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VAPOR & GAS SAMPLING OF SST 241SX103 USING THE
VAPOR SAMPLING SYSTEM

SEP 25 1995

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7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE MARCH 23, 1995, SAMPLING OF SST 241-SX-103 USING THE VAPOR SAMPLING SYSTEM.

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Using the Vapor Sampling System

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LIST OF TERMS

CGI	Combustible Gas Indicator
COC	Chain Of Custody
DOT	U.S. Department of Transportation
GC/FID	Gas Chromatograph/Flame Ionization Detector
GEA	Gamma Energy Analysis
HEPA	High-Efficiency Particulate Air (filter)
NH ₃	Ammonia
NO ₂	Nitrogen Dioxide
NO	Nitric Oxide
H ₂ O	Water Vapor
OPC	Offsite Property Control
ORNL	Oak Ridge National Laboratory
OVM	Organic Vapor Meter
PNL	Pacific Northwest Laboratory
SML	Sampling and Mobile Laboratories
SST	Single-Shell Tank
TCP	Tank Characterization Plan
team	SML Vapor Team
TOC	Total Organic Carbon
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-SX-103 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-SX-103. This document presents sampling data resulting from the March 23, 1995 sampling of SST 241-SX-103. 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-SX-103 on March 23, 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 SUMMA¹ canister headspace samples from SST 241-SX-103. The team then sent these samples to the 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 vapor 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

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

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 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-SX-103 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	Flow (stdcm ³ /min)	Error (%)
1	200	±0.7
3	200	±0.05

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 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 total organic carbon (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 μ m 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 total organic carbon. 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-313, *Tank 241-SX-103 Tank Characterization Plan* (Homi 1995). The Tank Characterization Plan (TCP) 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 S5-017.

3.2 OPERATIONS AND SAMPLING PERSONNEL

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

- R. A. Westberg, Field Scientist
- G. S. Caprio, VSS Technician
- T. B. Utecht, VSS Technician
- N. P. Buechler, VSS Technician.

The VSS was set up at SST 241-SX-103 on March 22, 1995 and was allowed to warm up overnight. Sampling began shortly after 9:00 a.m. on March 23, 1995, and was completed by 2:00 p.m. the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Prior to hooking up to SST 241-SX-103, an industrial hygiene technician field tested tank vapors. The vapor probe sample tube was purged for 5 minutes and then the vapor stream contents were field measured using a combustible gas indicator (CGI) and an organic vapor meter (OVM). The technician verbally reported an LEL of 0.0% and a oxygen content of 20.6% using the CGI, and the total organic carbon content of 4.6 ppm using the OVM. The technician measured 11 ppm of CO and 55 ppm of NH₃.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, March 23, 1995 was sunny with winds out of the southwest. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2.5 miles west of S Farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser 2 of SST 241-SX-103. The probe length, from the sample inlet to the top of the riser flange, was 7.3 meters.

All zones of the VSS were heated to 60 °C during setup of the VSS at SST 241-SX-103 on March 22, 1995. The team stabilized the VSS temperature zones by 9:00 a.m. on March 23, 1995, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-SX-103 were 976 mbar (732.2 Torr) and 18 °C, respectively. The sample log sheets (Appendix A) provide a complete chronology of the sample event including start and end times, flow rates, volumes, and specific sample identifiers.

Approximately 22 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. Prior to sampling tank vapors on March 23, 1995, the team collected two SUMMA™ canister samples of ambient air, one manually 10 meters upwind of the VSS connection with SST 241-SX-103, 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 sampling probe was performed prior to opening the tank probe vapor sampling valve. The system was evacuated to 286 mbar (214.4 torr) and leakage of ambient air into the system was observed by monitoring system pressure for 15 minutes. Leakage resulted in an increase of 13.9 mbar (10.4 torr/hr) 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 13.73 mL/min at a 285 mbar (213.5 torr). This leak rate was then 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 50 mL/min the dilution was approximately 0.4%, for TST traps sampled at 200 mL/min the dilution was approximately 0.5%, and for sorbent traps the dilution was approximately 0.4%.

The tank probe vapor sampling valve was opened and the VSS was purged with sample vapor from SST 241-SX-103 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.

Two analytical laboratories provided sample media. Oak Ridge National Laboratory (ORNL) provided triple sorbent traps (TSTs) for organic vapors; and Pacific Northwest Laboratory (PNL) provided SUMMA™ canisters and sorbent traps for organic vapors, ammonia (NH₃), nitrogen dioxide (NO₂), nitric oxide (NO), and water vapor (H₂O).

3.6 FIELD GC/FID RESULTS

The GC was single point calibrated on the day of sampling using 6.0 ppmC Propane standard by Scott Specialty Gas. The standard is an E.P.A. Protocol Gas that is $\pm 2\%$ NIST traceable. Table 2 displays the Field GC/FID results from the sampling of 241-SX-103.

Table 2. TOC Results.

Number of Runs	Description	Average TOC Concentration (ppmC)	% Standard Deviation
3	Propane	6.00	1.08
5	Ambient	2.82	0.39
4	Tank Vapor	4.00	1.38

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 pCi/g of beta-gamma activity and of alpha activity. Samples exceeding these DOT limits may be shipped as radioactive material if the samples do not exceed the following laboratory acceptance criteria:

ORNL: Beta-gamma activity <450 pCi/g of sample media. Alpha activity <135 pCi/g.

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

To protect the sampling manifold and sampling devices from radioactive particulates, all sample vapor for the March 23, 1995, SST 241-SX-103 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-SX-103 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-SX-103 met the laboratory acceptance criteria and the DOT definition of a nonradioactive shipment.

Table 3. Radionuclide Analysis Results.

Filter	Sample Identifier	Activity Results ^a (pCi/sample)	Activity ^b (pCi/L of tank gas)
Upstream HEPA filter (box)	S5017-A32.0U1	Total Alpha = 209 Total Beta = 259 GEA = 29.1 (²⁰⁸ Tl)	=0.63 =0.78 =0.09
Downstream HEPA filter (box)	S5017-A33.0D1	Total Alpha = <0.577 Total Beta = <2.48 GEA = <detectable	=<0.002 =0.007 =<detectable
Upstream HEPA filter (VSS)	S5017-A34.0U2	Total Alpha = <0.577 Total Beta = <2.70 GEA = <detectable	=<0.002 =<0.008 =<detectable
Downstream HEPA filter (VSS)	S5017-A35.0D2	Total Alpha = <0.577 Total Beta = 2.5 GEA = <detectable	=<0.002 =0.007 =<detectable
Tritium trap	S5017-A03.0T1	Total activity = <50.0	=<50.0 ^c

NOTES:

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

^aAll less than (<) values represent the minimum detection limits at Laboratory 222-S.

^bNumbers based on an approximation of the total volume of tank vapor through the HEPA filters. Appendix A and the sample checksheets were used to estimate a total flow through the VSS of 334 L.

^cNumber is calculated using a total volume of 1 L passing through the tritium trap.

4.0 SAMPLE CHAIN OF CUSTODY: RECEIPT, STORAGE, AND SHIPMENT

All sorbent trains, sorbent tubes, and SUMMA™ canisters received by SML are 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™ canisters were stored in the same locked storage area, but were not refrigerated.

TSTs are supplied by ORNL and ORNL initiates the chain-of-custody (COC) forms. The sample media is placed in 40-mL volatile organic analysis vials. Evidence tape is applied to the vials, which are then placed in a shipping container along with the relinquished COC forms and shipped to SML. TSTs are shipped to SML in a cooler containing "blue" ice.

The TSTs were received, inventoried against the COC forms, and 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 the storage area refrigeration unit.

The TSTs were shipped to ORNL using offsite property control (OPC W95-0-0304-21). Table 4 lists the sample identifiers, sample types, and COC form numbers for all ORNL samples. The samples were delivered to shipping on March 29, 1995 with instructions to ship via Federal Express, next-day delivery.

Table 4. Oak Ridge National Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5017-A7.901	TST	006760
S5017-A8.902	TST	006760
S5017-A9.903	TST	006760
S5017-A10.908	TST field blank	006760
S5017-A11.904	TST	006760
S5017-A12.905	TST	006760
S5017-A13.906	TST	006760
S5017-A14.907	TST	006760
S5017-A15.909	TST	006760
S5017-A16.508	TST	006760
S5017-A17.808	TST field blank	006760
S5017-A18.803	TST	006760
S5017-A19.528	TST	006760
S5017-A20.833	TST	006760
S5017-A21.900	TST trip blank	006760
S5017-A22.847	TST trip blank	006760

PNL supplied sorbent chain traps and SUMMA™ canisters, including COC forms. These Sampling devices were picked up from PNL by SML and transported in a government vehicle to a custody locked storage area. The sorbent trains were maintained at 4 ± 2 °C before and after the sampling event in storage area refrigeration unit.

After sampling, the PNL sorbent tubes and SUMMA™ canisters were transported by government vehicle directly to PNL and delivered to J. A. Edwards on March 29, 1995. Table 5 lists the sample identifiers, sample types, and COC form numbers for all PNL samples.

Table 5. Pacific Northwest Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5017-A01.136	Ambient upwind SUMMA™	008880
S5017-A02.137	Ambient SUMMA™ (VSS)	008880
S5017-A04.167	SUMMA™	008880
S5017-A05.168	SUMMA™	008880
S5017-A06.169	SUMMA™	008880
S5017-A23.27U	NH ₃ /NO _x /NO/H ₂ O sorbent	008881
S5017-A24.28U	NH ₃ /NO _x /NO/H ₂ O sorbent	008881
S5017-A25.29U	NH ₃ /NO _x /NO/H ₂ O sorbent	008881
S5017-A26.30U	NH ₃ /NO _x /NO/H ₂ O sorbent	008881
S5017-A27.31U	NH ₃ /NO _x /NO/H ₂ O sorbent	008881
S5017-A28.32U	NH ₃ /NO _x /NO/H ₂ O sorbent	008881
S5017-A29.33U	NH ₃ /NO _x /NO/H ₂ O trip blank	008881
S5017-A30.34U	NH ₃ /NO _x /NO/H ₂ O trip blank	008881
S5017-A31.35U	NH ₃ /NO _x /NO/H ₂ O trip blank	008881

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-SX-103, the VSS manifold and vapor sample transfer tubing was heated to 60 °C and ambient air was purged through the system for approximately 22 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 contaminants were 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 C of WHC-IP-1127-4.5 (WHC 1995b) and the project-specific file located with SML.

In compliance with the *Vapor Space Probe Cleaning Procedure* (WHC 1993) the team cleaned the hot-water-jacketed probe before it was installed in SST 241-SX-103. 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 via a hand-held organic vapor meter that the total organic concentration in the sample line is below 1 ppmv.

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 6. According to the calibration schedule shown in Table 6, all instrumentation was within its calibration period during the SST 241-SX-103 sampling event.

Table 6. Calibration Data.

System	Calibration Date	Expiration Date	WHC Standards Laboratory Code
Temperature Control System	04/21/94	04/21/95	804-67-74-009
Mass Flow System	12/08/94	12/08/95	804-28-03-001
Pressure System	12/07/94	12/07/95	804-67-89-001

5.3 BLANK SAMPLES

Trip blanks are samples that accompany the sample media from the point of generation through sample analysis. 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, including mounting on the sampling port for one minute, but no tank vapors are drawn through the field blanks.

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.

Tables 4 and 5 also list sample blanks used during the sampling of SST 241-SX-103.

6.0 ANOMALIES

All samples were collected in accordance with the TCP and WHC-IP-1127-4.5, *Collection of SUMMA Canisters and Sorbent Tube Samples Using the Vapor Sampling System* (WHC 1995b). During the collection of S5017-A25.38U the field scientist noticed that the c-flex clamp was slightly clamped. The pressure was reading 530 Torr when the field scientist opened the clamp. After the clamp was completely open the pressure began to rise. 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.
- Homi, C. S., 1995, *Tank 241-SX-103 Tank Characterization Plan*, WHC-SD-WM-TP-313, 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 SUMMA Canisters and Sorbent Tube Samples Using the Vapor Sampling System (VSS)*, Procedure WHC-IP-1127-4.5, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995c, *Release of Vapor Sampling Equipment*, Procedure 1995-33300-03, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993, *Vapor Space Probe Cleaning Procedure*, Procedure LO-080-405/A0, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A
SAMPLE LOG SHEETS

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Waste Tank
241-SX-103

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

Date: 3/23/95

Ensure HEPA filters are installed

VSS Personnel: R. Westberg, T. Utecht

Ensure connection to sample probe

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

Trailer Personnel: N. Buechler, G. Caprio

Tank Temperature 18 C

PNL				Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
ORNL		Port	Description	Flow	Duration	Total	Flow	Start	End	Total	Total
WHC Sample ID	Sample ID	Valve #		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
Group # 1						sccm	sccm	3/22/95	3/23/95	(min.)	Liters
Purge with ambient air for 30 min.				Over night	5450	30	163500	5450	12:08	8:20	0
S5017 A01 136	136		AMBIENT #1		1			9:00	9:01		
GC Run #1 Ambient air/Cleanliness check								9:04			
S5017 A02 137	137	15	AMBIENT #2		1			9:11	9:12		
GC Run #2 Ambient air								9:14			
Leak check (Appendix A)				Leak Rate:	10.4 torr/hr			9:21	9:36		
Purge with tank air for 30 min.				5450	30	163500	5450	9:47	10:17	30.0	163.50
Measure tank pressure				PE-1 =	732.2						
S5017 A03 0T1	-1863 (222S)	8	Tritium Trap	200	5	1000	200.00	10:28	10:34	5.0	1.00
GC Run # 3 (Tank run #1)								10:38			
S5017 A04 167	167	11	SUMMA #3		1			10:42	10:43	1.0	6.00
S5017 A05 168	168	13	SUMMA #4		1			10:47	10:48	1.0	6.00
S5017 A06 169	169	15	SUMMA # 5		1			10:51	10:52	1.0	6.00
GC Run # 4 (Tank run # 2)								10:57			
S5017 A07 901	TST#901	9	TST #1	50	4	200	50.10	11:08	11:12	4.0	0.20
S5017 A08 902	TST#902	10	TST #2	50	4	200	50.10	11:08	11:12	4.0	0.20
S5017 A09 903	TST#903	8	TST #3	50	4	200	50.10	11:18	11:22	4.0	0.20
S5017 A11 904	TST#904	10	TST #4	50	4	200	50.10	11:18	11:22	4.0	0.20

Waste Tank
241-SX-103

WHC Sample ID	PNL	ORNL	Port	Description	Desired Flow Rate	Desired Duration (min.)	Desired Total Flow	Actual Flow Rate	Actual Start Time	Actual End Time	Actual Total Time	Actual Total Flow
S5017 A10 908	TST#908			TST FIELD BLANK #1					11:19	11:20	1.0	
S5017 A12 905	TST#905		9	TST # 5	200	5	1000	200.40	11:27	11:32	5.0	1.00
S5017 A13 906	TST#906		10	TST # 6	200	5	1000	200.40	11:27	11:32	5.0	1.00
S5017 A14 907	TST#907		8	TST # 7	200	5	1000	200.40	11:41	11:46	5.0	1.00
S5017 A15 909	TST#909		10	TST # 8	200	5	1000	200.40	11:41	11:46	5.0	1.00
S5017 A16 508	TST#508		9	TST # 9	200	20	4000	200.40	11:56	12:16	20.0	4.01
S5017 A18 803	TST#803		10	TST # 10	200	20	4000	200.40	11:56	12:16	20.0	4.01
S5017 A17 808	TST#808			TST FIELD BLANK #2					11:58	11:59		
S5017 A19 528	TST#528		8	TST # 11	200	20	4000	200.40	12:24	12:44	20.0	4.01
S5017 A20 833	TST#833		10	TST # 12	200	20	4000	200.40	12:24	12:44	20.0	4.01
GC Run # 5 (Tank run #3)									12:51			
S5017 A23 36U	36U		9	NH3/NOx/H2O #1	200	15	3000	200.40	12:58	13:13	15.0	3.01
S5017 A24 37U	37U		10	NH3/NOx/H2O #2	200	15	3000	200.40	12:58	13:13	15.0	3.01
S5017 A25 38U *	38U		8	NH3/NOx/H2O #3	200	15	3000	200-175	13:19	13:34	15.0	2.93 *
S5017 A26 39U	39U		10	NH3/NOx/H2O #4	200	15	3000	200.40	13:19	13:34	15.0	3.01
S5017 A27 40U	40U		9	NH3/NOx/H2O #5	200	15	3000	200.40	13:45	14:00	15.0	3.01
S5017 A28 41U	41U		10	NH3/NOx/H2O #6	200	15	3000	200.40	13:45	14:00	15.0	3.01
GC Run # 6 (Tank run # 4)												
* C-flex tubing did not open fully which affected flow through sample S5017-A25.38U												TOTAL TANK GAS USED DURING SAMPLING RUNS
S5017 A32 0U1	T-1864 (222S)			Upstream HEPA(box)								57.80
S5017 A33 0D1	T-1865 (222S)			Downstream HEPA(box)								
S5017 A34 0U2	T-1866 (222S)			Upstream HEPA (VSS)								
S5017 A35 0D2	T-1867 (222S)			Downstream HEPA (VSS)								

Waste Tank
241-SX-103

WHC Sample ID	PNL	ORNL	Sample ID	Port	Valve #	Description	Desired		Actual		Actual		Actual	
							Flow	Rate	Duration	Total	Flow	Rate	Start	End
Trip Blanks (DO NOT EXPOSE)														
S5017 A21 900			TST#900			TST TRIP #1								
S5017 A22 847			TST#847			TST TRIP #1								
S5017 A29 42U			42U			NH3/NOx/H2O TRIP #1								
S5017 A30 43U			43U			NH3/NOx/H2O TRIP #2								
S5017 A31 44U			44U			NH3/NOx/H2O TRIP #3								

SX-103
TOTAL TANK VAPOR USED

	NUMBER		TIME		VOLUME	
	OF		IN		IN	TOTAL
	EVENTS		MINUTES		SCCM	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	163.50
GC PURGES	4		3		5000	60.00
SUMMA PURGES	3		2		5000	30.00
ALL SAMPLES COLLECTED						57.80
TOTAL FOR TANK SAMPLING RUN						333.70

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MHC-SD-WM-RPT-144, Rev. 0

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APPENDIX B
AMBIENT CONDITIONS

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WEATHER DURING VSS SAMPLING OF 241-SX-103

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APPENDIX C
CHAIN-OF-CUSTODY FORMS

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ORNL	CHAIN OF CUSTODY (Rev 1)	# 006760
Custody Form Initiator	Amy Dindal	Sampling Location
ORNL Contact	Roger Jenkins	Telephone
Method of Shipment	Federal Express	Shipped to
		Rick Mahon
Sample Identification		

WHC Identifier	TST #	Trap Type	Received at WHC (✓)	Received at ORNL (✓)
S5017-A7.901	901	SAMPLE	✓ 3-16-95	✓
S5017-A8.902	902	SAMPLE	✓	✓
S5017-A9.903	903	SAMPLE	✓	✓
S5017-A11.904	904	SAMPLE	✓	✓
S5017-A12.905	905	SAMPLE	✓	✓
S5017-A13.906	906	SAMPLE	✓	✓
S5017-A14.907	907	SAMPLE	✓	✓
S5017-A15.909	909	SAMPLE	✓	✓
S5017-A16.508	508	SAMPLE	✓	✓
S5017-A18.803	803	SAMPLE	✓	✓
S5017-A19.528	528	SAMPLE	✓	✓
S5017-A20.833	833	SAMPLE	✓	✓
S5017-A21.900	900	TRIP BLANK	✓	✓
S5017-A22.847	847	TRIP BLANK	✓	✓
S5017-A10.908	908	FIELD BLANK	✓	✓
S5017-A17.808	808	FIELD BLANK	✓	✓

COMMENTS: Samples collected 23MAR95. Rec'd @ ORNL OK

[] Field Transfer of Custody		Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
A.B. Dindal	3-15-95	10:35am	AP Burchley / R. Burchley	3-16-95	1600
AP Burchley / R. Burchley	3-23-95	0830	T.B. White / A. Burchley	3-23-95	0830
T.B. White / A. Burchley	3-29-95	0900	A.B. Dindal	3-30-95	1600

Cooler Temperature Status

Temperature (°C)	Min	Max
When Shipped from ORNL	-5	6
When Received at WHC	-3	6
When Shipped from WHC	-4°C	5°C
When Received at ORNL	-1	9

Westinghouse Hanford Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST										Page <u>1</u> of <u>1</u>	
Collector <u>T.B. UTECHT</u>		Company Contact <u>R.D. Mahon</u>				Telephone No. <u>373-2891</u>				Data Turnaround ☐ Priority ☒ Normal		COPY	
Project Designation <u>NA</u>		Sampling Location <u>241 5X 103</u>				SAF No. <u>55017</u>							
Ice Chest No. <u>NA</u>		Field Logbook No. <u>WHC-N-467-4</u>				Method of Shipment <u>Govt. Vehicle 929</u>							
Shipped To <u>222 S Labs</u>		Offsite Property No. <u>NA</u>				Bill of Lading/Air Bill No. <u>NA</u>							
Possible Sample Hazards/Remarks <u>NA</u>		Preservative <u>NA</u>											
		Type of Container <u>Silica Gel / HEPA filters</u>											
		No. of Container(s) <u>5</u>											
Special Handling and/or Storage		Volume <u>47 MM</u>											
SAMPLE ANALYSIS													
Sample No.		Matrix*		Date Sampled		Time Sampled							
55017 OT1		Silica Gel		3-23-95		T-1863							
55017 OUI		HEPA		3-23-95		T-1864							
55017 ODI		HEPA		3-23-95		T-1865							
55017 OUI2		HEPA		3-23-95		T-1866							
55017 ODI2		HEPA		3-23-95		T-1867							
CHAIN OF POSSESSION													
Relinquished By		Date/Time		Received By		Date/Time		SPECIAL INSTRUCTIONS				Matrix* S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other	
<u>NP Buchler</u>		<u>3-24-95 0900</u>		<u>RP Decker</u>		<u>3-24-95 0900</u>							
Relinquished By		Date/Time		Received By		Date/Time							
Relinquished By		Date/Time		Received By		Date/Time							
Relinquished By		Date/Time		Received By		Date/Time							
LABORATORY SECTION		Received By		Title		Date/Time							
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time							

Westinghouse Hanford Company

CHAIN OF CUSTODY

WHC 008880

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-SX-103 Tank Vapor Sample SAF S5-017
(VSS Truck)

Collection date 03 - 23 - 95

Preparation date 03 - 14 - 95

Ice Chest No.

Field Logbook No. WHC- N-642-10

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

S5-017 - A01 . 136

Ambient Air SUMMA #1 Upwind of SX-103

S5-017 - A02 . 137

Ambient Air SUMMA #2 Through Port 15

S5-017 - A04 . 167

SUMMA #3 Port 11

S5-017 - A05 . 168

SUMMA #4 Port 13

S5-017 - A06 . 169

SUMMA #5 Port 15

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>	03-17-95	1010	T B Utecht <i>T B Utecht</i>	03-17-95	1010
<i>T.B. Utecht / T B Utecht</i>	3-23-95	0830	<i>P. Breckler / P Breckler</i>	3-29-95	0830
<i>P Breckler / P Breckler</i>	3-29-95	1345	<i>A Edwards / J A Edwards</i>	3-29-95	1345

Final Sample Disposition

Comments:

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

(Revised 10/17/94 PNL)

Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 008881

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-SX-103 Tank Vapor Sample SAF S5-017
(VSS Truck)

Collection date 03 - 13 - 95

Preparation date 03 - 14 - 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 PNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S5-017 - A23 . 36U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 1)	Line # 9
S5-017 - A24 . 37U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 2)	Line # 10
* S5-017 - A25 . 38U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 3)	Line # 8
S5-017 - A26 . 39U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 4)	Line # 10
S5-017 - A27 . 40U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 5)	Line # 9
S5-017 - A28 . 41U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 6)	Line # 10
S5-017 - A29 . 42U	NH ₃ /NO _x /H ₂ O (Trap Trip Blank # 1)	
S5-017 - A30 . 43U	NH ₃ /NO _x /H ₂ O (Trap Trip Blank # 2)	
S5-017 - A31 . 44U	NH ₃ /NO _x /H ₂ O (Trap Trip Blank # 3)	

[] Field Transfer of Custody			[] Chain of Possession			(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time		
G W Dennis <i>[Signature]</i>	03-16-95	11:00	J A Edwards <i>[Signature]</i>	03-16-95	11:00		
J A Edwards <i>[Signature]</i>	03-17-95	10:10	TB Utecht <i>[Signature]</i>	03-17-95	10:10		
T.B. Utecht / T.B. Utecht	03-23-95	0830	T.B. Utecht / T.B. Utecht	3-23-95	0830		
T.B. Utecht / J.A. Edwards	3-29-95	1345	J.A. Edwards / J.A. Edwards	3-29-95	1345		

Final Sample Disposition

Comments:

	PNL (only) Checklist	Pick-up / Delivery	Comments:
0	Media labeled and checked?	(Y) N	I am checking if the reported flow is correct for tube S5-017-A25.38U. 3/29/95 Reviewed datalogger download and S5-017-A25.38U Sample volume was 2930 sccm as reported on sample Spreadsheet. <i>Karl Whistling</i> 3/29/95
0	Letter of instruction?	(Y) N	
0	Media in good condition?	(Y) N / (Y) N	
0	COC info/signatures complete?	(Y) N / (Y) N	
0	Sorbents shipped on ice?	(Y) N / (Y) N	
0	Rad release stickers on samples?	/ (Y) N	
0	Activity report from 222S?	/ (Y) N	
0	COC copy for LRB, RIDS filed?	/ (Y) N	
0	COC copy for sorbent follow-on?	/ (Y) N/A	
	POC (P)	POC (P)	