Sta 4 (E)

AUG 05 1997

ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT 621270

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-106. 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 Design- nator	Reason for Trans- mittal	Orig- inator Dispo- sition	Receiv- er Dispo- sition			
1	HNF-SD-WM-RPT-246		0	VAPOR AND GAS SAMPLING OF SST-241- S-106	Q	2					
16. KEY											
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) Rea- son	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Rea- son	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority									
		Design Agent									
2	1	Cog.Eng. R.D. Mahon	<i>R.D. Mahon</i>	7/30/97							
2	1	Cog. Mgr. L.L. Lockrem	<i>L.L. Lockrem</i>	7/24/97							
2	1	QA Mike Barnes	<i>Mike Barnes</i>	7-24-97							
		Safety									
		Env.									
18.			19.			20.			21. DOE APPROVAL (if required) Ctrl. No.		
Glenn S. Caprio <i>Glenn S. Caprio</i> Signature of EDG Date 8/5/97			Authorized Representative Date for Receiving Organization			L.L. Lockrem <i>L.L. Lockrem</i> Design Authority/ Cognizant Manager Date 7/24/97			☐ Approved ☒ Approved w/comments ☐ Disapproved w/comments		

VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-106 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: 621270

UC: 2070

Org Code: 8C530

Charge Code: E62000

B&R Code: EW3120074

Total Pages: 31

Key Words: 241-S-106, ISVS, SUMMA™, TST, SORBENT, TANK

Abstract: THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE JUNE
13, 1996 SAMPLING OF SST 241-C-204

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Kara J. Boz
Release/Approval

8/5/97
Date

Approved for Public Release

APPROVALS

Document title: Vapor and Gas Sampling of Single-Shell Tank 241-S-106
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
OVMT	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
WSCF	Waste Sampling and Characterization Facility

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VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-106 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-106. This document presents In Situ Vapor Sampling System (ISVS) data resulting from the June 13, 1996 sampling of SST 241-S-106. 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-106 on June 13, 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* (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, 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 S6-061.

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-S-106 on June 13, 1996 and was allowed to warm up for approximately 15 minutes. Sampling began at approximately 10:30 on June 13, 1996, and was completed by 12:30 the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Prior to inserting the tube bundle into SST 241-S-106, 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 four feet down the riser. The measurements reported at the breather filter: LEL 0%, NH_3 20.0 ppm, O_2 20.8%, HCN 0%, and TOC 3.7 ppm. The measurements approximately three feet down were: LEL 0.0%, NH_3 50 ppm, O_2 20.7%, HCN 0%, and TOC 3.9 ppm. The measurements approximately twenty feet down were: LEL 0.0%, NH_3 100.0 ppm, O_2 21.0%, HCN 0%, and TOC 7.8 ppm.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, June 13, 1996, was mostly sunny and clear with a slight breeze from the northeast. 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 1525 on June 12, 1996, and finished at approximately 1945. The SHA was connected to tube bundle 14C. The top collar as described in ECN #632433 was used for this sampling event. The sample assembly was transported to 241-S-106 on June 13, 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 6.096 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. The SHA was disconnected from the tube bundle. Black powder was visible in between the inner and outer sleeving over the SHA. There appeared to be tears in the inner sleeving as well. The HPT surveyed the SHA and tube bundle sleeving. Contamination was found on the tube bundle. The SHA was bagged as radioactive material.

After the final sample was collected the sample assembly was removed from the tank. 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 at 1215. 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 and silica gel trap were transported to 222-S for radiological analysis. The next several sampling events were scheduled in S-farm and therefore the ISVS was secured and left inside the farm.

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	S6061-A21.OU1	Total Alpha = <0.609 Total Beta = <2.06 GEA = <detectable	= <detectable = < detectable = <detectable
Downstream filter	S6061-A22.OD1	Total Alpha = <0.267 Total Beta = <1.29 GEA = <detectable	= <detectable = <detectable = <detectable
Tritium Trap	S6061-A03.OT1	Total Activity = 11.3	= 11.3

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-S-106, 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-106 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-S-106 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.

Approximately 50 feet to the north, a crane was in operation prior to the ambient purge and the ambient collection. Occasionally diesel fumes could be

smelled at the sample location. The crane was not running during collection of canister 086, 089 and the ambient purge.

While removing the SHA from the double bagging at the WSCF laboratory, it was observed that the c-flex plugs in line 6 and 9 had fallen out. Line 6 and 9 correspond to sample numbers S6061-A11.1001 and S6061-A14.1004 respectively. The upstream side of the two TSTs could have been exposed to the inside of the plastic bay for up to 20 hours.

These anomalies were also noted on the sample log sheets in Appendix A.

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. 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 S-106

Set up ISVS (Section 8.1)

Date: 13-Jun-96

Ensure particulate filters are installed

ISVS Personnel: Mahon, Caprio

LEAK CHECK (APPENDIX I) Leak Rate:

0 inch Hg in 5 min

Tank Temperature 19.1 C

Trailer Personnel: McClellan

WHC Sample ID	PNNL		Probe		Description	Desired	Desired	Desired	Actual	Actual	Actual	Actual	Actual
	Sample ID	Line	Sample	Cart		Flow	Duration	Total	Flow	Start	End	Total	Total
				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	100	1032	1037	5	
S6061 A01.086	086	NA	NA		Upwind SUMMA #1		1			1034	1035	1	
S6061 A02.089	089	S	SUMMA		Ambient #2		1			1037	1038	1	
Uncap and insert sample bundle into tank										1044	1050 at 3ft		
Connect bundle lines:											1055 at 20 ft		
			1	1									
S6061 A21.0U1	0U1	1	1		UPSTREAM FILTER	200	5	1000	218.00	1101	NA	NA	999
	A22 0D1	0D1			DOWNSTRM FILTER								
	A03 0T1	0T1			TRITIUM								
Connect bundle lines:													
			S	SUMMA									
			2	1									
			3	2									
			4	3									
			5	4									
Purge Summa line /w tank													
			S	SUMMA	SUMMA purge	1000	5	5000	1000	1112	1117	5	5000
S6061 A04.097	097	S	SUMMA		Summa #3		1			1117	1118	1	6000
S6061 A05.108	108	S	SUMMA		Summa #4		1			1124	1125	1	6000

ISVS Sampling of S-106

WHC Sample ID	PNL Sample ID	Probe Sample Line	Cart Port	Description	Desired Flow Rate SCCM	Desired Duration (min.)	Desired Total Flow SCC	Actual Flow Rate SCCM	Actual Start Time	Actual End Time	Actual Total Time (min.)	Actual Total Flow SCC
S6061 A06.120	120	S	SUMMA	Summa #5	1				1130	1131	1	6000
S6061 A07. S97	S97	2	1	NH3/NOx/H2O	200	10	2000	219.00	1135	NA	NA	1999
S6061 A08. S98	S98	3	2	NH3/NOx/H2O	200	10	2000	210.00	11:35:30	NA	NA	1999
S6061 A09. S99	S99	4	3	NH3/NOx/H2O	200	10	2000	211.00	1136	NA	NA	1999
S6061 A10. 01R	01R	5	4	NH3/NOx/H2O	200	10	2000	207.00	11:36:30	NA	NA	1998

Connect bundle lines:

6	1
7	2
8	3
9	4

S6061 A11.1001	1001	6	1	PNL TST #1	200	1	200	270 / 232	1201	NA	NA	203
S6061 A12.1002	1002	7	2	PNL TST #2	200	1	200	270 / 230	1201	NA	NA	200
S6061 A13.1003	1003	8	3	PNL TST #3	200	1	200	270 / 234	1201	NA	NA	200
S6061 A14.1004	1004	9	4	PNL TST #4	200	1	200	275 / 218	1201	NA	NA	203

Remove sample bundle from tank and cap

S6061 A21.0U1	S96VW0070	1	1	Bundle line 1 Upstream filter								
S6061 A22.0D1	S96VW0071	1	1	Bundle line 1 Downstream filter								
S6061 A03.0T1	S96VW0073	1	1	Bundle line 1 tritium trap								
S6061 A15.02R	02R	10	NA	Bundle store NH3/NOx/H2O FIELD BLANK #1								
S6061 A16.03R	03R	11	NA	Bundle store NH3/NOx/H2O FIELD BLANK #2								
S6061 A17.1005	PNL #1005	12	NA	Bundle store PNL TST FIELD BLANK #1								
S6061 A18.1006	PNL #1006	13	NA	Bundle store PNL TST FIELD BLANK #2								
S6061 A19.1036	PNL #1036	NA	NA	Bundle store PNL TST TRIP BLANK #1								
S6061 A20.1038	PNL #1038	NA	NA	Bundle store PNL TST TRIP BLANK #2								

S1061.XLS 6/17/96 1:06 PM

ISVS Sampling of S-106

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

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

BUNDLE TOTAL TANK GAS USED DURING SAMPLING RUNS (Liters) 32.80

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

ANOMALIES

Just before the ambient air purge and ambient SUMMA collection, a crane was running about 20 meters upwind of the sample location. The sample team could smell diesel exhaust while the crane was running. The crane was off during the ambient purge and the collection of SUMMA 086 and 089.

S6061-A11.1001, S6061-A14.1004 While removing the Sample Head Assembly from the double bagging at WSCF, it was observed that the c-flex plug in Line 6 and 9 had fallen out. The upstream side of the two TSTs could have been open to the inside of the plastic bag for up to 20 hours.

A-5

HNF-SD-WM-RPT-246, Rev. 0

Note: #VALUE! = <Detectable

S6061-A21.0U1 / S96WV0070

PARALLEL UPSTREAM FILTER

TOTAL VOLUME

ALPHA

BETA

GEA -

Co-60

Cs-134

Cs-137

Eu-152

Eu-154

Eu-155

Liters

pCi / filter

pCi / filter

< 0.609

#VALUE!

< 2.06

#VALUE!

< 13.99 < Detectable

< 10.07 < Detectable

< 18 < Detectable

< 52.13 < Detectable

< 28.73 < Detectable

< 28.39 < Detectable

S6061-A22.0D1 / S96WV0071

PARALLEL DOWNSTREAM FILTER

TOTAL VOLUME

ALPHA

BETA

GEA -

Co-60

Cs-134

Cs-137

Eu-152

Eu-154

Eu-155

Liters

pCi / filter

pCi / filter

< 0.267

#VALUE!

< 1.29

#VALUE!

< 9.787 < Detectable

< 11.6 < Detectable

< 28.13 < Detectable

< 75.35 < Detectable

< 38.2 < Detectable

< 33.22 < Detectable

S6061-A03.0T1 / S96WV0073

TRITIUM TRAP

TOTAL VOLUME

TOTAL ACTIVITY

Liters

pCi / filter

pCi / filter

1

11.3

11.3

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 / filter) = #VALUE!

Total Beta (pCi / filter) = #VALUE!

Total GEA Cs-137 (pCi / filter) = #VALUE!

SORBENT SAMPLING Used 5 g for sorbent mass

TOTAL VOLUME PER SAMPLE

2.00 Liters

Tritium per SAMPLE

NH3 (5 gram)

4.52 pCi per gram

H2O (5 gram)

4.52 pCi per gram

ALPHA per SAMPLE

NH3 (5 gram)

#VALUE! pCi per gram

H2O (5 gram)

#VALUE! pCi per gram

BETA per SAMPLE

NH3 (5 gram)

#VALUE! pCi per gram

H2O (5 gram)

#VALUE! pCi per gram

GEA per SAMPLE Cs-137

NH3 (5 gram)

#VALUE! pCi per gram

H2O (5 gram)

#VALUE! 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)

0.50 pCi per gram

ALPHA per Sample

TST (4.5 gram)

#VALUE! pCi per gram

BETA per Sample

TST (4.5 gram)

#VALUE! pCi per gram

GEA per Sample Cs-137

TST (4.5 gram)

#VALUE! pCi per gram

SUMMA SAMPLING

TOTAL VOLUME PER CANISTER

8 Liters (air at 300K, 1 bar = 1,161 g/L)

Tritium PER SAMPLE

9.73 pCi per gram

ALPHA PER SAMPLE

#VALUE! pCi per gram

BETA PER SAMPLE

#VALUE! pCi per gram

GEA PER SAMPLE Cs-137

#VALUE! pCi per gram

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APPENDIX B
AMBIENT CONDITIONS

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WEATHER DURING ISVS SAMPLING OF 241-S-106

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APPENDIX C
CHAIN-OF-CUSTODY FORMS

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Battelle Pacific National Northwest Lab	CHAIN OF CUSTODY	WHC 100093
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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 373-3793Project Designation/Sampling Locations 200 West Tank Farm
241-S-106 Tank Vapor Sample SAF S6061
(ISVS Cart)Collection date 06-13-96
Preparation date 06-10-96

Ice Chest No.

Field Logbook No. WHC-N-642-8

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

S6061 - A01 .086 Collect Ambient Air Sample SUMMA #1
 S6061 - A02 .089 Collect Ambient Air Sample SUMMA #2 (through tube bundle)
 S6061 - A04 .097 Collect SUMMA #3
 S6061 - A05 .108 Collect SUMMA #4
 S6061 - A06 .120 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>	06-10-96	1430	R D Mahon <i>R D Mahon</i>	06-10-96	1430
R D Mahon <i>R D Mahon</i>	06-11-96	1230	GS Caprio <i>GS Caprio</i>	06-11-96	1230
R D Mahon <i>R D Mahon</i>	06-18-96	0810	GS Caprio <i>GS Caprio</i>	06-18-96	0810
GS Caprio <i>GS Caprio</i>	06-18-96	1051	J A Edwards <i>J A Edwards</i>	06-18-96	1051

Comments:

Final Sample Disposition

PNNL (only) Checklist

- ☐ Media labeled and checked?
- ☐ Letter of instruction?
- ☐ Media in good condition?
- ☐ COC info/signatures complete?
- ☐ Rad release stickers on samples?
- ☐ Activity report from 222S?
- ☐ RSR/release? (a ≤100/B ≤400 pCi/g)
- ☐ COC copy for LRB, RIDS filed?

Pick-up / Delivery

Y/N
Y/N
Y/N
Y/N
Y/N
Y/N
Y/N
Y/N

Comments:

A diesel crane was running about 20m upwind of the sample collection point before the ambient purge and ambient collection. The VT could smell diesel exhaust while the crane was running. The crane was off during collection of can 086, 089 and off during ambient purges.

POC

POC

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

(Revised 05/30/96 PNNL)

Battelle Pacific
Northwest Laboratory

CHAIN OF CUSTODY

WHC 10094

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-S-106 Tank Vapor Sample SAF S6061
(ISVS Cart)

Collection date 06 - 12 - 96

Preparation date 06- 07 - 96

Ice Chest No.

Field Logbook No. WHC-11-677-8

Ertco HI/Lo thermometer No.

PNL-T-002

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

S6061 - A11 - 1001	PNL Triple Sorbent Trap (TST) Sample # 1
S6061 - A12 - 1002	PNL TST Sample # 2
S6061 - A13 - 1003	PNL TST Sample # 3
S6061 - A14 - 1004	PNL TST Sample # 4
S6061 - A17 - 1005	Open, close & store TST Field Blank # 1
S6061 - A18 - 1006	Open, close & store TST Field Blank # 2
S6061 - A19 - 1036	Store TST Trip Blank # 1
S6061 - A20 - 1038	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 Jolya	06-07-96	1425	JA Edwards	06-07-96	1425	
JA Edwards	06-10-96	1430	RM Arnold	06-10-96	1430	
RM Arnold	06-11-96	1230	RD Mahon	06-11-96	1230	
RD Mahon	06-18-96	0810	GS Caprio	06-18-96	0810	
GS Caprio	06-19-96	1050	JA Edwards	06-18-96	1050	

Final Sample Disposition

Comments:

- PNL (only) Checklist
- ☒ Media labeled and checked?
 - ☒ Letter of instruction?
 - ☒ Media in good condition?
 - ☒ COC info/signatures complete?
 - ☒ Sorbents shipped on ice? (<5°C)
 - ☒ Hi/Lo thermometer - Keep upright!
 - ☒ Hi/Lo thermometer
 - ☒ Rad release stickers on samples?
 - ☒ Activity report from 2225?
 - ☒ COC copy for LRB, RIDS filed?

Pick-up / Delivery

☒ N	☒ N
☒ N	☒ N
☒ N	☒ N
☒ N	☒ N
☒ N	☒ N
☒ N	☒ N
☒ N	☒ N
☒ N	☒ N
☒ N	☒ N
☒ N	☒ N

Comments:

While removing SHAs from double bagging on 14 JUN 96, it was observed that the plug in c/w flex upstream of TST 1001 and 1004 had fallen out. The upstream side of TST could have been exposed to inside of plastic bag for 20 hrs.

Cooler Temperature Status

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

Hi -15°C / Lo -15°C (delivery at WHC from PNL)

Hi -15°C / Lo -15°C (at return to PNL from WHC)

Hi -15°C / Lo -15°C (at delivery from WHC to PNL)

(Revised 06/21/95 PNL)

Battelle Pacific National Northwest Lab	CHAIN OF CUSTODY	WHC 100095
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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) 373-7437
Page 85-9656 / FAX 373-3793

Project Designation/Sampling Locations 200 West Tank Farm
241-S-106 Tank Vapor Sample SAF S6061
(ISVS Cart) Collection date 06 - 13 - 96
Preparation date 06 - 07 - 96

Ice Chest No. Field Logbook No. WHC-N-677.8

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

S6061 - A07 . S97 Collect NH₃/NO_x/H₂O Sorbent Trap
S6061 - A08 . S98 Collect NH₃/NO_x/H₂O Sorbent Trap
S6061 - A09 . S99 Collect NH₃/NO_x/H₂O Sorbent Trap
S6061 - A10 . 01R Collect NH₃/NO_x/H₂O Sorbent Trap

S6061 - A15 . 02R Open, close and store NH₃/NO_x/H₂O field blank #1
S6061 - A16 . 03R 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>J A Edwards</i>	06-10-96	1130	J A Edwards <i>J A Edwards</i>	06-10-96	1130	
J A Edwards <i>J A Edwards</i>	06-10-96	1430	R D Mahon <i>R D Mahon</i>	06-10-96	1430	
R D Mahon <i>R D Mahon</i>	06-11-96	1230	R D Mahon <i>R D Mahon</i>	06-11-96	1230	
R D Mahon <i>R D Mahon</i>	06-12-96	0810	G S Caprio <i>G S Caprio</i>	06-12-96	0810	
G S Caprio <i>G S Caprio</i>	06-12-96	1044	J A Edwards <i>J A Edwards</i>	06-12-96	1044	

Final Sample Disposition

Comments:

PNNL (oniv) 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 222S?	☒ 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) WEF061

POC

POC

1 of 1

(Revised 05/30/96 PNNL)

[illegible]

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

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>621270</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			