

RMIS View/Print Document Cover Sheet

This document was retrieved from the Documentation and Records Management (DRM) ISEARCH System. It is intended for Information only and may not be the most recent or updated version. Contact a Document Service Center (see Hanford Info for locations) if you need additional retrieval information.

Accession #: D296005613

Document #: SD-WM-RPT-198

Title/Desc:

VAPOR & GAS SAMPLING OF SST 241C301 USING THE
VAPOR SAMPLING SYSTEM

Pages: 41

JAN 11 1996

ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT No 614230

2. To: (Receiving Organization) DISTRIBUTION	3. From: (Originating Organization) SPECIAL ANALYTICAL STUDIES 75770	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: VAPOR/AS/SPECIAL ANALYTICAL STUDIES	6. Cog. Engr.: RICKY MAHON 3-7437	7. Purchase Order No.: N/A
8. Originator Remarks: 241-C-301, SAMPLING USING THE VAPOR SAMPLING SYSTEM		9. Equip./Component No.: N/A
11. Receiver Remarks:		10. System/Bldg./Facility: M0292/WSCF
		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 Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-WM-RPT-198	ALL	0	VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-C-301 USING THE VAPOR SAMPLING SYSTEM	Q	2	1	

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)	(H)	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M)	(H)
2	1	Cog. Eng.	R. D. MAHON	1/9/96	S3-27	RESOURCE CENTER		R2-12		3
2	1	Cog. Mgr.	J. B. DORTAN	1/9/96	S3-26	CENTRAL FILES		A3-88		3
2	1	QA	M. L. McELROY	1/9/96	S7-07					
3			DAVE BRATZEL		S7-21					
3			JOHN DEICHMAN		T6-03					
3			RAMPUR VISWANATH		S3-90					
3			JAMES HUCKABY		K6-80					

18. Signature of EDT Originator GLENN S. CAPRIDO 12/21/95	19. Authorized Representative Date for Receiving Organization	20. Cognizant Manager Date Ricky Mahon 1/9/96	21. DOE APPROVAL (if required) Ctrl. No. <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments
---	---	---	---

BD-7400-172-2 (04/94) GEF097

SUPPORTING DOCUMENT

1. Total Pages *38*

2. Title

VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-C-301 USING THE VAPOR SAMPLING SYSTEM

3. Number

WHC-SD-WM-RPT-198

4. Rev No.

0

5. Key Words

241-C-301
VSS
SUMMA
TST
SORBENT
TANK

6. Author

Name: G.S. CAPRIO

G.S. Caprio
Signature

Organization/Charge Code
75570/E62000

7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE SEPTEMBER 29, 1995, SAMPLING OF SST 241-C-301 USING THE VAPOR SAMPLING SYSTEM.

8. RELEASE STAMP

DATE:		ID:
STA: <i>4</i>		
JAN 11 1996		

RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-RPT-198, REV 0

Document Title: Vapor and Gas Sampling of Single-Shell Tank 241-C-301 Using the Vapor Sampling System

Release Date: 1/11/96

This document was reviewed following the procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:


Kara Broz


1/11/96

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.

This report has been reproduced from the best available copy. Available in paper copy. Printed in the United States of America. To obtain copies of this report, contact:

Westinghouse Hanford Company - Document Control Services
P.O. Box 1970, Mailstop H6-08, Richland, WA 99352
Telephone: (509) 372-2420; Fax: (509) 376-4989

APPROVALS

Document title: Vapor and Gas Sampling of Single-Shell Tank 241-C-301
Using the Vapor Sampling System

Approved by:  10/31/95
R. A. Westberg, Field Scientist
Vapor Sampling Project
Sampling and Mobile Laboratories
Date

Approved by:  13 DEC 95
R. D. Mahon, Project Lead
Vapor Sampling Project
Sampling and Mobile Laboratories
Date

Approved by:  11/2/95
D. L. Edwards, Technical Lead
Vapor Sampling Project
Sampling and Mobile Laboratories
Date

CONTENTS

1.0	SCOPE	1
2.0	SAMPLING EQUIPMENT DESCRIPTION	1
2.1	VAPOR SAMPLING SYSTEM	1
3.0	SAMPLING EVENT DESCRIPTION	3
3.1	SPECIFICATIONS	3
3.2	OPERATIONS AND SAMPLING PERSONNEL	4
3.3	INDUSTRIAL HYGIENE FIELD RESULTS	4
3.4	AMBIENT CONDITIONS	4
3.5	SAMPLE COLLECTION	4
3.6	FIELD GC/FID RESULTS	5
3.7	RADIATION SCREENING	6
4.0	SAMPLE CHAIN OF CUSTODY: RECEIPT, STORAGE, AND SHIPMENT	7
5.0	QUALITY ASSURANCE AND CONTROLS	9
5.1	VAPOR SAMPLING SYSTEM CLEANING	9
5.2	INSTRUMENT CALIBRATION	9
5.3	BLANK SAMPLES	10
6.0	ANOMALIES	11
7.0	REFERENCES	12
APPENDICES		
A	SAMPLE LOG SHEETS	A-1
B	AMBIENT CONDITIONS	B-1
C	CHAIN-OF-CUSTODY FORMS	C-1

LIST OF TABLES

1	Flow Control Calibration	2
2	TOC Results	5
3	Radionuclide Analysis Results	7
4	Pacific Northwest Laboratory Samples	8
5	Calibration Data	10

LIST OF TERMS

CGI	Combustible Gas Indicator
COC	Chain Of Custody
DOT	U.S. Department of Transportation
GC	Gas Chromatograph
GC/FID	Gas Chromatograph/Flame Ionization Detector
GEA	Gamma Energy Analysis
HEPA	High-Efficiency Particulate Air (filter)
NH ₃	Ammonia
NO ₂	Nitrogen Dioxide
NO _x	Nitric Oxide
H ₂ O	Water Vapor
OPC	Offsite Property Control
OVM	Organic Vapor Meter
PNL	Pacific Northwest Laboratory
SML	Sampling and Mobile Laboratories
SST	Single-Shell Tank
TCP	Tank Characterization Plan
team	SML Vapor Team
TOC	Total Organic Carbon
TST	Triple Sorbent Trap
VSS	Vapor Sampling System
WHC	Westinghouse Hanford Company

This page intentionally left blank.

VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-C-301 USING THE VAPOR SAMPLING SYSTEM

1.0 SCOPE

The Vapor Issue Resolution Program tasked the Sampling and Mobile Laboratories (SML) to collect representative headspace samples from Hanford Site single-shell tank (SST) 241-C-301. This document presents sampling data resulting from the September 29, 1995 sampling of SST 241-C-301. Analytical results will be presented in separate reports issued by the laboratories that supplied and analyzed the sampling media.

2.0 SAMPLING EQUIPMENT DESCRIPTION

2.1 VAPOR SAMPLING SYSTEM

The SML vapor team (the team) used the vapor sampling system (VSS) to collect representative samples of the air, gases, and vapors from the headspace of SST 241-C-301 on September 29, 1995. Mahon et al. (1994) describes in detail the VSS, its performance, and its operation. The team used the VSS to collect sorbent trap and SUMMA¹ canister headspace samples from SST 241-C-301. The team then sent these samples to the analytical laboratories for analysis.

The VSS comprises a mobile laboratory and stainless-steel transfer tubing that connects the mobile laboratory to the vapor space. A vacuum pump draws sample vapor from the tank headspace and through all transfer tubing and the sampling manifold. Electrically activated, pneumatically actuated, valves direct sample flow within the VSS. Instrumentation housed in the mobile laboratory monitors and controls system temperature, monitors absolute and differential system pressure, meters and controls vapor mass flow, and monitors sample vapor total organic carbon (TOC) content using a gas chromatograph/flame ionization detector (GC/FID).

A key feature of the VSS is its use of heated transfer tubing and a heated sampling manifold. Maintaining the system temperature at an electronically controlled, elevated temperature prevents vapor condensation and reduces vapor adsorption on surfaces exposed to sample vapor. Mahon et al. (1994) describes various tests and observations that indicate the VSS sample transfer efficiency is consistently high.

Sorbent trap samples are collected at the sorbent trap station of the sampling manifold. Sorbent traps are pencil-size stainless-steel or glass tubes that contain vapor-adsorbing media. A known amount of sample vapor is passed

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

through the tube, which traps (by adsorption) virtually all the target analytes. The concentration of analytes in the vapor sampled is calculated from the quantity of analyte found in the sorbent media and the volume of vapor passed through the sorbent trap.

The sorbent trap station uses highly accurate mass flow controllers to measure and control the flow rate of sample vapor through the sorbent traps. The controllers FICV-1 through FICV-9 are mounted on top of the sorbent station between the inlet and outlet valves. Controllers FICV-10 and FICV-11 are located downstream of the sorbent trap station and the in-line driers, which remove moisture from the sample vapor before it is metered. Errors associated with the mass flow controllers were determined by the Westinghouse Hanford Company (WHC) Standards Laboratory before the SST 241-C-301 sampling event (see Table 1). Flow rates and the duration of flow are specified by the analytical laboratories that supply and analyze the sorbent traps.

Table 1. Flow Control Calibration.

Flow-indicating Control valve	Typically used Flow (stdcm ³ /min)	% Change from 647 to Actual	% Change from Datalogger to Actual
1	200	-0.7	-0.85
2	200	0.05	-0.10
3	200	-0.45	-0.60
4	200	0.05	-0.10
5	200	0.55	0.35
6	200	0.25	0.05
7	200	0.4	0.20
8	200	0.25	-1.81
9	50	-0.128	-0.27
10	200	-1.1	-1.20
11	5000	0.332	0.17

The VSS is also equipped with a gas chromatograph (GC). The Hewlett Packard 5890 Series II GC is equipped with a flame-ionization detector (FID), a 1 mL sample loop, a 10 port injection valve, a 2 meter chromatographic column, a programmable oven, and a portable computer loaded with the HP-Chemstation² software used to control the GC. The GC is plumbed to directly transfer sample from the VSS manifold to the GC sample loop. After the sample is transferred into the sample loop and reaches equilibrium, the run is initiated manually. HP-Chemstation[™] software activates the 10 port valve to transfer

²HP-Chemstation is a registered trademark of the Hewlett Packard Company, Avondale, Pennsylvania.

the sample from the sample loop to the column. The sample passes through the column and the FID generates a signal for TOC. All data is then transmitted to the computer where it is stored for further analysis.

The GC is equipped with a HP-5 column which is 2 meters long, 0.25 mm inside diameter, and which contains a 0.25 um phenyl methyl silicone phase. The GC oven is programmed to heat from 50 °C to 270 °C at a rate of approximately 70 °C per minute. Helium is the carrier gas, air and hydrogen the combustion gases, and nitrogen the make-up gas.

The GC/FID is configured to quantitatively estimate concentrations of TOC. The GC/FID confirms sampling system cleanliness, ambient air background TOC concentrations during sampling, and TOC concentration of tank vapor samples. The system is multi-point calibrated at the weather station on a as available basis, the last time being January 1995. The GC/FID has displayed a high degree of stability over a period of months. For further details, see Section 3.6, Field GC/FID Results.

The sampling manifold also has a station for sampling vapor with evacuated SUMMA™ canisters. SUMMA™ canisters are stainless steel-vessels with internal surfaces that have been prepared by the SUMMA™ process, which passivates active sites on the canister walls to minimize adsorption of gases and vapors. An analytical laboratory must clean and evacuate SUMMA™ canisters before use. The evacuated canister is filled with sample vapor through a manually operated valve, which is then closed to seal the sample inside. SUMMA™ canisters essentially allow collection and transfer of whole-air samples from the sample site to an analytical laboratory where the sample is analyzed. The standard capacity of each SUMMA™ canister is 6 liters.

3.0 SAMPLING EVENT DESCRIPTION

3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in WHC-SD-WM-TP-335, Rev. 0G, *Vapor Sampling and Analysis Plan* (Homi 1995). 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. SML retains these documents in the project file. This sample event's project-specific number is S5-066.

3.2 OPERATIONS AND SAMPLING PERSONNEL

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

- G. S. Caprio, VSS Technician
- R. D. Mahon, VSS Lead Scientist
- D. Richards, Sampling Technician
- R. A. Westberg, Field Scientist.

The VSS was set up at SST 241-C-301 on September 28, 1995 and was allowed to warm up overnight. Sampling began shortly after 11:00 a.m. on September 29, 1995, and was completed by 3:00 p.m. the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Before hooking up to SST 241-C-301, an industrial hygiene technician field tested tank vapors. The technician purged the instrument/vent header for 5 minutes and then field measured vapor stream contents using a combustible gas indicator (CGI) and an organic vapor meter (OVM). The measurements were verbally reported, LEL 0%, NH₃ 0 ppm, O₂ 21.0%, and TOC 0.0 ppm.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, September 29, 1995 was cool and cloudy, with a light breeze from the northwest. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 5 miles west of C-Farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser 5 of SST 241-C-301. The probe length, from the sample inlet to the top of the riser flange, was 6.1 meters.

All zones of the VSS were heated to 60 °C during setup of the VSS at SST 241-C-301 on September 28, 1995. The team stabilized the VSS temperature zones by 11:00 a.m. on September 29, 1995, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-C-301 were 993 mbar (744.8 torr) and 19.6 °C, respectively. The sample log sheets in Appendix A provide a complete chronology of the sample event including start and end times, flow rates, volumes, and specific sample identifiers.

Approximately 12 hours before the first samples were collected, the team began heating the VSS transfer tubing and sampling manifold. During this warmup period, the team began a purge of all vapor transfer tubing and the sampling manifold with ambient air. Before sampling tank vapors on September 29, 1995, the team collected two SUMMA™ canister samples of ambient air, one manually

10 meters upwind of the VSS connection with SST 241-C-301, and the other using the VSS sampling manifold. The former was collected to establish background levels of trace organic vapors, and the latter was collected to establish the cleanliness of the sampling manifold.

A leak check of the VSS sampling manifold and transfer tubing was performed. The system was evacuated to 290 mbar (217.6 torr) and leakage of ambient air into the system was observed by monitoring system pressure for 15 minutes. Leakage resulted in an increase of 3.73 mbar (2.8 torr) in system pressure during the 15 minute test. Given a system volume of not more than 10 L, this pressure increase corresponds to a leak rate of approximately 8.58 ml/min. This leak rate was then estimated for average SUMMA™, triple sorbent trap (TST), and sorbent sampling pressures. It was found that for the SUMMA™ canisters, dilution by ambient air was approximately 0.1%, for TSTs sampled at 200 mL/min the dilution was approximately 0.4%, and for sorbent traps the dilution was approximately 0.3%.

The sampling valve was opened and the VSS was purged with sample vapor from SST 241-C-301 for 30 minutes at a total flow rate of 5.46 L/min. This purge was performed to flush ambient air from the system and saturate the system's active adsorption sites. Because the volume of transfer tubing and the sampling manifold upstream of the sampling devices is estimated to be no more than 10 L, this purge provided about 16.4 air turnovers in the system.

One analytical laboratory provided sample media. Pacific Northwest Laboratory (PNL) provided SUMMA™ canisters, TSTs, and sorbent traps for organic vapors, ammonia (NH₃), nitrogen dioxide (NO₂), and water vapor (H₂O).

3.6 FIELD GC/FID RESULTS

The GC was single point calibrated on the day of sampling using 6.0 ppmC Propane standard by Scott Specialty Gas. The standard is an E.P.A. Protocol Gas that is ±2% NIST traceable.

Table 2 displays the Field GC/FID results from the sampling of 241-C-301.

Table 2. TOC Results.

Number of Runs	Description	Average TOC Concentration (ppmC)	% Standard Deviation
3	Propane	6.00	1.23
4	Ambient	2.65	2.53
4	Tank Vapor	4.19	9.41

3.7 RADIATION SCREENING

Samples are unconditionally released from the SST farm in accordance with 1995-33300-RSP-03, *Release of Vapor Sampling Equipment* (WHC 1995c).

Radiological screening results are used to determine (1) if the samples must be shipped as radioactive or nonradioactive in accordance with U.S. Department of Transportation (DOT) regulations and (2) if the samples meet the laboratory acceptance criteria.

The DOT limits for shipping a nonradioactive sample are 2,000 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:

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

To protect the sampling manifold and sampling devices from radioactive particulates, all sample vapor for the September 29, 1995, SST 241-C-301 vapor sampling event was drawn through a series of four glass-fiber high-efficiency particulate air (HEPA) filters placed upstream of the sampling manifold. These four filters were in place any time tank vapors were flowing through the system. When sampling was complete, the filters were removed and assigned unique sample identifiers. All four HEPA filters were submitted to Laboratory 222-S for total alpha, total beta, and gamma energy analysis (GEA). The HEPA filter closest to the sampling manifold was analyzed to determine if the samples met DOT shipping criteria and laboratory acceptance criteria. Moisture from the tank vapors was collected in a silica gel trap through one of the sorbent station ports and analyzed for tritiated water. SST 241-C-301 filter and silica gel analysis results are shown in Table 3. SML scientists use the activity results in Table 3 to calculate pCi/g of sample media. SML maintains this information in the project-specific file. The results in Table 3 indicate that the samples collected from SST 241-C-301 met the laboratory acceptance criteria and the DOT definition of a nonradioactive shipment.

Table 3. Radionuclide Analysis Results.

Filter	Sample Identifier	Activity Results ^a (pCi/sample)	Activity ^b (pCi/L of tank gas)
Upstream HEPA filter (box)	S5066-A28.OU1	Total Alpha = 1.79 Total Beta = 16.4 GEA = <detectable	= 0.006 = 0.05 = <detectable
Downstream HEPA filter (box)	S5066-A29.OD1	Total Alpha = <0.71 Total Beta = 2.01 GEA = 24.4 (¹³⁷ Cs)	= <0.002 = 0.007 = 0.08
Upstream HEPA filter (VSS)	S5066-A30.OU2	Total Alpha = <0.765 Total Beta = 3.03 GEA = <detectable	= <0.003 = 0.01 = <detectable
Downstream HEPA filter (VSS)	S5066-A31.OD2	Total Alpha = <0.765 Total Beta = 3.18 GEA = <detectable	= <0.003 = 0.01 = <detectable
Tritium trap	S5066-A03.OT1	Total activity = <50.0	= <50.0 ^c

Notes:

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

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

^bNumbers based on an approximation of the total volume of tank vapor through the HEPA filters. Appendix A and the sample checksheets were used to estimate a total flow through the VSS of 306 L.

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

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

All sorbent trains, sorbent tubes, and SUMMA™ canisters received from PNL are kept in a custody locked storage area maintained by SML. Sorbent trains and tubes were maintained at 4 ± 2 °C in a refrigeration unit. SUMMA™ canisters were stored in the same locked storage area, but were not refrigerated. These sampling devices were picked up from PNL by SML and transported in a government vehicle to a custody locked storage area.

After sampling, the PNL sorbent tubes and SUMMA™ canisters were transported by government vehicle directly to PNL and delivered to J. A. Edwards on October 2, 1995. Table 4 lists the sample identifiers, sample types, and COC form numbers for all PNL samples.

Table 4. Pacific Northwest Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5066-A01.045	Ambient upwind SUMMA™	009262
S5066-A02.047	Ambient SUMMA™ (VSS)	009262
S5066-A04.068	SUMMA™	009262
S5066-A12.109	SUMMA™	009262
S5066-A20.140	SUMMA™	009262
S5065-A01.275	SUMMA™ Glove box	009261
S5065-A02.276	SUMMA™ Glove box	009261
S5065-A03.277	SUMMA™ Glove box	009261
S5066-A08.T06	NH ₃ /NO _x /H ₂ O sorbent	009264
S5066-A09.T07	NH ₃ /NO _x /H ₂ O sorbent	009264
S5066-A10.T08	NO _x /H ₂ O sorbent	009264
S5066-A11.T09	NH ₃ /H ₂ O/H ₂ O sorbent	009264
S5066-A16.T10	NH ₃ /NO _x /H ₂ O sorbent	009264
S5066-A17.T11	NH ₃ /NO _x /H ₂ O sorbent	009264
S5066-A18.T12	NO _x /H ₂ O sorbent	009264
S5066-A19.T13	NH ₃ /H ₂ O/H ₂ O sorbent	009264
S5066-A25.T14	NH ₃ /NO _x /H ₂ O field blank	009264
S5066-A26.T15	NH ₃ /NO _x /H ₂ O field blank	009264
S5066-A27.T16	NH ₃ /NO _x /H ₂ O field blank	009264
S5066-A05.676	PNL TST	009263
S5066-A06.677	PNL TST	009263
S5066-A07.678	PNL TST	009263
S5066-A13.679	PNL TST	009263
S5066-A14.680	PNL TST	009263
S5066-A15.681	PNL TST	009263
S5066-A21.682	PNL TST Field Blank	009263
S5066-A22.683	PNL TST Field Blank	009263
S5066-A23.684	PNL TST Trip Blank	009263
S5066-A24.685	PNL TST Trip Blank	009263

From the time that samples are received by SML until they are shipped back to the analytical laboratory, all COCs are maintained by SML in accordance with WHC-IP-1127-1.3, *Chain-of-Custody/Special Analysis Request for RCRA and CERCLA Protocol Samples* (WHC 1995a). Copies of the completed COC forms for this sampling event are included in Appendix C.

5.0 QUALITY ASSURANCE AND CONTROLS

5.1 VAPOR SAMPLING SYSTEM CLEANING

Immediately prior to sampling of SST 241-C-301, the VSS manifold and vapor sample transfer tubing was heated to 60 °C and ambient air was purged through the system for 30 minutes. Also, all pertinent system valves were actuated to release any contaminants that may have collected in the VSS valves themselves. After this purge an ambient air sample was drawn through the VSS manifold and a GC/FID run was initiated. No significant level of contaminants was detected. A second ambient air GC/FID run confirmed that the VSS manifold and transfer tubing was free of organic remnant residue down to ambient levels. A SUMMA™ canister ambient air sample was then collected to confirm by laboratory analysis that the VSS sampling manifold was free of trace organic contaminants (or to determine which contaminants were present and at what concentration), as discussed in Section 3.5. For further details, refer to Appendix E of WHC-IP-1127-4.10 (WHC 1995b) and the project-specific file located with SML.

5.2 INSTRUMENT CALIBRATION

Instruments located in the VSS are calibrated on an annual basis at the WHC Standards Laboratory. VSS instrumentation calibration data, maintained in files by SML, are summarized in Table 5. According to the calibration schedule shown in Table 5, all instrumentation was within its calibration period during the SST 241-C-301 sampling event.

Table 5. Calibration Data.

Element	Calibration Date	Expiration Date	WHC Standards Laboratory Code
FICV-1	5/08/95	5/08/96	518-28-03-012
FICV-2	5/08/95	5/08/96	518-28-03-008
FICV-3	5/08/95	5/08/96	518-28-03-004
FICV-4	5/08/95	5/08/96	518-28-03-006
FICV-5	5/08/95	5/08/96	518-28-03-011
FICV-6	5/08/95	5/08/96	518-28-03-009
FICV-7	5/08/95	5/08/96	518-28-03-014
FICV-8	5/08/95	5/08/96	518-28-03-013
FICV-9	5/08/95	5/08/96	518-28-03-007
FICV-10	5/08/95	5/08/96	518-28-03-010
FICV-11	5/08/95	5/08/96	518-28-03-005
PE-1	5/04/95	5/04/96	518-80-02-005
PE-2	5/04/95	5/04/96	518-80-02-006
PE-3	5/04/95	5/04/96	518-80-02-008
PE-4	5/04/95	5/04/96	518-80-02-007
PD-1	5/04/95	5/04/96	518-80-02-004
PD-2	5/04/95	5/04/96	518-80-02-003
Temperature Control System	08/25/95	08/25/96	804-67-74-009

5.3 BLANK SAMPLES

Trip blanks are samples that accompany the sample media from the point of generation through sample analysis. They are transported to the field with the sample collection media but remain unopened during the sampling event. Analysis of trip blanks is used to assess cross-contamination of sample media during field transport and storage.

Field blanks are sampling devices similar to trip blanks. They are prepared and handled in the same manner as the sampling media, but no tank vapors are drawn through them.

Spiked blanks are prepared as regular sampling media but also contain a known amount of special analyte. Tank vapors are drawn through these blanks and they are handled and analyzed just like any other sample. Analysis of the spiked blanks is used to evaluate potential sample loss during shipment or storage.

Ambient blanks are samples of ambient air collected at the sampling location. Analysis of ambient blanks is used to assess contamination that may be present in the atmosphere or in the transfer tubing or sampling manifold of the VSS immediately prior to sampling operations.

Table 4 lists sample blanks used during the sampling of SST 241-C-301.

6.0 ANOMALIES

All samples were collected in accordance with the Tank Characterization Plan (TCP) and WHC-IP-1127-4.10, *Collection of Parallel Sorbent Tubes and SUMMA Canisters Samples Using the Vapor Sampling System* (1995b).

While Rick Mahon was removing the HEPA filters from the HEPA transfer box HEPA body, he noticed a lot of gray dust/sandy dirt on the upstream side of the upstream filter. This is the first HEPA filter in the system. The HPT field survey of the filter and dirt rendered less than detectable alpha and beta radiation. The dirt was collected in one brown and one clear sample vial and is maintained at SML. A total of 2.55 g of sandy dirt was collected from the short O'Brien tube.

After returning from the tank farm, Rick quickly responded with a cc:mail to the program office, operations, SML, and PNL that described his findings.

Rick maintained contact with PNL as to the validity of the samples of 241-C-301 if analysis was performed. PNL suggested that the small amount of dirt discovered in the sample line should not significantly impact the analytical results. The program office agreed and the samples were later shipped to PNL for analysis.

7.0 REFERENCES

- 49 CFR 100-177, 1992, "Transportation," *Code of Federal Regulations*, as amended.
- Homi, C. S., 1995, *Vapor Sampling and Analysis Plan*, WHC-SD-WM-TP-335 Rev. 06, Westinghouse Hanford Company, Richland, Washington.
- Mahon, R. D., C. M. Jones, and M. S. Story, 1994 (draft), *Evaluation of the Capabilities and Use of the Vapor Sampling System for Tank Headspace Sampling and Characterization*, SD-WM-RPT-094, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995a, *Chain-of-Custody/Special Analysis Request for RCRA and CERCLA Protocol Samples*, Procedure WHC-IP-1127-1.3, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995b, *Collection of Parallel Sorbent Tubes and SUMMA Canister Samples Using the Vapor Sampling System (VSS)*, Procedure WHC-IP-1127-4.10, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995c, *Release of Vapor Sampling Equipment*, Procedure 1995-33300-RSP-03, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A
SAMPLE LOG SHEETS

This page intentionally left blank.

VSS Sampling of
C-301

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

Ensure HEPA filters are installed

Ensure connection to sample probe

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

Tank Temperature 19.6 C

GC Standard Runs

GC Ambient Air Runs through port 10

Date: 29 SEP 95

VSS Personnel: Westberg, Mahon, Richards

Trailer Personnel: Richards, Mahon

WHC Sample ID	PNL	Port	Description	Desired		Actual		Actual			
				Flow Rate SCCM	Duration (min.)	Flow Rate SCCM	Total Flow SCCM	Start Time	End Time	Total Time (min)	Total Flow (liters)
Purge with ambient air for 30 min.											
S5066-A01.045	045		AMBIENT #1	5500	30	5500	165000	10:37	11:07	30	165.00
GC Run #1 Ambient air/Cleanliness check											
S5066-A02.047	047	15	AMBIENT #2	5500	1	5500	5500	11:21	11:22	1	
GC RUN#2 Ambient air											
LEAK CHECK(APPENDIX A) Leak Rate: <u>11.2 torr/hr</u>				5500	30	5500	165000	11:29	11:30	1	
Purge with tank air for 30 min											
Measure tank pressure				5500	30	5500	165000	11:33	12:08	15	
								12:17	12:47	30	165.00
								12:49			
GCRUN #3 (Tank run #1)											
S5066-A04.068	068	11	SUMMA #3		1			12:51	12:56:30	1.5	6.00

PE-1 = 744.8 torr

VSS Sampling of C-301

WHC Sample ID	PNL Sample ID	Port Valve #	Description	Desired Flow Rate SCCM	Desired Duration (min.)	Desired Total Flow SCCM	Actual Flow Rate SCCM	Actual Start Time	Actual End Time	Actual Total Time (min.)	Actual Total Flow Liters
S5066-A08, T06	T06	1	NH3/NOx/H2O (#1)	200	15	3000	200.00	13:01	13:16	15	3.00
S5066-A09, T07	T07	2	NH3/NOx/H2O (#2)	200	15	3000	200.00	13:01	13:16	15	3.00
S5066-A10, T08	T08	3	NOx/H2O (#3)	200	15	3000	200.00	13:01	13:16	15	3.00
S5066-A11, T09	T09	4	NH3/H2O/H2O (#4)	200	15	3000	200.00	13:01	13:16	15	3.00
S5066-A05, 676	TST#676	5	TST #1	200	5	1000	189.40	13:01	13:06	5	0.95
S5066-A06, 677	TST#677	6	TST #2	200	5	1000	200.00	13:01	13:06	5	1.00
S5066-A07, 678	TST#678	7	TST #3	200	5	1000	173.90	13:01	13:06	5	0.87
S5066-A03, 0T1	T-2323 (222-S)	8	Tritium Trap	200	5	1000	198.40	13:01	13:06	5	0.99
GCRUN #4 (Tank run # 2)								13:19			
S5066-A12, 109	109	13	SUMMA #4		1			13:23	13:24:30	1.5	6.00
S5066-A16, T10	T10	1	NH3/NOx/H2O (#5)	200	15	3000	200.00	13:28	13:43	15	3.00
S5066-A17, T11	T11	2	NH3/NOx/H2O (#6)	200	15	3000	200.00	13:28	13:43	15	3.00
S5066-A18, T12	T12	3	NOx/H2O (#7)	200	15	3000	200.00	13:28	13:43	15	3.00
S5066-A19, T13	T13	4	NH3/H2O/H2O (#8)	200	15	3000	200.00	13:28	13:43	15	3.00
S5066-A13, 679	TST#679	5	TST #4	200	5	1000	200.00	13:28	13:33	5	1.00
S5066-A14, 680	TST#680	6	TST #5	200	5	1000	200.00	13:28	13:33	5	1.00
S5066-A15, 681	TST#681	7	TST #6	200	5	1000	184.30	13:28	13:33	5	0.92
GCRUN #5 (Tank run #3)								13:46			
S5066-A20, 140	140	15	SUMMA #5		1			13:50	13:51:30	1.5	6.00

VSS Sampling of
C-301

WHC Sample ID	PNL Sample ID	Port Valve #	Description	Desired		Desired		Actual		Actual	
				Flow Rate SCCM	Duration (min.)	Total Flow SCCM	Flow Rate SCCM	Start Time	End Time	Total Time (min.)	Total Flow Liters

S5066- A21. 682	TST#682		TST FIELD BLANK #1					14:00	14:01		
S5066- A22. 683	TST#683		TST FIELD BLANK #2					14:00	14:01		
S5066- A25. T14	T14		NH3/NOx/H2O FIELD BLANK #1					14:00	14:01		
S5066- A26. T15	T15		NH3/NOx/H2O FIELD BLANK #2					14:00	14:01		
S5066- A27. T16	T16		NH3/NOx/H2O FIELD BLANK #3					14:00	14:01		

GCRUN#6 (Tank run # 4) 13:55

TOTAL TANK GAS USED DURING SAMPLING RUNS 48.73

S5066- A28. OU1	T-2324 (222S)		Upstream HEPA(box)								
S5066- A29. OD1	T-2325 (222S)		Downstream HEPA(box)								
S5066 A30. OU2	T-2326 (222S)		Upstream HEPA(VSS)								
S5066- A31. OD2	T-2327 (222S)		Downstream HEPA (VSS)								

<u>Trip Blanks (DO NOT EXPOSE)</u>											
S5066- A23. 684	TST#684		TST TRIP #1								
S5066- A24. 685	TST#685		TST TRIP #2								

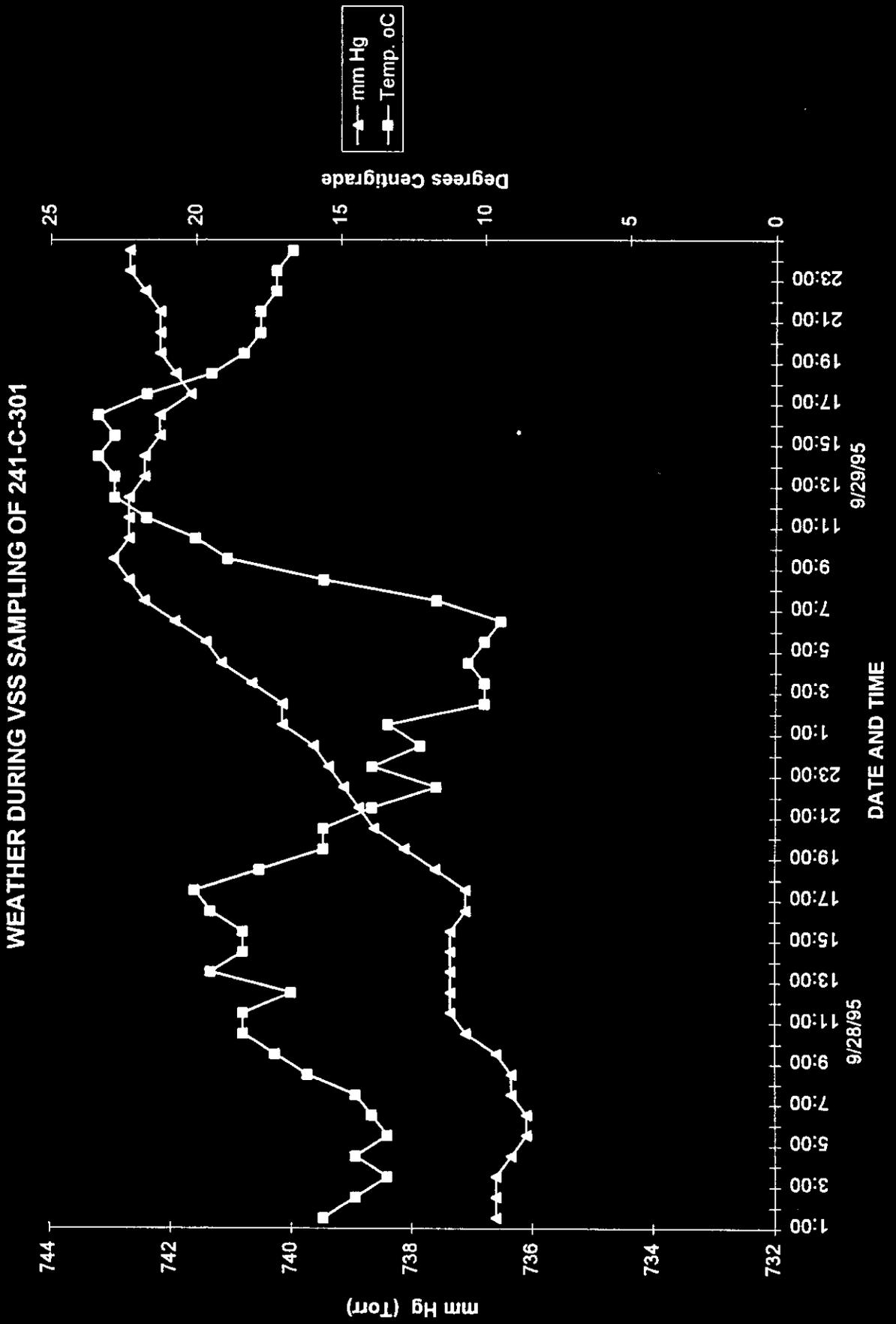
C-301
TOTAL TANK VAPOR USED

	NUMBER OF EVENTS	TIME IN MINUTES	VOLUME IN SCCM	TOTAL VOLUME, LITERS
LEAK CHECKS	1	0	5600	5.60
TANK PURGE PUMP DOWNS	3	1	5600	16.80
TANK PURGE TIME (From Spreadsheet)	1	30	5500	165.00
GC PURGES	4	2	5000	40.00
SUMMA PURGES	3	2	5000	30.00
ALL SAMPLES COLLECTED				48.73
TOTAL FOR TANK SAMPLING RUN				306.13

This page intentionally left blank.

APPENDIX B
AMBIENT CONDITIONS

This page intentionally left blank.



This page intentionally left blank.

APPENDIX C
CHAIN-OF-CUSTODY FORMS

This page intentionally left blank.

COPY

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C.# 9533
Page 1 of 1

Collector R.D. Moberg
 SAF Number 55066
 Project Title Vapor Samplings
 Shipped To (Lab) 222-S LABS
 Protocol NONE

Contact/Requestor R.D. Moberg
 Sample Origin C-301
 Logbook #
 Method of Shipment Hand Carry
 Data Turnaround Next Day

Tel. No. 373-7437
 Purchase Order/Charge Code E61638
 MSIN 53-27
 Ice Chest # N/A
 Temp. N/A
 Bill of Lading/Air Bill No. N/A
 Offsite Property No. N/A

Sample No.	Lab. ID	Date	Time	No/Type Container	Sample Analysis	Preservative
55066-011	T-2323	9/25/82	1400	(1) 5 Liters	TOTAL Activity	
55066-001	T-2324		1400	(1) HSPA	TOTAL ALPHA TOTAL BETA, KFA	
55066-001	T-2325		1400	(1) HSPA		
55066-002	T-2326		1400	(1) HSPA		
55066-002	T-2327		1400	(1) HSPA		
				()		
				()		
				()		
				()		
				()		
				()		
				()		
				()		
				()		

MSDS Yes No

POSSIBLE SAMPLE HAZARDS/REMARKS
 List all known wastes.

SPECIAL INSTRUCTIONS
 Please fax info to Rick Moberg at 373-7076. Thanks.

Relinquished By Rick Moberg	Print Rick Moberg	Sign Rick Moberg	Date/Time 2/15/95/1538	Received By [Signature]	Print [Signature]	Sign [Signature]	Date/Time 9-29-95 1538
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time

Matrix *

S = Soil	DS = Drum Solids
SE = Sediment	DL = Drum Liquids
SO = Solid	T = Tissue
SL = Sludge	WI = Wipe
W = Water	L = Liquid
O = Oil	V = Vegetation
A = Air	X = Other

FINAL SAMPLE DISPOSITION
 Disposal Method e.g. Return to customer, per lab procedure, used in process.
 Disposed By
 Date/Time

**Battelle
Pacific Northwest Lab**

CHAIN OF CUSTODY

WHC 009262

Custody Form Initiator J. A. Edwards - PNL

Telephone (509) 373-0141
Page 85-3009 / FAX 376-0418

Company Contact R. D. Mahon - WHC

Telephone (509) 373-2891
Page 85-3152 / FAX 373-3793

Project Designation/Sampling Locations 200 East Tank Farm
241-C-301 Tank Vapor Sample SAF S5066
(VSS Truck)

Collection date 09 - ___ - 95
Preparation date 09 - 07 - 95

Ice Chest No.

Field Logbook No. WHC-___-___-___

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Government Truck

Shipped to PNL

Possible Sample Hazards/Remarks Unknown at time of sampling

Sample Identification

S5066 - A01 . 045
S5066 - A02 . 047

Ambient Air SUMMA #1 Upwind of C-301
Ambient Air SUMMA #2 Through Port # ___

S5066 - A04 . 068
S5066 - A12 . 109
S5066 - A20 . 140

SUMMA #3 Port # ___
SUMMA #4 Port # ___
SUMMA #5 Port # ___

[] Field Transfer of Custody		[X] Chain of Possession			(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time	
J A Edwards	09-8-95	1410	GS CAPRIO	09-8-95	1410	
GS CAPRIO	9/29/95	0915	PE Richards	9/29/95	0915	
PE Richards	10/2/95	1025	GS CAPRIO	10/02/95	1025	
GS CAPRIO	10/2/95	1130	J A Edwards	10-2-95	1130	

Final Sample Disposition

Comments:

PNL (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?
- ◊ COC copy for LRB, RIDS filed?

Pick-up / Delivery

- (Y) N
- (Y) N
- (Y) N / (Q) IN

Comments:

POC (Signature) POC (Signature)

(Revised 10/17/94 PNL)

Battelle Pacific Northwest Lab **CHAIN OF CUSTODY** **WHC 009261**

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

Company Contact **R. D. Mahon - WHC** Telephone **(509) 373-2891**
 Page **85-3152 / FAX 373-3793**

Project Designation/Sampling Locations **200 East Tank Farm** Collection date **09 - ___ - 95**
241-C-301 Tank Vapor Sample SAF S5065 Preparation date **09 - 07 - 95**
(Glove box)

Ice Chest No. Field Logbook No. **WHC-___-___-___**

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

Method of Shipment **Government Truck**

Shipped to **PNL**

Possible Sample Hazards/Remarks **Unknown at time of sampling**

Sample Identification

S5065 - A01 . 275 SUMMA #1 Glove box #

S5065 - A02 . 276 SUMMA #2 Glove box #

S5065 - A03 . 277 SUMMA #3 Glove box #

<input type="checkbox"/> Field Transfer of Custody		<input checked="" type="checkbox"/> Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
J A Edwards <i>J A Edwards</i>	09-8-95	1405	GS CAPRIO <i>GS Caprio</i>	09-8-95	1405
GS CAPRIO <i>GS Caprio</i>	9/29/95	0715	VE Richards <i>VE Richards</i>	9/29/95	0715
VE Richards <i>VE Richards</i>	10/2/95	1025	GS CAPRIO <i>GS Caprio</i>	10/2/95	1025
GS CAPRIO <i>GS Caprio</i>	10/2/95	1130	J A EDWARDS <i>J A Edwards</i>	10-2-95	1130

Final Sample Disposition

Comments: *These Summa's were not used for collecting samples. JAC 10/2/95*

- 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
 - Rad release stickers on samples? Y N
 - Activity report from 222S? Y N
 - COC copy for LRB, RIDS filed? Y N
- Pick-up / Delivery: POC *[Signature]* POC *[Signature]*

(Revised 10/17/94 PNL)

Battelle Pacific Northwest Laboratory

CHAIN OF CUSTODY

WHC 009264

Custody Form Initiator **J. A. Edwards - PNL**

Telephone (509) 373-0141
Page 85-3009 / FAX 376-0418

Company Contact **R. D. Mahon - WHC**

Telephone (509) 373-2891
Page 85-3152 / FAX 373-3793

Project Designation/Sampling Locations **200 East Tank Farm
241-C-301 Tank Vapor Sample SAF S5066
(VSS Truck)**

Collection date 09 - - 95
Preparation date 09 - 08 - 95

Ice Chest No.

Field Logbook No. WHC- - -

Method of Shipment **Government Truck**

Shipped to **WHC**

Possible Sample Hazards/Remarks **Unknown at time of sampling**

Sample Identification

S5066 - A08 . T06 .	NH ₃ /NO _x /H ₂ O	(INORG Sorbent Trap # 1)
S5066 - A09 . T07 .	NH ₃ /NO _x /H ₂ O	(INORG Sorbent Trap # 2)
S5066 - A10 . T08 .	NO _x /H ₂ O	(INORG Sorbent Trap # 3)
S5066 - A11 . T09 .	NH ₃ /H ₂ O/H ₂ O	(INORG Sorbent Trap # 4)
S5066 - A16 . T10 .	NH ₃ /NO _x /H ₂ O	(INORG Sorbent Trap # 5)
S5066 - A17 . T11 .	NH ₃ /NO _x /H ₂ O	(INORG Sorbent Trap # 6)
S5066 - A18 . T12 .	NO _x /H ₂ O	(INORG Sorbent Trap # 7)
S5066 - A19 . T13 .	NH ₃ /H ₂ O/H ₂ O	(INORG Sorbent Trap # 8)
S5066 - A25 . T14	NH ₃ /NO _x /H ₂ O	(INORG Field Blank # 1)
S5066 - A26 . T15	NH ₃ /NO _x /H ₂ O	(INORG Field Blank # 2)
S5066 - A27 . T16	NH ₃ /NO _x /H ₂ O	(INORG Field Blank # 3)

[] Field Transfer of Custody		[] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
G W Dennis <i>[Signature]</i>	09-08-95	1000	J A Edwards <i>[Signature]</i>	09-08-95	1000
J A Edwards <i>[Signature]</i>	09-08-95	1400	GS CAPRIO <i>[Signature]</i>	09-08-95	1400
GS CAPRIO <i>[Signature]</i>	7/29/95	0915	DE Richards <i>[Signature]</i>	7/29/95	0915
DE Richards <i>[Signature]</i>	10/2/95	1025	GS CAPRIO <i>[Signature]</i>	10/2/95	1025
GS CAPRIO <i>[Signature]</i>	10/2/95	1140	J A EDWARDS <i>[Signature]</i>	10-2-95	1140

Final Sample Disposition

Comments:

- | | | |
|------------------------------------|---------------------------|------------------|
| PNL (only) Checklist | Pick-up / Delivery | Comments: |
| ◊ Media labeled and checked? | (Y) N | |
| ◊ Letter of instruction? | (Y) N | |
| ◊ Media in good condition? | (Y) N | |
| ◊ COC info/signatures complete? | (Y) N | |
| ◊ Sorbents shipped on ice? (<10°C) | (Y) N | |
| ◊ Rad release stickers on samples? | (Y) N | |
| ◊ Activity report from 222S? | (Y) N | |
| ◊ COC copy for LRB, RIDS filed? | (Y) N | |
| ◊ COC copy for sorbent follow-on? | (Y) N | |

POC *[Signature]* POC *[Signature]*

Original COC follows sorbent media

(Revised 05/10/95 PNL)

Battelle Pacific Northwest Laboratory

CHAIN OF CUSTODY

WHC 009263

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 East Tank Farm
241-C-301 Tank Vapor Sample SAF S5066
(VSS Truck)**

Collection date 09 - ___ - 95
Preparation date 09 - 08 - 95

Ice Chest No.

Field Logbook No. WHC-___-___-___

Erco Hi/Lo thermometer No. **PNL-T-003**

Method of Shipment **Government Truck**

Shipped to **WHC**

Possible Sample Hazards/Remarks **Unknown at time of sampling**

Sample Identification

- S5066 - A05 . 676 PNL Triple Sorbent Trap (TST) Sample # 1
- S5066 - A06 . 677 PNL TST Sample # 2
- S5066 - A07 . 678 PNL TST Sample # 3

- S5066 - A13 . 679 PNL TST Sample # 4
- S5066 - A14 . 680 PNL TST Sample # 5
- S5066 - A15 . 681 PNL TST Sample # 6

- S5066 - A21 . 682 Open, close & store PNL TST Field Blank # 1 In VSS truck
- S5066 - A22 . 683 Open, close & store PNL TST Field Blank # 2 In VSS truck

- S5066 - A23 . 684 Store PNL TST Trip Blank # 1 None
- S5066 - A24 . 685 Store PNL TST Trip Blank # 2 None

[] Field Transfer of Custody		[] Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
JL Julia	09-08-95	11:15	J A Edwards	09-08-95	11:15
J A Edwards	09-08-95	1405	GS CAPRIO	09-08-95	1405
GS CAPRIO	9/29/95	0915	GS CAPRIO	9/29/95	0915
GS CAPRIO	10/13/95	1025	GS CAPRIO	10/13/95	1025
GS CAPRIO	10/13/95	1132	J A Edwards	10-2-95	1132

Final Sample Disposition

Comments:

- PNL (only) Checklist**
- Media labeled and checked? / N
 - Letter of instruction? / N
 - Media in good condition? / N
 - COC info/signatures complete? / N
 - Sorbents shipped on ice? (<5°C) / N
 - Hi/Lo thermometer - *Keep upright!* / N
 - Hi/Lo thermometer / N
 - Rad release stickers on samples? / N
 - Activity report from 222S? / N
 - COC copy for LRB, RIDS filed? / N
- POC *[Signature]* POC *[Signature]*

Comments:

Cooler Temperature Status

Hi -8 °C / Lo -12 °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 +10 °C / Lo -9 °C (at delivery from WHC to PNL)

(Revised 06/21/95 PNL)

This page intentionally left blank.