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VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-C-107 USING the in Situ Vapor Sampling System

G.S. Caprio

SGN Eurisys Services Company, Richland, WA 99352
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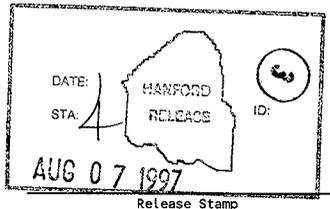
Abstract: THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE FEBURARY 07, 1997 SAMPLING OF SST 241-C-107(#5)

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Document title: Vapor and Gas Sampling of Single-Shell Tank 241-C-107
(#5) 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
ISVS	In Situ Vapor Sampling System
NH ₃	Ammonia
H ₂ O	Water Vapor
OPC	Offsite Property Control
OVM	Organic Vapor Meter
PNNL	Pacific Northwest National Laboratory
SAS	Special Analytical Studies
SML	Sampling and Mobile Laboratories
SST	Single-Shell Tank
TCP	Tank Characterization Plan
team	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-C-107 USING THE VAPOR SAMPLING SYSTEM

1.0 SCOPE

The Vapor Issue Resolution Program tasked the Vapor Team (the team) to collect representative headspace samples from Hanford Site single-shell tank (SST) 241-C-107. This document presents sampling data resulting from the February 7, 1997 sampling of SST 241-C-107. Analytical results will be presented in separate reports issued by the Pacific Northwest National Laboratory which supplied and analyzed the sample media.

This is the last in a series of temporal sampling events on SST 241-C-107. The strategy of temporal sampling is to measure the compositional changes of the waste tank headspace as related to seasonal effects and gradual changes of waste chemistry.

2.0 SAMPLING EQUIPMENT DESCRIPTION

2.1 VAPOR SAMPLING SYSTEM

The team, consisting of Special Analytical Studies (SAS) personnel, used the vapor sampling system (VSS) to collect representative samples of the air, gases, and vapors from the headspace of SST 241-C-107 with sorbent traps and SUMMA¹ canisters on February 7, 1997. Mahon et al. (1994) describes in detail the VSS, its performance, and its operation.

The VSS comprises a mobile laboratory connected to the vapor space of the waste tank by stainless steel transfer tubing. A vacuum pump draws sample vapor from the tank headspace through the transfer tubing and into 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 total organic carbon (TOC) content of 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 at an elevated and controlled 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.

Highly accurate mass flow controllers control the sample vapor flow rate through the sorbent traps at the sorbent trap station. The controllers FICV-1 through FICV-9 are mounted on top of the sorbent station between the inlet and outlet valves of their respective sampling ports. While 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.

The VSS is equipped with a Hewlett Packard 5890 Series II gas chromatograph (GC) which is equipped with a flame-ionization detector (FID), 1 mL sample loop, 10 port injection valve, 2 meter chromatographic column, programmable oven, and a portable computer loaded with the HP-Chemstation software providing computer control. The oven is programmed to heat from 50°C to 270°C at a rate of 70°C per minute. Helium is the carrier gas, air and hydrogen the

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

combustion gases, and nitrogen the make-up gas. The GC is plumbed to accept sample from the VSS manifold to the sample loop. After the sample is transferred into the sample loop and reaches equilibrium, the run is initiated by the operator from the computer. HP-Chemstation software activates the 10 port valve which transfers a sample from the sample loop to the HP-5 column. The column is 2m long and has an inside diameter of 0.25mm which is coated with a chemically bonded phenyl methyl silicone layer to minimize sample interference. The sample passes through the column to the FID which generates a TOC signal for that sample. The data is then transmitted to the computer where it is stored for future retrieval and analysis. The GC/FID is configured to confirm sampling system cleanliness, and to quantitatively estimate TOC concentration in ambient air and tank vapor samples in real time.

The system is multi-point calibrated at the weather station on a as available basis and last performed 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.

Sorbent trap samples, pencil-size stainless steel or glass tubes that contain vapor-adsorbing media, are collected at the sorbent trap station of the sampling manifold. The rate and duration of flow, as specified by the analytical laboratory providing the sample media, determines the total volume of vapor to be passed through the tube. Virtually all the target analytes are trapped in the tube by the adsorbing media. Analyte concentration in the tank vapor can then be ascertained from the sorbent media analysis knowing the total volume of vapor which passed through the sorbent trap.

SUMMA™ canisters, stainless steel vessels with their internal surfaces chemically passivated by the SUMMA™ process to minimize adsorption of gases and vapors, are used to sample tank vapor from the SUMMA™ sampling station on the sampling manifold. The precleaned and evacuated SUMMA™ canisters are filled with sample vapor by opening a manually operated valve, which is then shut after pressure equilibration to seal the sample inside. SUMMA™ canisters allow a 6 liter sample to be transported to an analytical laboratory.

3.0 SAMPLING EVENT DESCRIPTION

3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in WHC-SD-WM-TP-522 Rev 0D, *Vapor Sampling and Analysis Plan* (Buckley 1997). 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. The team retains these documents in the project file. This sample event's project-specific number is V7-005.

3.2 OPERATIONS AND SAMPLING PERSONNEL

Steve Carter was the Tank Farm Operations person-in-charge. The team members included:

R. D. Mahon, VSS Lead Scientist
L. A. Pingel, Field Scientist

The VSS was set up at SST 241-C-107 on February 6, 1996 and was allowed to warm up overnight. Sampling began approximately 10:00 a.m. on February 7, 1997, and was completed about 12:30 p.m. the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Prior to hooking up to SST 241-C-107, 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%, NH₃ 25 ppm, O₂ 20.9%, and TOC 3 ppm.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, February 7, 1997 was cold and partly cloudy, with a light wind from the northwest. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 6.5 miles west of C-Farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser 3 of SST 241-C-107. The probe length, from the sample inlet to the top of the riser flange, was 7.9 meters.

All zones of the VSS were heated to 60 °C during setup of the VSS at SST 241-C-107 on February 6, 1997. The team stabilized the VSS temperature zones by 9:30 a.m. on February 7, 1997, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-C-107 were 1007 mbar (755.1 torr) and 39.9 °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 21 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 February 7, 1997, the team collected two SUMMA™ canister samples of ambient air, one manually 10 meters upwind of the VSS connection with SST 241-C-107, 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. The flow meter's precision was verified prior to sampling. The Grubbs test for outliers was used to determine if a meter was operating outside of its acceptance range.

A leak check of the VSS sampling manifold and transfer tubing was performed. The system was evacuated to 275.4 mbar (206.6 torr) and leakage of ambient air into the system was observed by monitoring system pressure for 15 minutes. Leakage resulted in an increase of 5.6 mbar (4.2 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 13.5 ml/min.

The sampling valve was opened and the VSS was purged with sample vapor from SST 241-C-107 for 30 minutes at a total flow rate of 4.40 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 13.2 air turnovers in the system.

One analytical laboratory provided sample media. PNNL provided SUMMA™ canisters, sorbent traps for organic vapors, ammonia (NH₃) and water vapor (H₂O), and TST sorbent traps.

3.6 FIELD GC/FID RESULTS

The GC\FID was not used for the sampling of tank 241-C-107 due to the time required to get approval by the new flammability committee for use in field sampling. Per the sampling and analysis plan sampling will continue without the GC\FID.

3.7 RADIATION SCREENING

Samples are unconditionally released from the SST farm in accordance with 1996-3E100-RSP-02 Rev 01, *Release Survey of Vapor Sampling Equipment* (WHC 1996). 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 2000 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:

PNNL: 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 February 7, 1997, SST 241-C-107 vapor sampling event was drawn through a series of four 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 filters were submitted to WSCF Laboratory for total alpha, total beta, and gamma energy analysis (GEA). The 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-C-107 filter and silica gel analysis results are shown in Table 1. The vapor team scientists use the activity results in Table 1 to calculate pCi/g of sample media. The team maintains this information in the project-specific file. The results in Table 1 indicate that the samples collected from SST 241-C-107 met the laboratory acceptance criteria and the DOT definition of a nonradioactive shipment.

Table 1. Radionuclide Analysis Results.

Filter	Sample Identifier	Activity Results ^a (pCi/sample)	Activity ^b (pCi/L of tank gas)
Upstream filter (box)	V7005-A21.OU1	Total Alpha = 0.36 Total Beta = <0.45 GEA = <detectable	= 0.00 = <detectable = <detectable
Downstream filter (box)	V7005-A22.OD1	Total Alpha = 5.50 Total Beta = 550 GEA = Cs ₁₃₇ 21.8	= 0.03 = 2.68 = 0.16
Upstream filter (VSS)	V7005-A23.OU2	Total Alpha = <0.12 Total Beta = 1.40 GEA = <detectable	= <detectable = 0.01 = <detectable
Downstream filter (VSS)	V7005-A24.OD2	Total Alpha = <0.12 Total Beta = <0.18 GEA = <detectable	= <detectable = <detectable = <detectable
Tritium trap	V7005-A03.OT1	Total activity = 19	= 19°

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 WSCF Laboratory.

^bNumbers based on an approximation of the total volume of tank vapor through the filters. Appendix A and the sample checksheets were used to estimate a total flow through the VSS of 205.0 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, TSTs, and SUMMA[™] canisters received from PNNL were transported in a government vehicle to a custody locked storage area maintained by SAS. Sorbent trains, tubes and traps were maintained at 4 ± 2 °C in a refrigeration unit in the locked storage area.

On February 14, 1997, all sorbent tubes, TSTs, and SUMMA[™] canisters were transported by government vehicle to PNNL and delivered to J. A. Edwards. Table 2 lists the sample identifiers, types, and COC form numbers.

From the time that samples are received by SAS until they are shipped back to the analytical laboratory, all COCs are maintained by SAS 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.

Table 2. Pacific Northwest National Laboratory Samples.

Sample Identifier	Sample Type	COC Number
V7005-A01.182	Ambient upwind SUMMA™	100655
V7005-A02.184	Ambient SUMMA™ (VSS)	100655
V7005-A04.211	SUMMA™	100655
V7005-A05.212	SUMMA™	100655
V7005-A06.238	SUMMA™	100655
V7005-A07.34R	NH ₃ /H ₂ O sorbent	100657
V7005-A08.35R	NH ₃ /H ₂ O sorbent	100657
V7005-A09.36R	NO ₃ /H ₂ O sorbent	1004657
V7005-A10.37R	NH ₃ /H ₂ O sorbent	100657
V7005-A15.38R	NH ₃ /H ₂ O field blank	100657
V7005-A16.39R	NH ₃ /H ₂ O field blank	100657
V7005-A11.1374	TST	100656
V7005-A12.1375	TST	100656
V7005-A13.1376	TST	100656
V7005-A14.1377	TST	100656
V7005-A17.1378	TST Field Blank	100656
V7005-A18.1379	TST Field Blank	100656
V7005-A19.1380	TST Trip Blank	100656
V7005-A20.1381	TST Trip Blank	100656

5.0 QUALITY ASSURANCE AND CONTROLS

5.1 VAPOR SAMPLING SYSTEM CLEANING

Immediately prior to sampling of SST 241-C-107, the VSS manifold and vapor sample transfer tubing was heated to 60 °C and ambient air was purged through the system for 1260 minutes. Also, all pertinent system valves were actuated to release any contaminants that may have collected in the VSS valves themselves. 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 the team.

5.2 INSTRUMENT CALIBRATION

Instruments located in the VSS are calibrated on an annual basis. VSS instrumentation calibration data, maintained in files by the team, are summarized in Table 3. Errors associated with the mass flow meters and totalizers were determined by the Sierra Instruments Inc. all mass flow meters were within 0.5% full scale during the SST 241-BY-108 sampling event. Internal Memo 75820-96-028 (Tribble 1996c) discusses the recommendations concerning the instrument calibration and why Sierra Instruments was used. Prior to sampling a precision test was performed on the flow meters to indicate acceptable precision.

Table 3. Calibration Data.

Element	Calibration Date	Expiration Date	WHC Standards Laboratory Code	Sierra Instruments, Inc. Code
FICV-1	8/16/96	8/16/97	518-28-03-012	82254
FICV-2	8/16/96	8/16/97	518-28-03-008	78254
FICV-3	8/16/96	8/16/97	518-28-03-004	37023
FICV-4	8/16/96	8/16/97	518-28-03-006	44023
FICV-5	8/16/96	8/16/97	518-28-03-011	81274
FICV-6	8/16/96	8/16/97	518-28-03-009	80274
FICV-7	8/16/96	8/16/97	518-28-03-014	48264
FICV-8	8/16/96	8/16/97	518-28-03-013	47264
FICV-9	8/16/96	8/16/97	518-28-03-007	47023
FICV-10	8/16/96	8/16/97	518-28-03-010	81254
FICV-11	8/16/96	8/16/97	518-28-03-005	43023
PE-1	6/27/96	6/27/97	518-80-02-005	NA
PE-2	6/28/96	6/28/97	518-80-02-006	NA
PE-3	6/28/96	6/28/97	518-80-02-008	NA
PE-4	6/27/96	6/27/97	518-80-02-007	NA
PD-1	6/26/96	6/26/97	518-80-02-004	NA
PD-26/26/96	6/26/97	6/26/97	518-80-02-003	NA
Temperature Control System	7/24/96	7/24/97	ES-96-00543/W	NA

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 2 lists sample blanks used during the sampling of SST 241-C-107.

6.0 ANOMALIES

All samples were collected in accordance with the TCP and WHC-IP-1127-4.10, *Collection of Parallel Sorbent Tube and SUMMA Canister Samples Using the Vapor Sampling System* (1995b). After completing the sampling job the O'Brien temperature was note to be reading 39°C. the set point was 70°C. Due to the accuracy of +/- 2.2°C for each of the readings, there is a possibility that the O'Brien sample line was actually colder than the tank temperature during the last part of the sampling event. This could affect the samples by condensing tank vapor onto the O'Brien's surface.

7.0 REFERENCES

- 49 CFR 100-177, 1992, "Transportation," *Code of Federal Regulations*, as amended.
- Buckley, L. L., 1997, *Vapor Sampling and Analysis Plan*, WHC-SD-WM-TP-522 Rev. 0D, Westinghouse Hanford Company, Richland, Washington.
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- Trible, T. C., Viswanath, R. S., 1996c, *Recommendation concerning the ISVS/VSS comparison study data with respect to calibration errors in Mass flow monitors and controllers*, (internal memo 75820-96-028 to L.D. Pennington, August 28), 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 SUMMA Canister Samples Using the Vapor Sampling System (VSS)*, Procedure WHC-IP-1127-4.10, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1996, *Release Survey of Vapor Sampling Equipment*, Procedure 1996-3E100-RSP-02 Rev 01, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A
SAMPLE LOG SHEETS

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YSS Sampling of

C-107 #5

Date: 2/7/97

YSS Personnel: RD Mahon, LA Pingel

Trailer Personnel: None

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 39.9 C

WHC Sample ID	ORNLI/PNL Sample ID	Port Valve #	Description	Desired Flow Rate SCCM	Desired Duration (min.)	Desired Total Flow Rate SCCM	Actual Start Time	Actual Flow Rate SCCM	Actual End Time	Actual Total Time (min.)	Actual Total Flow
*Purge with ambient air for 30 min.											
V7005-A01	182	Upwind	AMBIENT #1	5500	30	165000	1230	4400	0930	1280	1280
V7005-A02	184	15	AMBIENT #2		1		1000		1001	1	
LEAK CHECK (APPENDIX A) Leak Rate: 18.8 Torr/Hr											
*Purge with tank vapor for 30 min											
Measure tank pressure PE-1 = 755.1 Torr											
V7005-A03	OT1	4	Tritium Trap	200	5	1000	1120	200	1125	5	1.00
V7005-A04	211	11	SUMMA #3		1		1129		1130	1	6.00
V7005-A05	212	13	SUMMA #4		1		1133		1134	1	6.00
V7005-A06	238	15	SUMMA #5		1		1142		1143	1	6.00
V7005-A07	34R	1	NH3/NOx/H2O (#1)	200	10	2000	1146	200	1156	10	2.00
V7005-A08	35R	2	NH3/NOx/H2O (#2)	200	10	2000	1148	200	1156	10	2.00
V7005-A09	36R	3	NH3/NOx/H2O (#3)	200	10	2000	1146	200	1156	10	2.00
V7005-A10	37R	4	NH3/NOx/H2O (#4)	200	10	2000	1146	200	1156	10	2.00

YSS Sampling of
C-107 #5

WHC Sample ID	ORNL/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
V7005- A11 1374	#1374	3	TST #1	100	2	200	100	1215	1217	2	0.20
V7005- A12 1375	#1375	4	TST #2	100	2	200	100	1215	1217	2	0.20
V7005- A13 1376	#1376	3	TST #3	100	2	200	100	1220	1222	2	0.20
V7005- A14 1377	#1377	4	TST #4	100	2	200	100	1220	1222	2	0.20

V7005- A17 1378	#1378		TST FIELD BLANK #1					1223	1224	1	
V7005- A18 1379	#1379		TST FIELD BLANK #2					1223	1224	1	

V7005- A15 38R	#38R		NH3/NOx/H2O FIELD BLANK #1					1202	1203	1	
V7005- A16 39R	#39R		NH3/NOx/H2O FIELD BLANK #2					1202	1203	1	

TOTAL TANK GAS USED DURING SAMPLING RUNS 27.80

V7005- A21 0U1	W97V00014		Upstream filter (box)								
V7005- A22 0D1	W97V00015		Downstream filter (box)								
S7010 A23 0U2	W97V00016		Upstream filter (VSS)								
V7005- A24 0D2	W97V00017		Downstream filter (VSS)								

Trip Blanks (DO NOT EXPOSE)											
V7005- A19 1380	TST#1380		TST TRIP #1								
V7005- A20 1381	TST#1381		TST TRIP #2								

Observations / Anomalies

VSS SAMPLING RADIOLOGICAL SCREENING RESULTS
C-107 #5

Note: #VALUE! = <Detectable

V7005-A31.001 / W97V00014
FILTER BOX UPSTREAM FILTER

TOTAL VOLUME

ALPHA

BETA

GEA

Co-60

Co-137

Eu-152

Eu-154

Eu-155

Eu-159

Ru-103

Ru-106

Sb-125

Sb-126

Sb-133

Zn-65

pci / liter

0.00

<Detectable

0.36

<0.45

<13.5

<0.28

<Detectable

<Detectable

<Detectable

<Detectable

<1.32

<0.45

<0.45

<Detectable

<Detectable

<1.69

<Detectable

<Detectable

<2.37

205.00

pci / liter

0.00

<Detectable

V7005-A32.001 / W97V00015
FILTER BOX DOWNSTREAM FILTER

TOTAL VOLUME

ALPHA

BETA

GEA

Co-60

Co-137

Eu-152

Eu-154

Eu-155

Eu-159

Ru-103

Ru-106

Sb-125

Sb-126

Sb-133

Zn-65

pci / liter

5.50

<Detectable

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

205.00

pci / liter

5.50

<Detectable

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

<0.0202

pci / liter

0.03

<Detectable

V7005-A33.012 / W97V00016
VSS UPSTREAM FILTER

TOTAL VOLUME

ALPHA

BETA

GEA

Co-60

Co-137

Eu-152

Eu-154

Eu-155

Eu-159

Ru-103

Ru-106

Sb-125

Sb-126

Sb-133

Zn-65

pci / liter

#VALUE!

0.01

<Detectable

<0.12

1.40

<Detectable

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

<0.28

205.00

pci / liter

<0.12

<0.16

<Detectable

<0.877

<Detectable

V7005-A33.011 / W97V00018
TRITIUM TRAP

TOTAL VOLUME

ALPHA

BETA

GEA

Co-60

Co-137

Eu-152

Eu-154

Eu-155

Eu-159

Ru-103

Ru-106

Sb-125

Sb-126

Sb-133

Zn-65

pci / liter

19

<Detectable

1

19

<Detectable

19

pci / liter

19

<Detectable

19

pci / liter

19

<Detectable

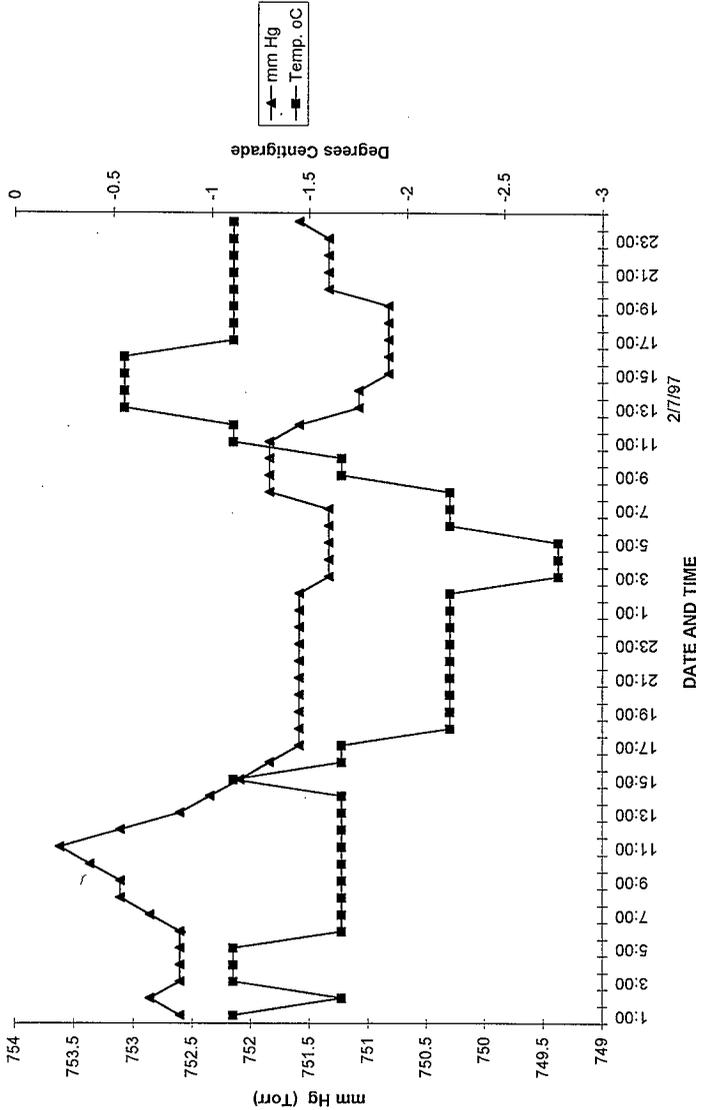
<Detectable

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APPENDIX B
AMBIENT CONDITIONS

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WEATHER DURING VSS SAMPLING OF 241-C-107



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APPENDIX C
CHAIN-OF-CUSTODY FORMS

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Battelle Pacific Northwest National Laboratory | **CHAIN OF CUSTODY** | **WHC 100656**

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-C-107 Tank Vapor Sample SAF V7005
Temporal #5 Riser # 3 (VSS Truck)
Ice Chest No.

Collection date 02-07-97
Preparation date 01-31-97
Field Logbook No. WHC RUST N-617.10
R.D.M.

Erco Hi/Lo thermometer No. PNL-T-00 3

Offsite Property No. N/A

Bill of Lading/Airbill No. N/A

Method of Shipment: Government Truck

Shipped to: WHC

Collector(s) R.D. Mahon
LA Engel

Possible Sample Hazards/Remarks: Unknown at time of sampling

Sample Identification

V7005 - A11 . 1374	PNL Triple Sorbent Trap (TST) Sample #1	02 - FEB - 97 / 1215
V7005 - A12 . 1375	PNL TST Sample #2	↓ - ↓ - 97 / 1215
V7005 - A13 . 1376	PNL TST Sample #3	↓ - ↓ - 97 / 1220
V7005 - A14 . 1377	PNL TST Sample #4	↓ - ↓ - 97 / 1220
V7005 - A17 . 1378	Open, close & store TST Field Blank #1	07 FEB - 97 / 1223
V7005 - A18 . 1379	Open, close & store TST Field Blank #2	07 FEB - 97 / 1223
V7005 - A19 . 1380	Store TST Trip Blank #1	02 - FEB - 97 / Not exposed
V7005 - A20 . 1381	Store TST Trip Blank #2	07 - FEB - 97 / Not exposed

Field Transfer of Custody | Chain of Possession | (Sign and Print Names)

Relinquished By	Date	Time	Received By	Date	Time
JL Jula	01-31-97	1230	JA Edwards	01-31-97	1230
JA Edwards	02-3-97	0930	ES MAST	2/3/97	0930
Smart S. Mahon	2/4/97	1252	ES CAPETA	2/4/97	1252
ES CAPETA	2/6/97	1500	Rick Mahon	2/6/97	1500
Rick Mahon	2/16/97	0730	ES MAST	2/16/97	0730
ES MAST	2-11-97	1900	CSMULLIN	2-11-97	0900
CSMULLIN	2-14-97	1015	JA EDWARDS	2-14-97	1015

Final Sample Disposition

Comments:	Pick-up / Delivery	Comments:
PNL (only) Checklist	<input checked="" type="checkbox"/> Y	
Media labeled and checked?	<input checked="" type="checkbox"/> Y	
Letter of instruction?	<input checked="" type="checkbox"/> Y	
Media in good condition?	<input checked="" type="checkbox"/> Y	
COC info/signatures complete?	<input checked="" type="checkbox"/> Y	
Sorbents shipped on ice? (<5°C)	<input checked="" type="checkbox"/> Y	
Hi/Lo thermometer - Keep upright!	<input checked="" type="checkbox"/> Y	
Hi/Lo thermometer	<input checked="" type="checkbox"/> Y	
Rad release stickers on samples?	<input checked="" type="checkbox"/> Y	
Activity report from 222S?	<input checked="" type="checkbox"/> Y	
COC copy for LRB, RIDs filed?	<input checked="" type="checkbox"/> Y	

Cooler Temperature Status	
Hi: -17 °C / Lo: -17 °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: °C / Lo: °C (at delivery from WHC to PNL)	

POC (Signature) POC (Signature)

(Revised 06/21/95 PNL)

Battelle Pacific **CHAIN OF CUSTODY** **WHC 100655**
National Northwest Lab

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

Company Contact R. D. Mahon - SESC Telephone (509) 373-7533
 Page 85-9656 / FAX 373-3193

Project Designation/Sampling Locations 200 West Tank Farm
 241-C-107 Tank Vapor Sample SAF V7005
 Temporal #5 Riser # 3 VSS
 Ice Chest No. Field Logbook No. WHC-N-64710

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

Method of Shipment Government Truck Collectors: R.D. Mahon
LA Pingel

Shipped to PNNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

V7005 - A01 . 182	Collect Ambient Air Sample SUMMA #1	<u>Sample Date/Time</u> <u>07FEB97 / 1000</u>
V7005 - A02 . 184	Collect Ambient Air Sample SUMMA #2	<u>07FEB97 / 1004</u>
V7005 - A04 . 211	Collect SUMMA #3	<u>07FEB97 / 1129</u>
V7005 - A05 . 212	Collect SUMMA #4	<u>↓ / 1133</u>
V7005 - A06 . 238	Collect SUMMA #5	<u>↓ / 1142</u>

[] Field Transfer of Custody		[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
J.A Edwards <u>JA Edwards</u>	02-3-97	0930	ES MAST <u>ES MAST</u>	02-3-97	0930
ES MAST <u>ES MAST</u>	2/6/97	1250	GS CAPRID <u>GS CAPRID</u>	2/6/97	1250
GS CAPRID <u>GS CAPRID</u>	2/6/97	1500	R.D. MAHON <u>R.D. MAHON</u>	6 FEB 97	1500
R.D. MAHON <u>R.D. MAHON</u>	11 FEB 97	0725	ES MAST <u>ES MAST</u>	11 FEB 97	0725
ES MAST <u>ES MAST</u>	2-14-97	0900	CS MCDLELLAN <u>CS MCDLELLAN</u>	2-14-97	0900
CS MCDLELLAN <u>CS MCDLELLAN</u>	2-14-97	1015	J.A EDWARDS <u>JA Edwards</u>	2-14-97	1015

Final Sample Disposition

Comments:

- | | | |
|------------------------------------|--|-----------|
| PNNL (only) Checklist: | Pick-up / Delivery | Comments: |
| Media labeled and checked? | <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | |
| Letter of instruction? | <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | |
| Media in good condition? | <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | |
| COC info/signatures complete? | <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | |
| Rad release stickers on samples? | <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | |
| Activity report from 222S? | <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | |
| RSR/release? (a ≤100/B ≤400 pCi/g) | <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | |
| COC copy for LRB, RIDS filed? | <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | |

POC (Signature) POC (Signature)

Battelle Pacific National Northwest Lab | **CHAIN OF CUSTODY** | **WHC 100657**

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

Company Contact: R. D. Mahon - SESC Telephone: (509) 373-7533
 Page: 85-9656 / FAX 373-3193

Project Designation/Sampling Locations: 200 West Tank Farm
 241-C-107 Tank Vapor Sample SAF V7005
 Temporal #5 Riser # 3 VSS
 Ice Chest No.

Field Logbook No. LHC - N - 647-10

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

Method of Shipment: Government Truck Collectors: RD Mahon
LA Pingel

Shipped to: PNNL

Possible Sample Hazards/Remarks: Unknown at time of sampling

Sample Identification

		Sample Date/Time
V7005 - A07 .34R	Collect NH ₃ /NO _x /H ₂ O Sorbent Trap	<u>07FEB97/1146</u>
V7005 - A08 .35R	Collect NH ₃ /NO _x /H ₂ O Sorbent Trap	<u>↓ / ↓</u>
V7005 - A09 .36R	Collect NH ₃ /NO _x /H ₂ O Sorbent Trap	<u>↓ / ↓</u>
V7005 - A10 .37R	Collect NH ₃ /NO _x /H ₂ O Sorbent Trap	<u>↓ / ↓</u>
V7005 - A15 .38R	Open, close and store NH ₃ /NO _x /H ₂ O field blank #1	<u>07FEB97/1202</u>
V7005 - A16 .39R	Open, close and store NH ₃ /NO _x /H ₂ O field blank #2	<u>07FEB97/1202</u>

[] Field Transfer of Custody		[X] Chain of Possession		(Sign and Print Names)		
Relinquished By	Date	Time	Received By	Date	Time	
L M Thomas <u>LM Thomas</u>	01-27-97	1015	J A Edwards <u>J Edwards</u>	01-27-97	1015	
J A Edwards <u>J Edwards</u>	02-3-97	0945	ES MAST <u>S / mast</u>	02-3-97	0945	
<u>ES MAST S / mast</u>	2/6/97	1250	GS CAPRIO <u>GS CAPRIO</u>	2/6/97	1250	
<u>GS CAPRIO AS / [unclear]</u>	2/6/97	1500	Rick Mahon <u>RT Mahon</u>	6 FEB 97	1500	
<u>Rick Mahon Rick Mahon</u>	11 FEB 97	0725	ES MAST <u>S / mast</u>	11 FEB 97	0725	
<u>ES MAST S / mast</u>	2-14-97	0900	C SW McLELL <u>C Swell</u>	2-14-97	0900	
<u>C SW McLELL C Swell</u>	2-14-97	1015	J A EDWARDS <u>J Edwards</u>	2-14-97	1015	

Final Sample Disposition

Comments:

- | | | |
|--------------------------------------|-------------------------|-----------|
| PNNL (only) Checklist | Pick-up / Delivery | Comments: |
| ◊ Media labeled and checked? | <u>Y/N</u> | |
| ◊ Letter of instruction? | <u>Y/N</u> | |
| ◊ Media in good condition? | <u>Y/N</u> / <u>Y/N</u> | |
| ◊ COC info/signatures complete? | <u>Y/N</u> / <u>Y/N</u> | |
| ◊ Rad release stickers on samples? | <u>Y/N</u> / <u>Y/N</u> | |
| ◊ Activity report from 222S? | <u>Y/N</u> / <u>Y/N</u> | |
| ◊ RSR/release? (a ≤100/B ≤400 pCi/g) | <u>Y/N</u> / <u>Y/N</u> | |
| ◊ COC copy for LRB, RIDs filed? | <u>Y/N</u> / <u>Y/N</u> | |

POC [Signature] POC [Signature]

COPY

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C.H
V7005-A
Page 1 of 1

Westinghouse Hanford
Company

Collecting Office: Chemistry - Rick Mahon / Rick Mahon
 Contact/Requestor: Rick Mahon / 300 CDS
 Sample Origin: C-107
 Fed. No: 373-7533 MSIN: 53-70 FAX: 373-3193
 Purchase Order/Charge Code: E46353
 SAF Number: V7005
 Logbook #: WHC-N-647-10 Temp: NA
 Project Title: VAPOR SAMPLING
 Method of Shipment: Government Vehicle
 Shipped To (Lab): WSCF
 Bill of Lading/Air Bill No.: NA
 Office Property No.: NA
 Federal No. 5: _____
 Preservative: _____

Sample No.	Lab. ID	*	Date	Time	No/Type	Container	Sample Analysis
V7005-A21.041			9/28/97	1300	(1) Petri Dish	AT, TB, GEA	NA
-A22.041			9/28/97	1300	(1) Petri Dish		
-A23.042			9/28/97	1300	(1) Petri Dish		
-A24.042			9/28/97	1300	(1) Petri Dish		
↓ -A03.071			9/28/97	1120	(1) Silver Gel	Total Activity Counted as tritium	
					()		
					()		
					()		
					()		
					()		
					()		

POSSIBLE SAMPLE HAZARD/REMARKS: _____
 MSDS: Yes No
 Lab. all known wastes.
 SPECIAL INSTRUCTIONS: Hold Time
Please Fax results or email results to Rick Mahon, Chemistry/Health Mahon
Please include Date + Time of analysis on the report.
Thanks!

Requested By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
Rick Mahon		Rick Mahon	10/28/97/0755	C. S. McClellan		C. S. McClellan	2/19/97 0755
C. S. McClellan		C. S. McClellan	2-19-97/1415	St. Cobb		St. Cobb	02/19/97

Manx*
 DS Don. Solids
 SE Soil
 SO Solid
 SL Sludge
 W Water
 L Liquid
 O Oil
 V Vegetation
 X Other

Disposal Method: s.g. Return to customer, per lab procedure, used in process.
 Disposed by: _____ Date/Time: _____
 Disposed by: _____ Date/Time: _____

DISTRIBUTION SHEET

To Distribution	From Special Analytical Support, Numatec Hanford	Page 1 of 1
		Date 8/7/97
Project Title/Work Order VAPOR AND GAS SAMPLING USING THE IN SITU VAPOR SAMPLING SYSTEM		EDT No. <u>621404</u>
		ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
<u>Lockheed Martin Hanford Company</u>					
L. L. Buckley	R2-12	X			
<u>Lockheed Martin Services, Inc.</u>					
Central Files	A3-88	X			
<u>SGN Eurisys Services Corporation</u>					
E. S. Mast	S3-90	X			
<u>PNNL</u>					
J. L. Huckaby	K6-80	X			