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VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-C-204 USING the in Situ Vapor Sampling System

G.S. Caprio

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Abstract: THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE JULY 02, 1996 SAMPLING OF SST 241-C-204

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APPROVALS

Document title: Vapor and Gas Sampling of Single-Shell Tank 241-C-204
Using the In Situ Vapor Sampling System

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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
OVM	Organic Vapor Meter
PNNL	Pacific Northwest National Laboratory
SAS	Special Analytical Studies
SHA	Sample Head Assembly
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

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VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-C-204 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-C-204. This document presents In Situ Vapor Sampling System (ISVS) data resulting from the July 2, 1996 sampling of SST 241-C-204. 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-C-204 on July 02, 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 (sccm).

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. 2A, *Vapor Sampling and Analysis Plan* (Buckley 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, checksheets 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 S6-067.

3.2 OPERATIONS AND SAMPLING PERSONNEL

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

- G. S. Caprio, Field Scientist
- R. D. Mahon, Lead Scientist
- C. S. McClellan, Sampling Technician.

The ISVS was set up at SST 241-C-204 on July 2, 1996 and was allowed to warm up for approximately 15 minutes. Sampling began at approximately 0944 on July 2, 1996, and was completed by 1141 the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Prior to inserting the tube bundle into SST 241-C-204, 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 six 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 0 ppm, O_2 20.8%, and TOC 1.6 ppm. The measurements approximately twenty six feet down were: LEL 0%, NH_3 0 ppm, O_2 21.0%, and TOC 5.0 ppm.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, July 2, 1996, was sunny and clear with a slight breeze from the northwest. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 6 miles north west of C-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 1215 on July 1, 1996, and finished at approximately 1400. The SHA was connected to tube bundle 14D. The top collar as described in ECN #632433 was used for this sampling event. The sample assembly was transported to 241-C-204 on July 2, 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 135.46 mbar (4 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 7.925 meters (26 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. Following the HPT survey the SHA was packaged as radiation material and transported back to a custody secure RMA at WSCF where it was disassembled the following day. Plugs were placed in the c-flex inlets and c-flex clamps on the 1/4 inch Tygon tubing coming out of the Top Collar to isolate the samples from ambient conditions. Following the HPT survey the SHA was packaged as radiation material and transported back to a custody secure RMA at WSCF where it was disassembled the following day. The in-line filters were transported to 222-S for analysis.

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 ^a (pCi/sample)	Activity ^b (pCi/L of tank gas)
Upstream filter	S6067-A21.OU1	Total Alpha = <4.58 Total Beta = 22.10 GEA = <detectable	= <detectable = 22.10 = <detectable
Downstream filter	S6067-A22.OD1	Total Alpha = 1.50 Total Beta = <1.35 GEA = <detectable	= 1.50 = <detectable = <detectable
Tritium Trap	S6067-A03.OT1	Total Activity = <2.9	= <detectable

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 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-C-204, 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-C-204 sampling event. Duration of flow are specified by the analytical laboratories that supply and analyze the sorbent traps.

"Due to calibration discrepancies, the mass flow measurements for this sampling event may have an error of 6% to 14%. A detailed description of this discrepancy can be found in internal memo 75820-96-028".

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-C-204 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. Anomalies noted during the sample collection are briefly described below.

Moisture drops appeared on the SUMMA[™] cannister fitting of SUMMA[™] #184 but were not visible in the sample line.

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.
- Buckley, L. L., 1996b, *Vapor Sampling and Analysis Plan*, WHC-SD-WM-TP-335 Rev. 2A, Westinghouse Hanford Company, Richland, Washington.
- 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, *Vapor Sampling of Waste Tanks Using In Situ Vapor Sampling System (ISVS)*, Procedure WHC-IP-1127-4.8, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A
SAMPLE LOG SHEETS

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ISVS Sampling of C-204

Set up ISVS (Section 8.1)

Date: 7/2/96

Ensure particulate filters are installed

ISVS Personnel: Glenn Caprio, Rick Mahon, Chuck McClellan

LEAK CHECK(APPENDIX I) Leak Rate: 0 inch Hg in 5 min

Tank Temperature 17.8 C

Trailer Personnel: None

Ambient Temp. 26.3 C

WHC Sample ID	Probe				Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
	PNNL	Sample	Cart	Description	Flow	Duration	Total	Flow	Start	End	Total	Total
	Sample ID	Line	Port		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
	SCCM	SCCM	SCCM	SCCM	Time	Time	Time (min.)	Flow SCC				
Purge SUMMA line of sample line with ambient air					1000	5	5000	1000	0946	0951	5	
S6067 A01.126	126	NA	NA	Upwind SUMMA #1		1			0948	0949	1	
S6067 A02.166	166	S	SUMMA	Bundle Ambient #2		1			0951	0951	1	

Uncap and insert sample bundle into tank

1017 1141

Connect bundle lines: 1 1

S6067 A21.0U1	0U1	1	1	UPSTREAM FILTER	200	5	1000	221	1022	N/A	N/A	998.28
A22 OD1	OD1			DOWNSTRM FILTER								
A03 OT1	OT1			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	1033	1038	5	5000
S6067 A04.136	136	S	SUMMA	Summa #3	1			1038	1039	1	6000
S6067 A05.153	153	S	SUMMA	Summa #4	1			1046	1047	1	6000

ISVS Sampling of C-204

WHC Sample ID	Probe			Description	Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
	PNNL	Sample	Cart		Flow	Duration	Total	Flow	Start	End	Total	Total
	Sample ID	Line	Port		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
					SCCM		SCC	SCCM			(min.)	SCC
S6067 A06. 184	184	S	SUMMA	Summa #5		1			1052	1053	1	6000
S6067 A07. 22R	22R	2	1	NH3/NOx/H2O	200	10	2000	215	1101	NA	NA	2002
S6067 A08. 23R	23R	3	2	NH3/NOx/H2O	200	10	2000	208	1101:30	NA	NA	1998
S6067 A09. 24R	24R	4	3	NH3/NOx/H2O	200	10	2000	210	1102	NA	NA	2000
S6067 A10. 25R	25R	5	4	NH3/NOx/H2O	200	10	2000	205	1102:30	NA	NA	1999

Connect bundle lines:

6	1
7	2
8	3
9	4

S6067 A11. 1077	1077	6	1	PNNL TST #1	200	1	200	281.00	1126	NA	NA	203
S6067 A12. 1078	1078	7	2	PNNL TST #2	200	1	200	277.00	1126	NA	NA	200
S6067 A13. 1079	1079	8	3	PNNL TST #3	200	1	200	275.00	1126	NA	NA	207
S6067 A14. 1080	1080	9	4	PNNL TST #4	200	1	200	269.00	1126	NA	NA	205

Remove sample bundle from tank and cap

1130 1141

Dismantle sample bundle

S6067 A21. 0U1	S96WV0089A	1	1	Bundle line 1 Upstream filter
S6067 A22. 0D1	S96WV0090A	1	1	Bundle line 1 Downstream filter
S6067 A03. 0T1	S96WV0091	1	1	Bundle line 1 tritium trap
S6067 A15. 26R	26R	10	NA	Bundle store NH3/NOx/H2O FIELD BLANK #1
S6067 A16. 27R	27R	11	NA	Bundle store NH3/NOx/H2O FIELD BLANK #2
S6067 A17. 1081	PNNL #1081	12	NA	Bundle store PNNL TST FIELD BLANK #1
S6067 A18. 1082	PNNL #1082	13	NA	Bundle store PNNL TST FIELD BLANK #2
S6067 A19. 1083	PNNL #1083	NA	NA	Bundle store PNNL TST TRIP BLANK #1
S6067 A20. 1084	PNNL #1084	NA	NA	Bundle store PNNL TST TRIP BLANK #2

ISVS Sampling of C-204

WHC Sample ID	Probe			Description	Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
	PNNL	Sample	Cart		Flow	Duration	Total	Flow	Start	End	Total	Total
	Sample ID	Line	Port		Rate	(min.)	Flow	Rate	Time	Time	Time	Flow
					SCCM		SCC	SCCM			(min.)	SCC

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

BUNDLE TOTAL TANK GAS USED DURING SAMPLING RUNS (Liters) 32.81

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

A-5

HNF-SD-WM-RPT-250, Rev. 0

C-204 ISSVS SAMPLING RADIOLOGICAL SCREENING RESULTS

56057-A21.001 / S96W0039A				56057-A22.001 / S96W0039A			
PARALLEL UPSTREAM FILTER				PARALLEL DOWNSTREAM FILTER			
ALPHA				ALPHA			
BETA				BETA			
CEA -				CEA -			
Co-60				Co-60			
Co-134				Co-134			
Co-137				Co-137			
Eu-152				Eu-152			
Eu-154				Eu-154			
Eu-155				Eu-155			
#VALUE!	< 435			#VALUE!	< 435		
Liters	1.00			Liters	1.00		
pCi / liter				pCi / liter			
56057-A21.001 / S96W0039A				56057-A22.001 / S96W0039A			
TOTAL VOLUME				TOTAL VOLUME			
ALPHA				ALPHA			
BETA				BETA			
CEA -				CEA -			
Co-60				Co-60			
Co-134				Co-134			
Co-137				Co-137			
Eu-152				Eu-152			
Eu-154				Eu-154			
Eu-155				Eu-155			
#VALUE!	< 1.14			#VALUE!	< 1.14		
Liters	1.00			Liters	1.00		
pCi / liter				pCi / liter			
56057-A21.001 / S96W0039A				56057-A22.001 / S96W0039A			
TOTAL ACTIVITY				TOTAL ACTIVITY			
Tritium Trap				Tritium Trap			
56057-A23.001 / S96W00391				56057-A23.001 / S96W00391			
Liters	1.00			Liters	1.00		
pCi / liter				pCi / liter			
> 2.9				> 2.9			
#VALUE!				#VALUE!			

Note: #VALUE! = < Detectable

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

Total Alpha (pCi / liter) =

Total Beta (pCi / liter) =

Total CEA Co-137 (pCi / liter) =

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

#VALUE!

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#VALUE!

#VALUE!

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#VALUE!

#VALUE!

#VALUE!

SOBRENT SAMPLING Used 5 g for solvent mass		2.00 Liters	
TOTAL VOLUME PER SAMPLE		#VALUE! pCi per gram	
Tritium per Sample		#VALUE! pCi per gram	
H2O (5 gram)		#VALUE! pCi per gram	
H2O (5 gram)		#VALUE! pCi per gram	
H2O (5 gram)		#VALUE! pCi per gram	
H2O (5 gram)		#VALUE! pCi per gram	
H2O (5 gram)		#VALUE! pCi per gram	
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H2O (5 gram)		#VALUE! pCi per gram	
H2O (5 gram)		#VALUE! pCi per gram	
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H2O (5 gram)		#VALUE! pCi per gram	
H2O (5 gram)		#VALUE! pCi per gram	
H2O (5 gram)		#VALUE! pCi per gram	
H2O (5 gram)			

APPENDIX B
AMBIENT CONDITIONS

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WEATHER DURING ISVS SAMPLING OF 241-C-204

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APPENDIX C
CHAIN-OF-CUSTODY FORMS

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Battelle Pacific National Northwest Lab	CHAIN OF CUSTODY	WHC 100247
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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-C-204 Tank Vapor Sample SAF S6067
 (ISVS Cart)

Collection date 07 - 2 - 96

Preparation date 06 - 26 - 96

Ice Chest No.

Field Logbook No. WHC-N 47-8

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

S6067 - A01 . 126 Collect Ambient Air Sample SUMMA #1
 S6067 - A02 . 166 Collect Ambient Air Sample SUMMA #2 (through tube bundle)

S6067 - A04 . 136 Collect SUMMA #3
 S6067 - A05 . 153 Collect SUMMA #4
 S6067 - A06 . 184 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 <i>J A Edwards</i>	07- 01 -96	1055	<i>John L. D. = GS CAPED</i>	07- 01 -96	1055
<i>GS CAPED M. Call</i>	07-10-96	1425	<i>J A Edwards = J A Edwards</i>	7-10-96	1425

Final Sample Disposition

Comments:

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

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

POC

(Signature)

POC

(Signature)

(Revised 05/30/96 PNNL)

Battelle Pacific
National Northwest Lab

CHAIN OF CUSTODY

WHC 100249

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 373-3793Project Designation/Sampling Locations 200 West Tank Farm
241-C-204 Tank Vapor Sample SAF S6067
(ISVS Cart)Collection date 07-01-96 06 - 2 - 96
Preparation date 06 - 17 - 96

Ice Chest No.

Field Logbook No. WHC- N - 47 - 5

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

S6067 - A07 . 22R

Collect NH₃/NO_x/H₂O Sorbent Trap

S6066 - A08 . 23R

Collect NH₃/NO_x/H₂O Sorbent Trap

S6067 - A09 . 24R

Collect NH₃/NO_x/H₂O Sorbent Trap

S6067 - A10 . 25R

Collect NH₃/NO_x/H₂O Sorbent Trap

S6067 - A15 . 26R

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

S6067 - A16 . 27R

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 <i>M.W.D.</i>	06-20-96	1150	J A Edwards <i>J A Edwards</i>	06-20-96	1150
J A Edwards <i>J A Edwards</i>	06-27-96	1055	GS CAPRISO <i>GS CAPRISO</i>	06-27-96	1055
GS CAPRISO <i>GS CAPRISO</i>	07-10-96	1435	J A EDWARDS <i>J A Edwards</i>	7-10-96	1435

Comments:

Final Sample Disposition

PNNL (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 2225?	☒ Y / ☒ N	
RSR/release? (a ≤ 100/B ≤ 400 pCi/g)	☒ Y / ☒ N	
COC copy for LRB, RIDS filed?	☒ Y / ☒ N	

(WHC-SD-WM-TP-335, REV. 2, Table 2b)
A-6000-407 (12/92) WEF061POC 1/2 POC _____

(Revised 05/30/96 PNNL)

Battelle Pacific
Northwest Laboratory

CHAIN OF CUSTODY

WHC 100248

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 373-7076Project Designation/Sampling Locations 200 West Tank Farm
241-C-204 Tank Vapor Sample SAF S6067
(ISVS Cart)Collection date 07 - 2 - 96
Preparation date 06 - 22 - 96

Ice Chest No.

Field Logbook No. WHC-N 647-S

Ertco Hi/Lo thermometer No.

PNL-T-003

Bill of Lading/Airbill No.

N/A

Offsite Property No. N/A

Method of Shipment

Government Truck

Shipped to

WHC-

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S6067 - A11 . 1077 - PNL Triple Sorbent Trap (TST) Sample # 1
 S6067 - A12 . 1078 - PNL TST Sample # 2
 S6067 - A13 . 1079 - PNL TST Sample # 3
 S6067 - A14 . 1080 - PNL TST Sample # 4
 S6067 - A17 . 1081 - Open, close & store TST Field Blank # 1
 S6067 - A18 . 1082 - Open, close & store TST Field Blank # 2
 S6067 - A19 . 1083 - Store TST Trip Blank #1
 S6067 - A20 . 1084 - Store TST Trip Blank #2

[] Field Transfer of Custody		[X] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
JL Julia	07-01-96	0945	JA Edwards	07-01-96	0945
JA Edwards	07-01-96	1055	JA Edwards	07-01-96	1055
GS CAPRIO	07-10-96	1430	JA Edwards	7-10-96	1430

Final Sample Disposition

Comments:

- PNL (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
 - Sorbents shipped on ice? (<5°C) ☒ Y/N
 - Hi/Lo thermometer - Keep upright! ☒ Y/N
 - Hi/Lo thermometer / Y/N
 - Rad release stickers on samples? / Y/N
 - Activity report from 222S? / Y/N
 - COC copy for LRB, RIDS filed? ☒ Y/N

POC ☒ POC

Comments:

Cooler Temperature Status

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

Hi ____°C / Lo ____°C (delivery at WHC from PNL)

Hi ____°C / Lo ____°C (at return to PNL from WHC)

Hi +22°C / Lo -8°C (at delivery from WHC to PNL)

(Revised 06/21/95 PNL)

Westinghouse Hanford Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				COC# 00219 COPY of 1	
Collector Glenn Caprio/Rick Mahon				Contact/Requestor Rick Mahon		Tel. No. 373-7437 MSIN S3-27 FAX 373-7076	
SAF Number S6067				Sample Origin C-204		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	A	Date	Time	No/Type Container	Sample Analysis	Perservative
S6067-A21.001	S96WV	X	7/2/96	1300	(1) 13mm Filter Holder	AT/TB/GEA	n/a
S6067-A22.001	S96WV	X	↓	↓	(1) 13mm Filter Holder	AT/TB/GEA	n/a
S6067-A03.011	S96WV	X	↓	↓	(1) silica gel	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 5 days for 20 days. Please fax reports to Rick Mahon. Thanks.		
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
Relinquished By	Glenn Caprio	Glenn Caprio	7/3/96/0910	Received By	Glenn Caprio	7/3/96/0910	
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time
FINAL SAMPLE DISPOSITION				Disposal Method e.g. Return to customer, per lab procedure, used in process.			
				Disposed By			
				Date/Time			

HNF-SD-WM-RPT-250, Rev. 0

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>621269</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			