATION

Instruments located in the VSS are calibrated on an annual basis at the WHC Standards Laboratory. VSS instrumentation calibration data, maintained in files by SML, are summarized in Table 5. According to the calibration schedule shown in Table 5, all instrumentation was within its calibration period during the SST 241-T-110 sampling event.

Table 5. Calibration Data.

Element	Calibration Date	Expiration Date	WHC Standards Laboratory Code
FICV-1	5/08/95	5/08/96	518-28-03-012
FICV-2	5/08/95	5/08/96	518-28-03-008
FICV-3	5/08/95	5/08/96	518-28-03-004
FICV-4	5/08/95	5/08/96	518-28-03-006
FICV-5	5/08/95	5/08/96	518-28-03-011
FICV-6	5/08/95	5/08/96	518-28-03-009
FICV-7	5/08/95	5/08/96	518-28-03-014
FICV-8	5/08/95	5/08/96	518-28-03-013
FICV-9	5/08/95	5/08/96	518-28-03-007
FICV-10	5/08/95	5/08/96	518-28-03-010
FICV-11	5/08/95	5/08/96	518-28-03-005
PE-1	5/04/95	5/04/96	518-80-02-005
PE-2	5/04/95	5/04/96	518-80-02-006
PE-3	5/04/95	5/04/96	518-80-02-008
PE-4	5/04/95	5/04/96	518-80-02-007
PD-1	5/04/95	5/04/96	518-80-02-004
PD-2	5/04/95	5/04/96	518-80-02-003
Temperature Control System	8/25/95	8/25/96	804-67-74-009

### 5.3 BLANK SAMPLES

Trip blanks are samples that accompany the sample media from the point of generation through sample analysis. They are transported to the field with the sample collection media but remain unopened during the sampling event. Analysis of trip blanks is used to assess cross-contamination of sample media during field transport and storage.

Field blanks are sampling devices similar to trip blanks. They are prepared and handled in the same manner as the sampling media, but no tank vapors are drawn through them.

Spiked blanks are prepared as regular sampling media but also contain a known amount of special analyte. Tank vapors are drawn through these blanks and

they are handled and analyzed just like any other sample. Analysis of the spiked blanks is used to evaluate potential sample loss during shipment or storage.

Ambient blanks are samples of ambient air collected at the sampling location. Analysis of ambient blanks is used to assess contamination that may be present in the atmosphere or in the transfer tubing or sampling manifold of the VSS immediately prior to sampling operations.

Table 4 lists sample blanks used during the sampling of SST 241-T-110.

## 6.0 ANOMALIES

All samples were collected in accordance with the Tank Characterization Plan (TCP and WHC-IP-1127-4.10, *Collection of Parallel Sorbent Tube and SUMMA Canister Samples Using the Vapor Sampling System* (1995b)). There were no anomalies during the sample collection and the samples maintained their integrity.

## 7.0 REFERENCES

- 49 CFR 100-177, 1992, "Transportation," *Code of Federal Regulations*, as amended.
- Homi, C. S., 1995, *Vapor Sampling and Analysis Plan*, WHC-SD-WM-TP-335, Rev. 0F, Westinghouse Hanford Company, Richland, Washington.
- Mahon, R. D., C. M. Jones, and M. S. Story, 1994 (draft), *Evaluation of the Capabilities and Use of the Vapor Sampling System for Tank Headspace Sampling and Characterization*, SD-WM-RPT-094, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995a, *Chain-of-Custody/Special Analysis Request for RCRA and CERCLA Protocol Samples*, Procedure WHC-IP-1127-1.3, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995b, *Collection of Parallel Sorbent Tube and Canister Samples Using the Vapor Sampling System*, Procedure WHC-IP-1127-4.10, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995c, *Release of Vapor Sampling Equipment*, Procedure 1995-33300-RSP-03, Westinghouse Hanford Company, Richland, Washington.

This page intentionally left blank.

**APPENDIX A**  
**SAMPLE LOG SHEETS**

This page intentionally left blank.

Waste Tank  
241-T-110

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

Ensure HEPA filters are installed

Ensure connection to sample probe

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

Tank Temperature 18.6 C

GC Standard Runs

GC Ambient Air Runs through port 10

Date: 8/31/95

VSS Personnel: Rich Westberg and Glenn Caprio

Trailer Personnel: Tim Utecht

WHC Sample ID	PNL Sample ID	Port Valve #	Description	Desired Flow Rate SCCM	Desired Duration (min.)	Desired Total Flow SCCM	Actual Flow Rate SCCM	Actual Start Time	Actual End Time	Actual Total Time (min.)	Actual Total Flow Liters
Purge with ambient air for 30 min.				5500	30	165000	5500	8/30-14:21	8/31-08:50	1109	6099.50
S5056-A01.061	061		AMBIENT #1	5500	1	5500	5500	09:11	09:12	1	
GC Run #1 Ambient air/Cleanliness check								09:17			
S5056-A02.069	069	15	AMBIENT #2	5500	1	5500	5500	09:23	09:24	1	
GC RUN#2 Ambient air								09:25			
LEAK CHECK (APPENDIX A) Leak Rate: <u>34 torr/hr</u>											
Purge with tank air for 30 min				5500	30	165000	5500	10:14	10:44	30	165.00
Measure tank pressure PE-1 = 744.5 torr											
<hr/>											
GCRUN #3 (Tank run #1)								10:47			
S5056-A04.071	071	11	SUMMA #3		1			10:51	10:52	30	6.00

Waste Tank  
241-T-110

WHC Sample ID	PNL Sample ID	Port Valve #	Description	Desired		Desired		Actual		Actual		
				Flow Rate SCCM	Duration (min.)	Total Flow SCCM	Flow Rate SCCM	Start Time	End Time	Total Time (min.)	Total Flow Liters	
S5056-A05.662	TST#662	1	TST #1	200	5	1000	200.00	10:55	11:00	5	1.00	
S5056-A06.663	TST#663	2	TST #2	200	5	1000	200.00	10:55	11:00	5	1.00	
S5056-A07.664	TST#664	3	TST #3	200	5	1000	196.10	10:55	11:00	5	0.98	
S5056-A03.0T1	T-2307 (222-S)	4	Tritium Trap	200	5	1000	200.00	10:55	11:00	5	1.00	
S5056-A08.88T	88T	5	NH3/NOx/H2O (#1)	200	15	3000	200.00	10:55	11:10	15	3.00	
S5056-A09.89T	89T	6	NH3/NOx/H2O (#2)	200	15	3000	200.00	10:55	11:10	15	3.00	
S5056-A10.90T	90T	7	NOx/H2O (#3)	200	15	3000	195.60	10:55	11:10	15	2.93	
S5056-A11.91T	91T	8	NH3/H2O/H2O (#4)	200	15	3000	200.00	10:55	11:10	15	3.00	
GCRUN #4 (Tank run # 2)								11:13				
S5056-A12.073	073	13	SUMMA #4			1			11:17	11:18	1	6.00
S5056-A13.665	TST#665	1	TST #4	200	5	1000	200.00	11:21	11:26	5	1.00	
S5056-A14.666	TST#666	2	TST #5	200	5	1000	200.00	11:21	11:26	5	1.00	
S5056-A15.667	TST#667	3	TST #6	200	5	1000	199.90	11:21	11:26	5	1.00	
S5056-A16.92T	92T	5	NH3/NOx/H2O (#5)	200	15	3000	200.00	11:21	11:36	15	3.00	
S5056-A17.93T	93T	6	NH3/NOx/H2O (#6)	200	15	3000	200.00	11:21	11:36	15	3.00	
S5056-A18.94T	94T	7	NOx/H2O (#7)	200	15	3000	194.40	11:21	11:36	15	2.92	
S5056-A19.95T	95T	8	NH3/H2O/H2O (#8)	200	15	3000	200.00	11:21	11:36	15	3.00	
GCRUN #5 (Tank run #3)								11:38				
S5056-A20.088	088	15	SUMMA #5			1			11:42	11:43	1	6.00

Waste Tank  
241-T-110

WHC Sample ID	PNL	Port	Description	Desired		Desired		Actual		Actual		
				Flow Rate SCCM	Duration (min.)	Total Flow SCCM	Flow Rate SCCM	Start Time	End Time	Total Time (min.)	Total Flow Liters	
S5056-A21.668	TST#668		TST FIELD BLANK #1					11:28	11:29			
S5056-A22.669	TST#669		TST FIELD BLANK #2					11:28	11:29			
S5056-A25.96T	96T		NH3/NOx/H2O FIELD BLANK #1					11:41	11:42			
S5056-A26.97T	97T		NH3/NOx/H2O FIELD BLANK #2					11:41	11:42			
S5056-A27.98T	98T		NH3/NOx/H2O FIELD BLANK #3					11:41	11:42			
GCRUN#6 (Tank run # 4)												
										TOTAL TANK GAS USED DURING SAMPLING RUNS		48.83

215

S5056-A28.OU1	T-2308 (222S)		Upstream HEPA(box)								
S5056-A29.OD1	T-2309 (222S)		Downstream HEPA(box)								
S5056-A30.OU2	T-2310 (222S)		Upstream HEPA(VSS)								
S5056-A31.OD2	T-2311 (222S)		Downstream HEPA (VSS)								

Trip Blanks (DO NOT EXPOSE)											
S5056-A23.670	TST#670		TST TRIP #1								
S5056-A24.671	TST#671		TST TRIP #2								

T-110  
TOTAL TANK VAPOR USED

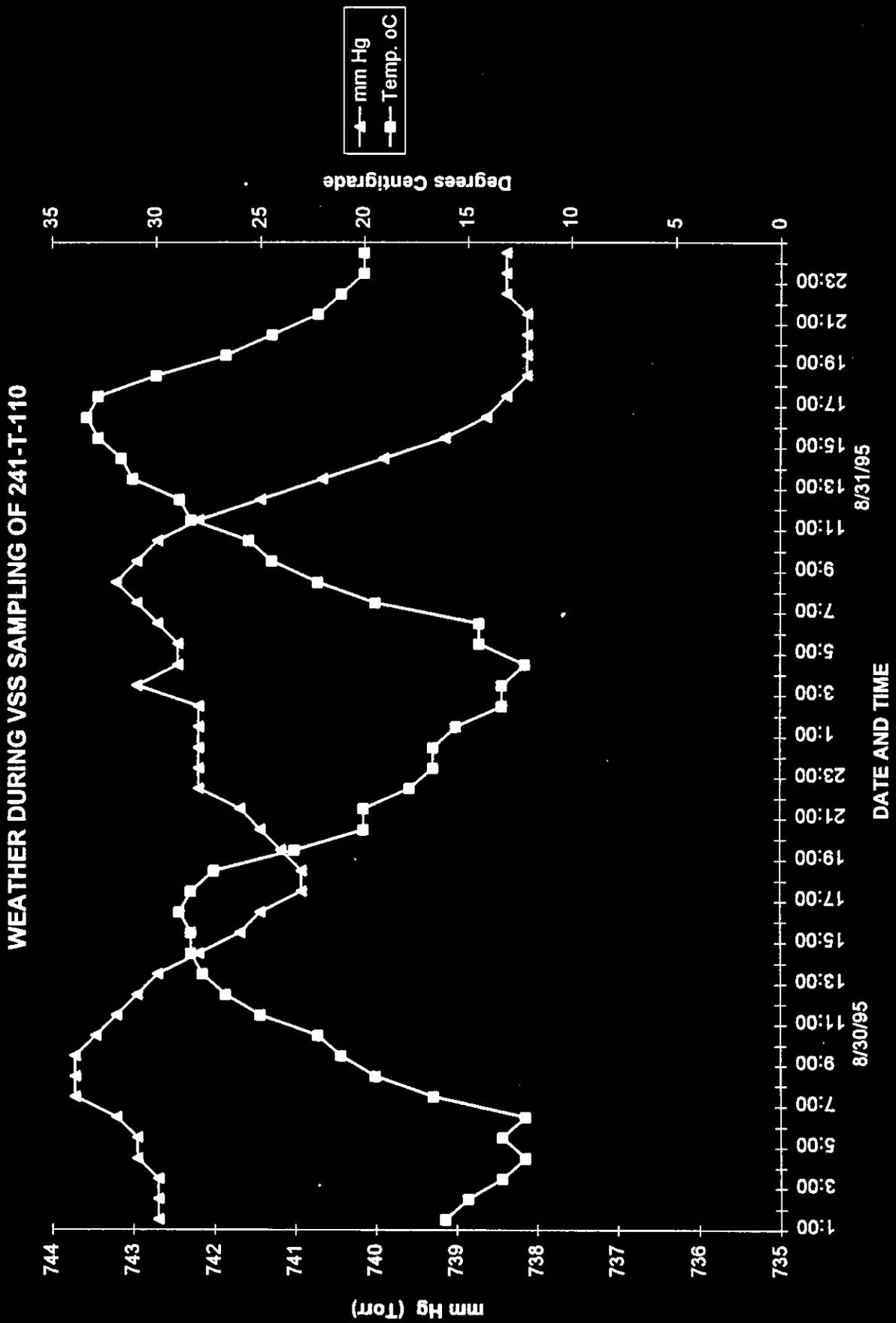
	NUMBER OF EVENTS	TIME IN MINUTES	VOLUME IN SCCM	TOTAL VOLUME, LITERS
LEAK CHECKS	1	0	5600	5.60
TANK PURGE PUMP DOWNS	3	1	5600	16.80
TANK PURGE TIME (From Spreadsheet)	1	30	5450	165.00
GC PURGES	4	2	5000	40.00
SUMMA PURGES	3	2	5000	30.00
ALL SAMPLES COLLECTED				48.83
TOTAL FOR TANK SAMPLING RUN				306.23



This page intentionally left blank.

**APPENDIX B**  
**AMBIENT CONDITIONS**

This page intentionally left blank.



This page intentionally left blank.

**APPENDIX C**  
**CHAIN-OF-CUSTODY FORMS**

This page intentionally left blank.

**DDPW**  
**09512**

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

Westinghouse Hanford Company

Collector: **T.B. Utschak / G.S. CAPRIO**      Contact/Requestor: **R.D. McHugh**      Tel. No. **373-7437**      MSIN **53-27**      FAX **373-7076**

SAP Number: **55056**      Sample Origin: **241-Q-110**      Purchase Order/Charge Code: **E61638**

Project Title: **VAPOR SAMPLING**      Logbook #: **N/A**      Ice Chest #: **N/A**      Temp.: **N/A**

Shipped To (Lab): **222-S LABS**      Method of Shipment: **6047 VEHICLES**      Bill of Lading/Air Bill No.: **N/A**

Protocol: **NONE**      Date Turnaround: **NEXT DAY**      Office Property No.: **N/A**

Sample No.	Lab ID	Date	Time	No/Type Container	Sample Analysis	Preservative
55056-011	T-2307			(1) Silica Gel	TOTAL ACTIVITY	NONE
55056-001	T-2308			(1) HEPA	TOTAL ALPHA, TOTAL BETA, GEA	NONE
55056-001	T-2309			(1) HEPA	"	NONE
55056-002	T-2310			(1) HEPA	"	NONE
55056-002	T-2311			(1) HEPA	"	NONE
				( )		
				( )		
				( )		
				( )		
				( )		
				( )		
				( )		

**POSSIBLE SAMPLE HAZARDS/REMARKS**      MSDS    Yes  No       Hold Time

List all known wastes.

**SPECIAL INSTRUCTIONS**      Date/Time

PLEASE SEND INFO TO TIM UTSCHAK AT 373-7076

X = HEPA FILTERS/SILICA GEL      THANKS

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix*
G.S. CAPRIO	John D. Caprio	[Signature]	8/31/95 1325	R.T. SKEAFF	[Signature]	[Signature]	8/31/95 1325	S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air
R.T. SKEAFF	R.T. SKEAFF	[Signature]	8/31/95 1325	EEDUKES	[Signature]	[Signature]	8/31/95 1323	DS - Drum Solids DL - Drum Liquids T - Tissue WI - Wipe L - Liquid V - Vegetation X - Other
Relinquished By			Date/Time	Received By			Date/Time	

**FINAL SAMPLE DISPOSITION**      Disposed By      Date/Time

All samples containing hazardous materials shall be picked up by responder and returned to parent container or site of origin.

**Battelle  
Pacific Northwest Lab**

**CHAIN OF CUSTODY**

**WHC 009254**

Custody Form Initiator J. A. Edwards - PNL Telephone (509) 373-0141  
Page 85-3009 / FAX 376-0418

Company Contact R. D. Mahon - WHC Telephone (509) 373-2891  
Page 85-3152 / FAX 373-3793

Project Designation/Sampling Locations 200 West Tank Farm Collection date 08 - 31 - 95  
241-T-110 Tank Vapor Sample SAF S5056 Preparation date 08 - 11 - 95  
(VSS Truck)

Ice Chest No. Field Logbook No. WHC-11-672-10

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

Method of Shipment Government Truck

Shipped to PNL

Possible Sample Hazards/Remarks Unknown at time of sampling

**Sample Identification**

S5056 - A01 . 061 Ambient Air SUMMA #1 Upwind of T-110  
S5056 - A02 . 069 Ambient Air SUMMA #2 Through Port # 15

S5056 - A04 . 071 SUMMA #3 Port # 15  
S5056 - A12 . 073 SUMMA #4 Port # 15  
S5056 - A20 . 088 SUMMA #5 Port # 13

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>	08-14-95	0925	T B Utecht <i>T B Utecht</i>	08-14-95	0925
<i>T B Utecht / T B Utecht</i>	09-31-95	0900	<i>M D Caprio / M D Caprio</i>	09-31-95	0900
<i>M D Caprio / M D Caprio</i>	09-31-95	1045	<i>J A Edwards / J A Edwards</i>	9-1-95	1045

**Final Sample Disposition**

Comments:

PNL (only) Checklist	Pick-up / Delivery	Comments:
Media labeled and checked?	<input checked="" type="checkbox"/> / N	
Letter of instruction?	<input checked="" type="checkbox"/> / N	
Media in good condition?	<input checked="" type="checkbox"/> / <input checked="" type="checkbox"/> / N	
COC info/signatures complete?	<input checked="" type="checkbox"/> / <input checked="" type="checkbox"/> / N	
Rad release stickers on samples?	<input checked="" type="checkbox"/> / <input checked="" type="checkbox"/> / N	
Activity report from 222S?	<input checked="" type="checkbox"/> / <input checked="" type="checkbox"/> / N	
COC copy for LRB, RIDS filed?	<input checked="" type="checkbox"/> / <input checked="" type="checkbox"/> / N	
	POC <i>(Signature)</i>	POC <i>(Signature)</i>

(Revised 10/17/94 PNL)

**Battelle Pacific  
Northwest Laboratory**

**CHAIN OF CUSTODY**

**WHC 009256**

Custody Form Initiator J. A. Edwards - PNL

Telephone (509) 373-0141  
Page 85-3009 / FAX 376-0418

Company Contact R. D. Mahon - WHC

Telephone (509) 373-2891  
Page 85-3152 / FAX 373-3793

Project Designation/Sampling Locations 200 West Tank Farm  
241-T-110 Tank Vapor Sample SAF S5056  
(VSS Truck)

Collection date 08 - 31 - 95  
Preparation date 08 - 09 - 95

Ice Chest No.

Field Logbook No. WHC-N-647-10

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to WHC

Possible Sample Hazards/Remarks Unknown at time of sampling

**Sample Identification**

S5056 - A08 . 88T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O	(INORG Sorbent Trap # 1)
S5056 - A09 . 89T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O	(INORG Sorbent Trap # 2)
S5056 - A10 . 90T	NO <sub>x</sub> /H <sub>2</sub> O	(INORG Sorbent Trap # 3)
S5056 - A11 . 91T	NH <sub>3</sub> /H <sub>2</sub> O/H <sub>2</sub> O	(INORG Sorbent Trap # 4)
S5056 - A16 . 92T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O	(INORG Sorbent Trap # 5)
S5056 - A17 . 93T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O	(INORG Sorbent Trap # 6)
S5056 - A18 . 94T	NO <sub>x</sub> /H <sub>2</sub> O	(INORG Sorbent Trap # 7)
S5056 - A19 . 95T	NH <sub>3</sub> /H <sub>2</sub> O/H <sub>2</sub> O	(INORG Sorbent Trap # 8)
S5056 - A25 . 96T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O	(INORG Field Blank # 1)
S5056 - A26 . 97T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O	(INORG Field Blank # 2)
S5056 - A27 . 98T	NH <sub>3</sub> /NO <sub>x</sub> /H <sub>2</sub> O	(INORG Field Blank # 3)

Field Transfer of Custody		Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
G W Dennis <i>A.W.D.</i>	08-09-95	1445	J A Edwards <i>J A Edwards</i>	08-09-95	1445
J A Edwards <i>J A Edwards</i>	08-09-95	1445	T. B. Utter <i>T. B. Utter</i>	08-09-95	1445
<i>T. B. Utter / T. B. Utter</i>	08-31-95	0900	<i>JA Edwards / G.S. Carr</i>	08-31-95	0900
<i>JA Edwards / G.S. Carr</i>	09-01-95	1050	<i>J A Edwards / J A Edwards</i>	9-1-95	1050

**Final Sample Disposition**

Comments:

PNL (only) Checklist	Pick-up / Delivery	Comments:
Media labeled and checked?	<input checked="" type="checkbox"/> Y / N	
Letter of instruction?	<input checked="" type="checkbox"/> Y / N	
Media in good condition?	<input checked="" type="checkbox"/> Y / N / <input type="checkbox"/> N	
COC info/signatures complete?	<input checked="" type="checkbox"/> Y / N / <input type="checkbox"/> N	
Sorbents shipped on ice? (<10°C)	<input checked="" type="checkbox"/> Y / N / <input type="checkbox"/> N	
Rad release stickers on samples?	<input type="checkbox"/> Y / N / <input type="checkbox"/> N	
Activity report from 222S?	<input type="checkbox"/> Y / N / <input type="checkbox"/> N	
COC copy for LRB, RIDS filed?	<input type="checkbox"/> Y / N / <input type="checkbox"/> N	
COC copy for sorbent follow-on?	<input type="checkbox"/> Y / N / <input type="checkbox"/> N	
	POC <i>(Signature)</i>	Original COC follows sorbent media

(Revised 05/10/95 PNL)

**Battelle Pacific  
Northwest Laboratory**

**CHAIN OF CUSTODY**

**WHC 009255**

Custody Form Initiator J. A. Edwards - PNL

Telephone (509) 373-0141  
Page 85-3009 / P8-08 / FAX 376-0418

Company Contact R. D. Mahon - WHC

Telephone (509) 373-7437  
Page 85-9656 / S3-27 / FAX 373-7076

Project Designation/Sampling Locations 200 West Tank Farm  
241-T-110 Tank Vapor Sample SAF S5058  
(VSS Truck)

Collection date 08 - 31 - 95  
Preparation date 08 - 01 - 95

Ice Chest No.

Field Logbook No. WHC-11-647 10

Erco Hi/Lo thermometer No. PNL-T-00 4

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to WHC

Possible Sample Hazards/Remarks Unknown at time of sampling

**Sample Identification**

S5056 - A05 . 662 .	PNL Triple Sorbent Trap (TST) Sample # 1	
S5056 - A06 . 663 .	PNL TST Sample # 2	
S5056 - A07 . 664 .	PNL TST Sample # 3	
S5056 - A13 . 665 .	PNL TST Sample # 4	
S5056 - A14 . 666 .	PNL TST Sample # 5	
S5056 - A15 . 667 .	PNL TST Sample # 6	
S5056 - A21 . 668 .	Open, close & store PNL TST Field Blank # 1	In VSS truck
S5056 - A22 . 669 .	Open, close & store PNL TST Field Blank # 2	In VSS truck
S5056 - A23 . 670 .	Store PNL TST Trip Blank # 1	None
S5056 - A24 . 671 .	Store PNL TST Trip Blank # 2	None

[ ] Field Transfer of Custody		[ ] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
J.A. Edwards	08-09-95	1420	T.B. Utter / T.B. Utter	08-09-95	1420
T.B. Utter	08-24-95	0900	M.A. C. / G.S. C. / G.S. C.	08-31-95	0900
M.A. C.	09-01-95	1055	J.A. Edwards / R.D. Mahon	9-1-95	1055

**Final Sample Disposition**

**Comments:**

- PNL (only) Checklist
- Media labeled and checked?  Y/N
- Letter of instruction?  Y/N
- Media in good condition?  Y/N / Y/N
- COC info/signatures complete?  Y/N / Y/N
- Sorbents shipped on ice? (<5°C)  Y/N / Y/N
- Hi/Lo thermometer - Keep upright!  Y/N
- Hi/Lo thermometer / Y/N
- Rad release stickers on samples? / Y/N
- Activity report from 222S? / Y/N
- COC copy for LRB, RIDS filed? / Y/N

**Comments:**

Cooler Temperature Status

Hi -15 °C / Lo -15 °C (pick up at PNL to WHC) |

Hi \_\_\_ °C / Lo \_\_\_ °C (delivery at WHC from PNL) |

Hi \_\_\_ °C / Lo \_\_\_ °C (at return to PNL from WHC) |

Hi +17 °C / Lo +2 °C (at delivery from WHC to PNL) |

POC (15)

(Revised 06/21/95 PNL)