Sta 4 (9)

AUG 05 1997

ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT 621401

2. To: (Receiving Organization) DISTRIBUTION	3. From: (Originating Organization) SPECIAL ANALYTICAL SUPPORT 8C530	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: VAPOR/AS/SPECIAL/ANALYTICAL/ SUPPORT	6. Design Authority/ Design Agent/Cog. Engr.: RICKY MAHON 3-7437	7. Purchase Order No.: N/A
8. Originator Remarks: SST-241-S-109. SAMPLING USING THE VAPOR SAMPLING SYSTEM		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: 622G
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ No		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date:

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 Trans- mittal	Originator Dispo- sition	Receiv- er Dispo- sition
1	HNF-SD-WM-RPT-243		0	VAPOR AND GAS SAMPLING OF SST-241- S-109	Q	2		
KEY								
16. Approval Designator (F)		Reason for Transmittal (G)			Disposition (H) & (I)			
E, S, Q, D or N/A (see WHC-CM-3-5, Sec. 12.7)		1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)			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) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name
		Design Authority						
		Design Agent						
2	1	Cog. Eng. R.D. Mahon	<i>[Signature]</i>	7/30/97				
2	1	Cog. Mgr. L.L. Lockrem	<i>[Signature]</i>	7/17/97				
2	1	QA Mike Barnes	<i>[Signature]</i>	6-23-97				
		Safety						
		Env.						
18. <i>Glenn S. Caprio</i> Signature of EDT Originator		19. <i>[Signature]</i> Authorized Representative Date for Receiving Organization		20. <i>L.L. Lockrem</i> Design Authority/ Cognizant Manager		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments		

VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-109 USING the in Situ Vapor Sampling System

G.S. Caprio

SGN Eurisys Services Company, Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 621401

UC: 2070

Org Code: 8C530

Charge Code: E62000

B&R Code: EW3120074

Total Pages: 31

Key Words: 241-S-109, ISVS, SUMMA™, TST, SORBENT, TANK

Abstract: THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE JUNE 04, 1996 SAMPLING OF SST 241-S-109

SUMMA is a trademark of Molectrics, Inc.

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.

Printed in the United States of America. To obtain copies of this document, contact: Document Control Services, P.O. Box 950, Mailstop H6-08, Richland WA 99352, Phone (509) 372-2420; Fax (509) 376-4989.

Release Approval

Date

Release Stamp

Approved for Public Release

APPROVALS

Document title: Vapor and Gas Sampling of Single-Shell Tank 241-S-109
Using the In Situ Vapor Sampling System

Approved by:

G. S. Caprio, Field Scientist
Vapor Sampling Project
Special Analytical Studies

Date

Approved by:

R. D. Mahon, Project Lead
Vapor Sampling Project
Special Analytical Studies

Date

Approved by:

L. L. Lockrem, Manager
Special Analytical Studies

Date

7/17/97

CONTENTS

1.0	SCOPE	1
2.0	SAMPLING EQUIPMENT DESCRIPTION	1
2.1	IN SITU VAPOR SAMPLING SYSTEM	1
3.0	SAMPLING EVENT DESCRIPTION	2
3.1	SPECIFICATIONS	2
3.2	OPERATIONS AND SAMPLING PERSONNEL	2
3.3	INDUSTRIAL HYGIENE FIELD RESULTS	2
3.4	AMBIENT CONDITIONS	3
3.5	SAMPLE COLLECTION	3
3.6	RADIATION SCREENING	3
4.0	SAMPLE CHAIN OF CUSTODY: RECEIPT, STORAGE, AND SHIPMENT	4
5.0	QUALITY ASSURANCE AND CONTROLS	5
5.1	CLEANLINESS OF SYSTEM	5
5.2	INSTRUMENT CALIBRATION	5
5.3	BLANK SAMPLES	6
6.0	ANOMALIES	6
7.0	REFERENCES	7

APPENDICES

SAMPLE LOG SHEETS	A-1
AMBIENT CONDITIONS	B-1
CHAIN-OF-CUSTODY FORMS	C-1

LIST OF TABLES

1. Radionuclide Analysis Results	4
2. Calibration Data	5
3. Totalizer Calibration Data	6

LIST OF TERMS

CGI	Combustible Gas Indicator
COC	Chain Of Custody
DOT	U.S. Department of Transportation
GEA	Gamma Energy Analysis
ISVS	In Situ Vapor Sampling System
NH ₃	Ammonia
H ₂ O	Water Vapor
OPC	Offsite Property Control
OVN	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
TOC	Total Organic Carbon
TST	Triple Sorbent Trap
VT	Vapor Team, personnel from Sampling and Mobile Laboratories and Special Analytical Studies
WHC	Westinghouse Hanford Company

This page intentionally left blank.

VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-109 USING THE IN SITU VAPOR SAMPLING SYSTEM

1.0 SCOPE

The Vapor Issue Resolution Program tasked the Vapor Team (VT) to collect representative headspace samples from Hanford Site single-shell tank (SST) 241-S-109. This document presents In Situ Vapor Sampling System (ISVS) data resulting from the June 4, 1996 sampling of SST 241-S-109. Analytical results will be presented in separate reports issued by the Pacific Northwest National Laboratory (PNNL) which supplied and analyzed the sample media.

2.0 SAMPLING EQUIPMENT DESCRIPTION

2.1 IN SITU VAPOR SAMPLING SYSTEM

The VT, consisting of Sampling and Mobile Laboratories (SML) and Special Analytical Studies (SAS) personnel, used the ISVS to collect representative samples of the air, gases, and vapors from the headspace of SST 241-S-109 on June 4, 1996. WHC-SD-WM-SDD-068 Rev. 0, *System Design Description for the In Situ Vapor Sampling System* (Blanchard 1996a) describes, in detail the ISVS performance, its characteristics, and its operation.

In situ sampling is a method designed to collect vapor samples of the homogeneous headspace of waste tanks. Sample media, consisting of sorbent traps and radiological filters, are lowered into the tank headspace. Tank gases are drawn through the media by means of the ISVS manifold, which measure the volume of gas drawn through the system. The sample media are collected together in a sample head assembly (SHA). The SHA provides for twelve sorbent or triple sorbent trap (TST) samples (single sample each) to be sampled in sets of four, one SUMMA[®] sampling line, and one line for radiological filtration.

The SHA is protected from external contamination and breakage by a transparent plastic tube. The plastic tube is cut, formed, and connected to the SHA. The plastic tube also prevents any part of the SHA from accidentally falling into the tank.

A set of 1/4 or 5/16 inch diameter flexible tubes, approximately 50 feet long, are held together with spiral wrap to form a "tube bundle", which connects the ISVS to the SHA. The tube bundle and SHA are assembled prior to sampling and are referred to as the "sample assembly".

Sorbent traps are pencil-size stainless steel or glass tubes that contain vapor-adsorbing media. The sorbent traps may be used singly or may be prepared with several individual traps joined in series (a sorbent train). 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. In addition to the sorbent traps, SUMMA[®] canisters are also used to collect samples.

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 each use. The

evacuated canister is filled with sample vapor through a valve, which is then closed to seal the sample inside. SUMMA[®] canisters allow collection and transfer of whole-air samples from location to an analytical laboratory where the sample is analyzed. The standard capacity of each SUMMA[®] canister is 6 liters.

The ISVS consists of five sample stations, (four for sorbent trap sampling and one for SUMMA[®] sampling) terminating in 1/4 inch outside diameter stainless steel tubing. Each sorbent sample station is independently operable at the selected flow rate, from 50 to 500 standard cubic centimeters per minute (scm).

The system is a portable sampling system. It is designed to allow setup and preparation to be performed outside of the tank farm, with a minimum number of steps to be performed inside the farm. It operates on 110V AC power. The ISVS was designed to meet the requirements of National Fire Protection Association 70 - 1993 (the National Electrical Code) for general industrial use. Before the ISVS can be used in any tank, procedures require a flammability check of the waste tank which shows that concentrations of flammable materials are well below lower flammability limits.

Tank gases passing through the ISVS will either pass through a sorbent trap and then a backup line dryer, or through the on-board activated charcoal/drierite cartridge. A check valve is installed in the system to prevent any possibility of siphoning materials into the waste tanks.

3.0 SAMPLING EVENT DESCRIPTION

3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in WHC-SD-WM-TP-335 Rev. 2, *Vapor Sampling and Analysis Plan* (Homi 1996b). 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, check sheets for each individual sample help ensure correct sampling procedures. The VT retains these documents in the project file. The project specific number for this sampling event is S6-057.

3.2 OPERATIONS AND SAMPLING PERSONNEL

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

R. D. Mahon, Lead Scientist
C. S. McClellan, Sampling Technician.

The ISVS was set up at SST 241-S-109 on June 4, 1996 and was allowed to warm up for approximately 15 minutes. Sampling began at approximately 13:30 on June 4, 1996, and was completed by 15:15 the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Prior to inserting the tube bundle into SST 241-S-109, an industrial hygiene technician field tested tank vapors. The technician purged the instrument with tank gas for 5 minutes and then field measured vapor stream contents using a combustible gas indicator (CGI) and an organic vapor meter (OVM). The technician measured the tank vapors at the breather filter, three feet down

the riser, and twenty feet down the riser. The measurements reported at the breather filter: LEL 0%, NH_3 0 ppm, O_2 20.9%, and TOC 0 ppm. The measurements approximately three feet down were: LEL 0%, NH_3 25 ppm, O_2 20.8%, and TOC 6.8 ppm. The measurements approximately twenty feet down were: LEL 0%, NH_3 50 ppm, O_2 20.8%, and TOC 6.9 ppm.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, June 4, 1996, was sunny and clear, with a light breeze blowing from the northwest. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2.5 miles north east of S-Farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

One analytical laboratory provided sample media. PNNL provided SUMMA[™] canisters, sorbent traps for organic vapors, ammonia (NH_3), NO_x , and water vapor (H_2O).

The VT began inserting the sample media into the SHA at 0800 on June 4, 1996, and finished at approximately 1100. The SHA was connected to tube bundle 14A, with the top collar described in ECN #632433. The sample assembly was transported to 241-S-109 on June 4, 1996, and connected to ISVS #1 for the sampling event.

Prior to sample collection, a leak check of the ISVS sampling manifold and transfer tubing was performed. Pressure gauge readings were recorded at the beginning of the leak check. The gauge readings were used for the leak check calculations but for report purposes will be converted to absolute pressure. The system was evacuated to approximately 118.5 mbar (3.5 inHg) and leakage of ambient air into the system was observed by monitoring system pressure for 5 minutes. Leakage resulted in an increase of 0 mbar (0 inHg) in system pressure during the 5 minute test.

The tank flange was opened and the tube bundle was lowered 6.1 meters (20 feet). Tank vapor was drawn through each TST, sorbent, and SUMMA[™] line for a specified period of time. Appendix A indicates the exact times and volumes of tank gas that was drawn through each sample.

After the final sample was collected the sample assembly was removed from the tank. A clean work area was prepared and the SHA was disassembled in the farm. Following the HPT survey the samples were packaged as radiation material and transported back to a custody secure RMA. The in-line filters were transported to 222-S for analysis.

The ISVS was transported to C Farm to prepare for next sampling event.

3.6 RADIATION SCREENING

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 <15 pCi/g of sample media.
Alpha activity <5 pCi/g of sample media.

The sample media was not filtered for radiological particulates. The idea of unfiltered samples was to provide better analytical data for the laboratories. The samples were released for shipment based on the analytical results of the series of two filters and tritium trap collected through one of the 1/4 inch flexible lines. Based on the radiological results for the filters and tritium trap it is believed that the same concentration of radiological contaminants passed through the other 13 lines. The filters were analyzed by 222-S Laboratory. Based on the analytical results provided in Table 1 the samples were shipped to PNNL and delivered to J. A. Edwards. The VT scientists use the activity results in Table 1 to calculate pCi/g of sample media. The VT maintains this information in the project-specific file.

Table 1. Radionuclide Analysis Results.

Filter	Sample Identifier	Activity Results* (pCi/sample)	Activity* (pCi/L of tank gas)
Upstream filter	S6058-A21.OU1	Total Alpha = 2.69 Total Beta = 5.84 GEA = <detectable	= 2.69 = 5.84 = <detectable
Downstream filter	S6058-A22.OD1	Total Alpha = <0.181 Total Beta = 1.32 GEA = <detectable	= <0.181 = 1.32 = <detectable
Tritium Trap	S6058-A03.OT1	Total Activity = 10.7	= 10.7

NOTES:

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

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

*Numbers based on 1 liter for the total volume of tank vapor through the filters.

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

All sorbent trains, TSTs, and SUMMA™ canisters received from PNNL are kept in a custody locked storage area maintained by SML. Sorbent trains and TSTs were maintained at 4 ± 2 °C in a refrigeration unit. SUMMA™ canisters were stored in the same locked storage area, but were not refrigerated. The sample media was picked up from PNNL by SAS and transported in a government vehicle to a custody locked storage area. Appendix C lists the sample identifiers, sample types, and COC form numbers for the sampling event.

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).

5.0 QUALITY ASSURANCE AND CONTROLS

5.1 CLEANLINESS OF SYSTEM

Immediately prior to sampling of SST 241-S-109, the ISVS manifold was purged with ambient air for 5 minutes at 1 L/min. After this purge an ambient air SUMMA sample was drawn through the ISVS manifold and the 1/4 inch SUMMA sampling line. A second ambient air SUMMA sample was collected 10 meters upwind from the tank breather filter. The ambient air samples were then collected to confirm by laboratory analysis that the ISVS sampling manifold was free of trace organic contaminants (or to determine which contaminants were present and at what concentration). For further details, refer to WHC-IP-1127-4.8 (WHC 1995b) and the project-specific file located with the VT.

5.2 INSTRUMENT CALIBRATION

The ISVS uses mass flow meters to measure the flow rate and totalizers to measure the total volume of sample vapor drawn through the sample media. Errors associated with the mass flow meters and totalizers were determined by the Westinghouse Hanford Company (WHC) Standards Laboratory before the SST 241-S-109 sampling event. Duration of flow are specified by the analytical laboratories that supply and analyze the sorbent traps.

The flow measurements for this sampling event may have an error of 6 percent to 14 percent due to the mass flow measuring devices recalibration discrepancies. A detailed description of this discrepancy can be found in internal memo 75-820-96-028 (Trible 1996c).

Table 2. Calibration Data.

Element	Calibration Date	Expiration Date	WHC Standards Laboratory Code
Rotameter AALBORG 102-05	8/8/95	8/8/96	518-28-13-001
Digital Thermometer HH22	1/11/96	1/11/97	518-79-06-003
Vacuum Gauge ASHCROFT	8/7/95	8/7/96	518-31-05-003
Headspace Thermocouple	5/31/96	5/31/97	518-78-02-010
Mass Flowmeters Sierra 822-13-OV1 FM-1/FT-1	8/8/95	8/8/96	518-28-03-015
Mass Flowmeters Sierra 822-13-OV1 FM-2/FT-2	8/8/95	8/8/96	518-28-03-016
Mass Flowmeters Sierra 822-13-OV1 FM-3/FT-3	8/8/95	8/8/96	518-28-03-017
Mass Flowmeters Sierra 822-13-OV1 FM-4/FT-4	8/8/95	8/8/96	518-28-03-018

Instruments located in the ISVS are calibrated on an annual basis at the WHC Standards Laboratory. ISVS instrumentation calibration data, maintained in files by the VT, are summarized in Table 2. According to the calibration schedule shown in Table 2, all instrumentation was within its calibration period during the SST 241-S-109 sampling event.

The totalizers were calibrated in conjunction with the mass flow meters and the calibration data is summarized in Table 3.

Table 3. Totalizer Calibration Data.

Number	Calibration Date	Expiration Date	Flow Rate (stdcm ³ /min)	Time (min)	Calc. Total	UUT	Deviation
3494-1 FT-1	8/8/95	8/8/96	247.1	5.833	1441.2	1500	3.9%
3494-2 FT-2	8/8/95	8/8/96	253.8	7.065	1793.1	1800	0.4%
3494-3 FT-3	8/8/95	8/8/96	262.7	5.081	1334.7	1300	2.6%
3494-4 FT-4	8/8/95	8/8/96	25.2	5.186	1302.8	1300	0.2%

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 ISVS immediately prior to sampling operations.

6.0 ANOMALIES

The VT used the Sampling and Analysis Plan and WHC-IP-1127-4.8, *Vapor Sampling of Waste Tanks Using In Situ Vapor Sampling System (ISVS)*, (1995b) to guide the sample collection. There were no anomalies noted during the sample collection.

7.0 REFERENCES

- 49 CFR 100-177, 1992, "Transportation," *Code of Federal Regulations*, as amended.
- Blanchard, R. J., 1996a, *System Design Description for the In Situ Vapor Sampling System*, WHC-SD-WM-SDD-068 Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Homi, C. S., 1996b, *Vapor Sampling and Analysis Plan*, WHC-SD-WM-TP-335 Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- Tribble, T.C., R.S. Viswanath, 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, *Vapor Sampling of Waste Tanks Using In Situ Vapor Sampling System (ISVS)*, Procedure WHC-IP-1127-4.8, Westinghouse Hanford Company, Richland, Washington.

This page intentionally left blank.

APPENDIX A
SAMPLE LOG SHEETS

This page intentionally left blank.

ISVS Sampling of S-109

Set up ISVS (Section 8.1)

Ensure particulate filters are installed

LEAK CHECK (APPENDIX I) Leak Rate:

0 inch Hg in 5 minTank Temperature 20.5 C

Date: 4-Jun-96

ISVS Personnel: Mahon, McClellan

Trailer Personnel: None

		Probe				Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
		PNNL	Sample	Cart	Description	Flow	Duration	Total	Flow	Start	End	Total	Total
WHC Sample ID	Sample ID	Line	Port			Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
						SCCM		SCC	SCCM			(min.)	SCC
Purge SUMMA line of sample line with ambient air						1000	5	5000	1000	1330	1335	5	
S6057 A01 302	302	NA	NA	Upwind SUMMA #1			1			1333	1334	1	
S6057 A02 303	303	S	SUMMA	Ambient #2			1			1336	1337	1	
Uncap and insert sample bundle into tank										1340			
Connect bundle lines:		1	1										
S6057 A21 0U1	0U1	1	1	UPSTREAM FILTER	200	1	1000	227.00	1405	1410	5	1003	
A22 0D1	0D1			DOWNSTRM FILTER									
A03 0T1	0T1			TRITIUM									
Connect bundle lines:		S	SUMMA										
		2	1										
		3	2										
		4	3										
		5	4										
Purge Suma line /w tank		S	SUMMA	SUMMA purge	1000	5	5000	1000	1416	1421	5	5000	
S6057 A04 304	304	S	SUMMA	Summa #3		1			1421	1422	1	6000	
S6057 A05 305	305	S	SUMMA	Summa #4		1			1427	1428	1	6000	
S6057 A06 307	307	S	SUMMA	Summa #5		1			1432	1433	1	6000	

ISVS Sampling of S-109

WHC Sample ID	PNNL Sample ID	Probe		Description	Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
		Sample	Cart		Flow	Duration	Total	Flow	Start	End	Total	Total
		Line	Port		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
					SCCM		SCC	SCCM			(min.)	SCC
S6057 A07 S79	S79	2	1	NH3/N2O/NO/H2O	200	10	2000	215.00	1441	NA	NA	2000
S6057 A08 S80	S80	3	2	NH3/N2O/NO/H2O	200	10	2000	214.00	14:41:30	NA	NA	2000
S6057 A09 S81	S81	4	3	NH3/N2O/NO/H2O	200	10	2000	212.00	1442	NA	NA	2000
S6057 A10 S82	S82	5	4	NH3/N2O/NO/H2O	200	10	2000	224.00	14:42:30	NA	NA	2001

Connect bundle lines:

6	1
7	2
8	3
9	4

S6057 A11 1008	1008	6	1	PNNL TST #1	200	1	200	206.00	1504	NA	NA	201
S6057 A12 1009	1009	7	2	PNNL TST #2	200	1	200	253.00	1504	NA	NA	208
S6057 A13 1010	1010	8	3	PNNL TST #3	200	1	200	268.00	1504	NA	NA	210
S6057 A14 1012	1012	9	4	PNNL TST #4	200	1	200	257.00	1504	NA	NA	210

Remove sample bundle from tank and cap

1512 1515

Dismantle sample bundle

S6057 A21 0U1	S96WV0060	1	1	Bundle line 1 Upstream filter
S6057 A22 0D1	S96WV0061	1	1	Bundle line 1 Downstream filter
S6057 A03 0T1	S96WV0062	1	1	Bundle line 1 tritium trap
S6057 A15 S83	S83	10	NA	Bundle store NH3/N2O/NO/H2O FIELD BLANK #1
S6057 A16 S84	S84	11	NA	Bundle store NH3/N2O/NO/H2O FIELD BLANK #2
S6057 A17 1013	PNNL #1013	12	NA	Bundle store PNNL TST FIELD BLANK #1
S6057 A18 1014	PNNL #1014	13	NA	Bundle store PNNL TST FIELD BLANK #2
S6057 A19 1015	PNNL #1015	NA	NA	Bundle store PNNL TST TRIP BLANK #1
S6057 A20 1016	PNNL #1016	NA	NA	Bundle store PNNL TST TRIP BLANK #2

Remove filters from cart manifold ports 1, 2, 3, 4, and SUMMA to release cart.

ISVS Sampling of S-109

WHC Sample ID	PNNL Sample ID	Probe		Description	Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
		Sample	Cart		Flow	Duration	Total	Flow	Start	End	Total	Total
		Line	Port		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
					SCCM		SCC	SCCM			(min.)	SCC
		BUNDLE .TOTAL TANK GAS USED DURING SAMPLING RUNS (Liters)										

Note: SCCM for the ISVS is reported at 760 torr, 21 C

S-109 ISVS SAMPLING RADIOLOGICAL SCREENING RESULTS

Note: #VALUEI = <Detectable

S6057-A21.OU1 / S96WV0060

PARALLEL UPSTREAM FILTER

	Liters	pCi / filter	pCi / liter
TOTAL VOLUME	1.00		
ALPHA		2.69	2.69
BETA		5.84	5.84
GEA - Co-60		< 26.09	< Detectable
Cs-134		< 24.65	< Detectable
Cs-137		< 33.36	< Detectable
Eu-152		< 139	< Detectable
Eu-154		< 82.99	< Detectable
Eu-155		< 72.39	< Detectable

S6057-A22.OD1 / S96WV0061

PARALLEL DOWNSTREAM FILTER

	Liters	pCi / filter	pCi / liter
TOTAL VOLUME	1.00		
ALPHA		< .181	#VALUEI
BETA		1.32	1.32
GEA - Co-60		< 24.82	< Detectable
Cs-134		< 24.9	< Detectable
Cs-137		< 32.12	< Detectable
Eu-152		< 135.8	< Detectable
Eu-154		< 93.75	< Detectable
Eu-155		< 73.22	< Detectable

S6057-A03.OT1 / S96WV0062

TRITIUM TRAP

	Liters	pCi / filter	pCi / liter
TOTAL VOLUME	1		
TOTAL ACTIVITY		10.7	10.7

SAMPLE EXPOSURE ANALYSIS, USING TOTAL OF BOTH UPSTREAM AND DOWNSTREAM FILTER ANALYSIS AS POSSIBLE EXPOSURE LEVEL

= BETA and ALPHA Less than DOT shipping limits

Total Alpha (pCi / liter) = 2.69

Total Beta (pCi / liter) = 7.16

Total GEA Cs-137 (pCi / liter) = #VALUEI

SORBENT SAMPLING Used 5 g for sorbent mass

TOTAL VOLUME PER SAMPLE	2.00	Liters
Tritium per SAMPLE		
NH3 (5 gram)	4.28	pCi per gram
H2O (5 gram)	4.28	pCi per gram
ALPHA per SAMPLE		
NH3 (5 gram)	1.08	pCi per gram
H2O (5 gram)	1.08	pCi per gram
BETA per SAMPLE		
NH3 (5 gram)	2.86	pCi per gram
H2O (5 gram)	2.86	pCi per gram
GEA per SAMPLE Cs-137		
NH3 (5 gram)	#VALUEI	pCi per gram
H2O (5 gram)	#VALUEI	pCi per gram

TST SAMPLING Used 4.5 g for TST mass

TOTAL VOLUME PER SAMPLE	0.20	Liter
Tritium per Sample		
TST (4.5 gram)	0.48	pCi per gram
ALPHA per Sample		
TST (4.5 gram)	0.12	pCi per gram
BETA per Sample		
TST (4.5 gram)	0.32	pCi per gram
GEA per Sample Cs-137		
TST (4.5 gram)	#VALUEI	pCi per gram

SUMMA SAMPLING

TOTAL VOLUME PER CANISTER	6	Liters (air at 300K, 1 bar = 1.161 g/L)
Tritium PER SAMPLE	9.22	pCi per gram
ALPHA PER SAMPLE	2.32	pCi per gram
BETA PER SAMPLE	6.17	pCi per gram
GEA PER SAMPLE Cs-137	#VALUEI	pCi per gram

INF-SD-WM-RPT-243, Rev. 0

This page intentionally left blank.

APPENDIX B
AMBIENT CONDITIONS

This page intentionally left blank.

WEATHER DURING ISVS SAMPLING OF 241-S-109

This page intentionally left blank.

APPENDIX C
CHAIN-OF-CUSTODY FORMS

This page intentionally left blank.

Battelle Pacific National Northwest Lab	CHAIN OF CUSTODY	WHC 100084
--	------------------	------------

Custody Form Initiator J. A. Edwards - PNNL

Telephone (509) 373-0141

Page 85-3009 / FAX 376-2329

Company Contact R. D. Mahon - WHC

Telephone (509) 373-2891

Page 85-3656 / FAX 373-3793

Project Designation/Sampling Locations 200 West Tank Farm
 241-S-109 Tank Vapor Sample SAF S6057
 (ISVS Cart)

Collection date 06 - 04 - 96

Preparation date 05 - 30 - 96

Ice Chest No.

Field Logbook No. WHC-N-647-B

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to PNNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S6057 - A01 . 302 Collect Ambient Air Sample SUMMA #1
 S6057 - A02 . 303 Collect Ambient Air Sample SUMMA #2 (through tube bundle)
 S6057 - A04 . 304 Collect SUMMA #3
 S6057 - A05 . 305 Collect SUMMA #4
 S6057 - A06 . 307 Collect SUMMA #5

[] Field Transfer of Custody			[X] Chain of Possession			(Sign and Print Names)		
Relinquished By	Date	Time	Received By	Date	Time			
J A Edwards	06-03-96	12:55	CS MacCulloch	06-03-96	12:55			
CS MacCulloch	6-11-96	11:30	GS CAPRIO	06-11-96	11:30			
GS CAPRIO / MS C	6-11-96	13:20	J A Edwards	06-11-96	13:20			

Final Sample Disposition

Comments:

PNNL (only) Checklist

Media labeled and checked?	Y/N	Pick-up / Delivery	Comments:
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 2223?	Y/N		
RSR/release? (a ≤100/B ≤400 pCi/g)	Y/N		
COC copy for LRB, RIDS filed?	Y/N		

POC

POC

(WHC-SD-WM-TP-335, REV. 2, Table 2b)

(Revised 05/30/96 PNNL)

Battelle Pacific
National Northwest Lab

CHAIN OF CUSTODY

WHC 100086

Custody Form Initiator

J. A. Edwards - PNNL

Telephone (509) 373-0141

Page 85-3009 / FAX 376-2329

Company Contact

R. D. Mahon - WHC

Telephone (509) 373-7437

Page 85-9656 / FAX 373-3793

Project Designation/Sampling Locations 200 West Tank Farm

241-S-109 Tank Vapor Sample SAF S6057
(ISVS Cart)

Collection date 08 - 04 - 96

Preparation date 05 - 30 - 96

Ice Chest No.

Field Logbook No. WHC- N-647.8

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

Shipped to

PNNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S6057 - A07 - S79

Collect NH₃/NO_x/H₂O Sorbent Trap

S6057 - A08 - S80

Collect NH₃/NO_x/H₂O Sorbent Trap

S6057 - A09 - S81

Collect NH₃/NO_x/H₂O Sorbent Trap

S6057 - A10 - S82

Collect NH₃/NO_x/H₂O Sorbent Trap

S6057 - A15 - S83

Open, close and store NH₃/NO_x/H₂O field blank #1

S6057 - A16 - S84

Open, close and store NH₃/NO_x/H₂O field blank #2

[] Field Transfer of Custody		[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
G W Dennis <u>JA Edwards</u>	05-31-96	1100	JA Edwards <u>JA Edwards</u>	05-31-96	1100
JA Edwards <u>JA Edwards</u>	6-3-96	1255	CS McElroy <u>CS McElroy</u>	6-3-96	1255
CS McElroy <u>CS McElroy</u>	6-11-96	1130	CS Caprio <u>CS Caprio</u>	06/11/96	1130
CS Caprio <u>JA Edwards</u>	06/11/96	1330	JA Edwards <u>JA Edwards</u>	06/11/96	1330

Final Sample Disposition

Comments:

- PNNL (only) Checklist
- 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
 - RSR/release? (a ≤100/B ≤400 pCi/g) ☒ Y ☐ N
 - COC copy for LRB, RIDS filed? ☒ Y ☐ N

Pick-up / Delivery

Comments:

POC

POC

(WHC-SD-WM-TP-335, REV. 2, Table 2b)
A-6000-407 (12/92) WEP061

1 of 1

(Revised 05/30/96 PNNL)

Westinghouse Hanford Company						CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST								C.O.C.# <u>100189</u>			
						Page <u>1</u> of <u>1</u>											
Collector Glenn Caprio/Rick Mahon							Contact/Requestor Rick Mahon					Tel. No. 373-7437 MSN S3-27 FAX 373-7076					
SAF Number S6057							Sample Origin S-109					Purchase Order/Charge Code E29937/75745					
Project Title ISVS Vapor Sampling							Logbook# N/A					Ice Chest # n/a Temp. n/a					
Shipped To (Lab) 222-S Laboratory							Method of Shipment Government Vehicle					Bill of Lading/Air Bill No. n/a					
Protocol none							Data Turnaround 24 hr					Offsite Property No. n/a					
Sample No.		Lab. ID		*	Date	Time	No/Type Container	Sample Analysis							Perservative		
S6057-A21.0M	S96WV	X	5JUN96	1400	(1)silica gel	MAT/TB/GEA							n/a				
S6057-A22.0DI	S96WV	X	4JUN96	1400	(1)petri dish	MAT/TR/GEA							n/a				
S6057-A03.0TI	S96WV	X	4JUN96	1400	(1)silica ge	Total Activity							n/a				
					()												
					()												
					()												
					()												
					()												
					()												
					()												
					()												
					()												
POSSIBLE SAMPLE HAZARDS/REMARKS List all known wastes.							MSDS Yes ☐ No ☒		SPECIAL INSTRUCTIONS Hold Time _____ These samples require multi-day analysis to calculate decay rates. Please analyze these once every <u>5 DAYS</u> for <u>20</u> days. Please fax reports to Rick Mahon. Thanks.								
Relinquished By Print Rick Mahon		Sign Rick Mahon		Date/Time 4JUN96/1555		Received By Print Michael Lindberg		Sign [Signature]		Date/Time 4JUN96/1605		Matrix *					
Relinquished By				Date/Time		Received By				Date/Time		S = Soil DS = Drum Solids SE = Sediment DL = Drums Liquids SO = Solid T = Tissue SL = Sludge WI = Wipe W = Water L = Liquid O = Oil V = Vegetation A = Air X = Other					
Relinquished By				Date/Time		Received By				Date/Time							
Relinquished By				Date/Time		Received By				Date/Time							
FINAL SAMPLE DISPOSITION		Disposed Method e.g. Return to customer, per lab procedure, used in process.										Disposed By		Date/Time			
														A-GDOI-500 (07/95)			

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>621401</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			