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Accession #: D196054832

Document #: SD-WM-RPT-143

Title/Desc:

VAPOR & GAS SAMPLING OF SST 241S111 USING THE
VAPOR SAMPLING SYSTEM

STA.4
SEP 15 1995

ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT No 612704

2. To: (Receiving Organization) DISTRIBUTION		3. From: (Originating Organization) SAMPLING AND MOBILE LABS OM624		4. Related EDT No.: N/A							
5. Proj./Prog./Dept./Div.: VAPOR/HTS/SAMPLING AND MOBILE LABS		6. Cog. Engr.: RICKY MAHON 3-7437		7. Purchase Order No.: N/A							
8. Originator Remarks: 241-S-111, SAMPLING USING THE VAPOR SAMPLING SYSTEM				9. Equip./Component No.: N/A							
				10. System/Bldg./Facility: M0292/WSCF							
11. Receiver Remarks:				12. Major Asm. Dwg. No.: N/A							
				13. Permit/Permit Application No.: N/A							
				14. Required Response Date: 17 JULY 95							
15. DATA TRANSMITTED											
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Trans- mittal	(H) Orig- inator Dispo- sition	(I) Receiv- er Dispo- sition			
1	WHC-SD-WM-RPT-143 WHC-	ALL	0	VAPOR AND GAS SAMPLING OF SINGLE- SHELL TANK 241-S-111 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) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
2	1	Cog. Eng. R.D. MAHON	<i>R.D. Mahon</i>	20 AUG 95	S3-27	RESOURCE CENTER			R2-12	3	
2	1	Cog. Mgr. J.D. DORIAN	<i>J.D. Dorian</i>	9/5/95	S3-27	Central Files			A3-88	3	
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18.		19.		20.		21. DOE APPROVAL (if required) Ctrl. No.					
GLENN S. CARRIO <i>Glenn S. Carrio</i> Signature of EDT Originator		Date 7/28/95		JOHN J. DORIAN <i>John J. Dorian</i> Cognizant Manager		Date 9/5/95		☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments			

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RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-RPT-143, REV 0

Document Title: Vapor and Gas Sampling of Single-Shell Tank 241-S-111 Using the Vapor Sampling System

Release Date: 9/15/95

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

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

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9/15/95

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SUPPORTING DOCUMENT

1. Total Pages 35 *20* *AMB* *8/15/95*

2. Title

VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-111 USING THE VAPOR SAMPLING SYSTEM

3. Number

WHC-SD-WM-RPT-143

4. Rev No.

0

5. Key Words

241-S-111
VSS
SUMMA
TST
SORBENT
TANK

6. Author

Name: G.S. CAPRIO

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Signature

Organization/Charge Code 0M624/EL61920

7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE MARCH 21, 1995, SAMPLING OF SST 241-S-111 USING THE VAPOR SAMPLING SYSTEM.

8. RELEASE STAMP

OFFICIAL RELEASE
BY WHC
DATE SEP 15 1995

Sta. 4

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APPROVALS

Document title: Vapor and Gas Sampling of Single-Shell Tank 241-S-111
Using the Vapor Sampling System

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LIST OF TERMS

CGI	Combustible Gas Indicator
COC	Chain Of Custody
DOT	U.S. Department of Transportation
GC/FID	Gas Chromatograph/Flame Ionization Detector
GEA	Gamma Energy Analysis
HEPA	High-Efficiency Particulate Air (filter)
NH ₃	Ammonia
NO ₂	Nitrogen Dioxide
NO	Nitric Oxide
H ₂ O	Water Vapor
OPC	Offsite Property Control
OVM	Organic Vapor Meter
ORNL	Oak Ridge National Laboratory
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

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VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-111 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-S-111. This document presents sampling data resulting from the March 21, 1995 sampling of SST 241-S-111. 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-S-111 on March 21, 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-S-111. The team then sent these samples to the analytical laboratories for analysis.

The VSS comprises a mobile laboratory, a hot-water-jacketed stainless steel probe that is inserted into the tank headspace, and stainless steel transfer tubing that connects the mobile laboratory to the probe. 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

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

contain vapor-adsorbing media. 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.

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 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-S-111 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	Flow (stdcm ³ /min)	Error (%)
1	200	±0.7
3	200	±0.05

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-Chemstation 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 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 standard capacity of each SUMMA™ canister is 6 liters.

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 μ m 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.

3.0 SAMPLING EVENT DESCRIPTION

3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in WHC-SD-WM-TP-317, *Tank 241-S-111 Tank Characterization Plan* (Homi 1995). The Tank Characterization Plan (TCP) 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 S5-016.

3.2 OPERATIONS AND SAMPLING PERSONNEL

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

- R. D. Mahon, Vapor Sampling Project Lead
- E. A. Johnson, Field Scientist
- R. A. Westberg, Field Scientist
- R. L. Ragan, Field Scientist
- T. B. Utecht, VSS Technician
- N. P. Beuchler, VSS Technician.

The VSS was set up at SST 241-S-111 on March 20, 1995 and was allowed to warm up overnight. Sampling began shortly after 10:00 a.m. on March 21, 1995, and was completed by 3:30 p.m. the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Prior to hooking up to SST 241-S-111, an industrial hygiene technician field tested tank vapors. The technician purged the vapor probe sample tube 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 0.0%, oxygen content of 20.5%, and the TOC content of 2.4 ppm. The technician also sampled tank vapors for CO. It was believed that H₂ was affecting the CO reading of 110 ppm.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, March 21, 1995 was cool and cloudy with gusty winds. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2.5 miles west of S Farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser 14 of SST 241-S-111. The probe length, from the sample inlet to the top of the riser flange, was 6.7 meters.

All zones of the VSS were heated to 60 °C during setup of the VSS at SST 241-S-111 on March 20, 1995. The team stabilized the VSS temperature zones by 9:30 a.m. on March 21, 1995, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-S-111 were 975 mbar (731.2 Torr) and 23 °C, respectively. The sample log sheets (Appendix A) provide a complete chronology of the sample event including start and end times, flow rates, volumes, and specific sample identifiers.

Approximately 23 hours before the first samples were collected, the team began heating the VSS transfer tubing and sampling manifold. During this warmup period, the team began a purge of all vapor transfer tubing and the sampling manifold with ambient air. Prior to sampling tank vapors on March 21, 1995, the team collected two SUMMA™ canister samples of ambient air, one manually 10 meters upwind of the VSS connection with SST 241-S-111, 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 (up to the connection to the sampling probe) was performed prior to opening the tank probe vapor sampling valve. The system was evacuated to 285 mbar (213.5 torr) and leakage of ambient air into the system was observed by monitoring system pressure for 15 minutes. Leakage resulted in an increase of 18 mbar (13.6 torr/hr) in system pressure during the 15 minute test. Given a system volume of not more than 10 L, this pressure increase corresponds to a leak rate of approximately 13.73 mL/min at a 285 mbar (213.5 torr). This leak rate was then estimated for average SUMMA™, TST, and sorbent sampling pressures. It was found that for the SUMMA™ canisters, dilution by ambient air was approximately 0.1%, for TST traps sampled at 50 mL/min the dilution was approximately 0.4%, for TST traps sampled at 200 mL/min the dilution was approximately 0.5%, and for sorbent traps the dilution was approximately 0.4%.

The tank probe vapor sampling valve was opened and the VSS was purged with sample vapor from SST 241-S-111 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.

Two analytical laboratories provided sample media. Oak Ridge National Laboratory (ORNL) provided triple sorbent traps (TSTs) for organic vapors and Pacific Northwest Laboratory (PNL) provided SUMMA™ canisters and sorbent traps for ammonia (NH₃), nitrogen dioxide (NO₂), nitric oxide (NO), 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 $\pm 2\%$ NIST traceable. Table 2 displays the Field GC/FID results from the sampling of 241-S-111.

Table 2. TOC Results.

Number of Runs	Description	Average TOC Concentration (ppmC)	% Standard Deviation
3	Propane	6.00	1.66
5	Ambient	2.83	0.51
2	Tank Vapor	7.57	1.12

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 pCi/g of beta-gamma activity and of alpha activity. Samples exceeding these DOT limits may be shipped as radioactive material if the samples do not exceed the following laboratory acceptance criteria:

- ORNL: Beta-gamma activity <450 pCi/g of sample media. Alpha activity <135 pCi/g.
- 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 March 21, 1995, SST 241-S-111 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-S-111 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-S-111 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)	S5016-A32.0U1	Total Alpha = 174 Total Beta = 274 GEA = 34.3 (²⁰⁸ Tl)	=0.52 =0.82 =0.10
Downstream HEPA filter (box)	S5016-A33.0D1	Total Alpha = <1.16 Total Beta = 1.97 GEA = <detectable	=<0.003 =0.006 =<detectable
Upstream HEPA filter (VSS)	S5016-A34.0U2	Total Alpha = <0.826 Total Beta = 1.93 GEA = <detectable	=<0.002 =0.006 =<detectable
Downstream HEPA filter (VSS)	S5016-A35.0D2	Total Alpha = <0.577 Total Beta = <5.32 GEA = <detectable	=<0.002 =<0.02 =<detectable
Tritium trap	S5016-A03.0T1	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 334 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 by SML 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.

TSTs are supplied by ORNL and ORNL initiates the chain-of-custody (COC) forms. The sample media is placed in 40-mL volatile organic analysis vials. Evidence tape is applied to the vials, which are then placed in a shipping container along with the relinquished COC forms and shipped to SML. TSTs are shipped to SML in a cooler containing "blue" ice.

The TSTs were received, inventoried against the COC forms, and the "received by" block on the COC form was signed by SML. They were maintained at 4 ± 2 °C before and after the sampling event in the storage area refrigeration unit.

The TSTs were shipped back to ORNL after the sampling event using offsite property control (OPC W95-0-0304-21). Table 4 lists the sample identifiers, sample types, and COC form numbers for all ORNL samples. The samples were delivered to shipping on March 29, 1995 with instructions to ship via Federal Express, next-day delivery.

Table 4. Oak Ridge National Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5016-A7.502	TST	006759
S5016-A8.503	TST	006759
S5016-A9.504	TST	006759
S5016-A10.540	TST field blank	006759
S5016-A11.505	TST	006759
S5016-A12.507	TST	006759
S5016-A13.509	TST	006759
S5016-A14.510	TST	006759
S5016-A15.542	TST	006759
S5016-A16.512	TST	006759
S5016-A17.541	TST field blank	006759
S5016-A18.536	TST	006759
S5016-A19.537	TST	006759
S5016-A20.538	TST	006759
S5016-A21.501	TST trip blank	006759
S5016-A22.539	TST trip blank	006759

PNL supplied sorbent chain traps and SUMMA™ canisters, including COC forms. These Sampling devices were picked up from PNL by SML and transported in a government vehicle to a custody locked storage area. The sorbent trains were maintained at 4 ± 2 °C before and after the sampling event in storage area refrigeration unit.

After sampling, the PNL sorbent traps and SUMMA™ canisters were transported by government vehicle directly to PNL and delivered to J. A. Edwards on March 29, 1995. Table 5 lists the sample identifiers, sample types, and COC form numbers for all PNL samples.

Table 5. Pacific Northwest Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5016-A01.127	Ambient upwind SUMMA™	008110
S5016-A02.128	Ambient SUMMA™ (VSS)	008110
S5016-A04.129	SUMMA™	008110
S5016-A05.133	SUMMA™	008110
S5016-A06.134	SUMMA™	008110
S5016-A29.27U	NH ₃ /NO _x /NO/H ₂ O sorbent	008111
S5016-A30.28U	NH ₃ /NO _x /NO/H ₂ O sorbent	008111
S5016-A31.29U	NH ₃ /NO _x /NO/H ₂ O sorbent	008111
S5016-A32.30U	NH ₃ /NO _x /NO/H ₂ O sorbent	008111
S5016-A33.31U	NH ₃ /NO _x /NO/H ₂ O sorbent	008111
S5016-A34.32U	NH ₃ /NO _x /NO/H ₂ O sorbent	008111
S5016-A35.33U	NH ₃ /NO _x /NO/H ₂ O trip blank	008111
S5016-A36.34U	NH ₃ /NO _x /NO/H ₂ O trip blank	008111
S5016-A37.35U	NH ₃ /NO _x /NO/H ₂ O trip blank	008111

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 Report 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-S-111, the VSS manifold and vapor sample transfer tubing was heated to 60 °C and ambient air was purged through the system for 22 hours. 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 contaminants were 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 C of WHC-IP-1127-4.5, (WHC 1995b) and the project-specific file located with SML.

In compliance with the *Vapor Space Probe Cleaning Procedure* (WHC 1993c) the team cleaned the hot-water-jacketed probe before it was installed in SST 241-S-111. This procedure requires a solvent rinse of all internal probe surfaces with acetone and methanol to clear the sample line of possible contamination remaining from the construction process. The probes are then heated to 90 °C, and dry air is passed through the probe to evaporate the solvents. Before the probes are released, the team ensures via a hand-held organic vapor meter that the total organic concentration in the sample line is below 1 ppmv.

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 6. According to the calibration schedule shown in Table 6, all instrumentation was within its calibration period during the SST 241-S-111 sampling event.

Table 6. Calibration Data.

System	Calibration Date	Expiration Date	WHC Standards Laboratory Code
Temperature Control System	04/21/94	04/21/95	804-67-74-009
Mass Flow System	12/08/94	12/08/95	804-28-03-001
Pressure System	12/07/94	12/07/95	804-67-89-001

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, including mounting on the sampling port for one minute, but no tank vapors are drawn through the field blanks.

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.

Tables 4 and 5 also list sample blanks used during the sampling of SST 241-S-111.

6.0 ANOMALIES

All samples were collected in accordance with the TCP and WHC-IP-1127-4.5, *Collection of SUMMA Canisters and Sorbent Tube Samples Using the Vapor Sampling System* (WHC 1995b). During the setup of the VSS a lock and tag violation occurred. While connecting the sampling line a crescent wrench was used to operate a valve on the probe that had been removed. After the violation was recognized by SML, they reported it to the PIC. Further details are available in the project-specific file maintained by SML.

7.0 REFERENCES

- 49 CFR 100-177, 1992, "Transportation," *Code of Federal Regulations*, as amended.
- Homi, C. S., *Tank 241-S-111 Tank Characterization Plan*, WHC-SD-WM-TP-317, 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, 1993b, *Collection of SUMMA Canisters and Sorbent Tube Samples Using the Vapor Sampling System (VSS)*, Procedure WHC-IP-1127-4.5, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993c, *Release of Vapor Sampling Equipment*, Procedure 1995-33300-RSP-03, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993, *Vapor Space Probe Cleaning Procedure*, Procedure LO-080-405/A0, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A
SAMPLE LOG SHEETS

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Waste Tank
241-S-111

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 23°C

GC Standard Runs

GC Ambient Air runs through port 10

PNL

OGI/ORNL Port Description

Sample ID Valve #

WHC Sample ID

Purge with ambient air for 30 min.

S5016- A01. 127 127 AMBIENT #1 (PNL)

GC Run #1 Ambient air/Cleanliness check

S5016- A02. 128 128 15 AMBIENT #2 (PNL)

GC Run #2 Ambient air

Leak check (Appendix A) Leak Rate: 13.6 Torr/Hr.

Purge with tank air for 30 min.

Measure tank pressure PE-1, 731.2

S5016- A03. OT1 T1856(222S) 8 Tritium Trap

GC Run # 3 (Tank run #1)

S5016- A04. 129 129 11 SUMMA #3

S5016- A05. 133 133 13 SUMMA #4

S5016- A06. 134 134 15 SUMMA # 5

GC Run # 4 (Tank run # 2)

Date: March 21, 1995

VSS Personnel:

R. Westberg R. Ragan

R. Mahon T. Utecht

Trailer Personnel:

N. Buechler

Desired Flow Rate	Desired Duration (min.)	Desired Total Flow	Actual Flow Rate	Actual Start Time	Actual End Time	Actual Total Time (min.)	Actual Total Flow
5450	30	163500	SCGM 5460	3/20/95 11:15	3/21/95 09:15	1,320	7,207

1	09:45	09:46	1.0				
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1	09:50						
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1	09:55	09:56	1.0				
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	09:59						
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5450	30	163500	5460	10:34	11:04	30.0	163.80
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200	5	1000	210.50	11:12	11:17	5.0	1.05
				11:21			

1	11:28	11:29	1.0	6.00			
1	11:33	11:34	1.0	6.00			
1	11:38	11:39	1.0	6.00			
	11:41						

Waste Tank
241-S-111

WHC Sample ID	PNL OGI/ORNL Sample ID	Port Valve #	Description	Desired Flow Rate	Desired Duration (min.)	Desired Total Flow	Actual Flow Rate	Actual Start Time	Actual End Time	Actual Total Time	Actual Total Flow
S5016- A07. 502	TST#502	9	TST #1	50	4	200	50.13	11:55	11:59	4.0	0.20
S5016- A08. 503	TST#503	10	TST #2	50	4	200	50.13	11:55	11:59	4.0	0.20
S5016- A09. 504	TST#504	8	TST #3	50	4	200	50.15	12:10	12:14	4.0	0.20
S5016- A11. 505	TST#505	10	TST #4	50	4	200	50.15	12:10	12:14	4.0	0.20
S5016- A10. 540	TST#540		TST FIELD BLANK #1					12:16	12:17	1.0	
S5016- A12. 507	TST#507	9	TST # 5	200	5	1000	200.00	12:28	12:33	5.0	1.00
S5016- A13. 509	TST#509	10	TST # 6	200	5	1000	199.00	12:28	12:33	5.0	1.00
S5016- A14. 510	TST#510	8	TST # 7	200	5	1000	200.40	12:44	12:49	5.0	1.00
S5016- A15. 542	TST#542	10	TST # 8	200	5	1000	200.40	12:44	12:49	5.0	1.00
S5016- A16. 512	TST#512	9	TST # 9	200	20	4000	200.40	12:58	13:18	20.0	4.01
S5016- A18. 536	TST#536	10	TST # 10	200	20	4000	200.40	12:58	13:18	20.0	4.01
S5016- A17. 541	TST#541		TST FIELD BLANK #2					12:59	13:00	1.0	
S5016- 0 537	TST#537	8	TST # 11	200	20	4000	200.40	13:29	13:49	20.0	4.01
S5016- A20. 538	TST#538	10	TST # 12	200	20	4000	200.40	13:29	13:49	20.0	4.01
GC Run # 4 (Tank run #34)								13:59			
S5016- A23. 27U	27U	9	NH3/NOx/H2O #1	200	15	3000	200.40	14:19	14:34	15.0	3.01
S5016- A24. 28U	28U	10	NH3/NOx/H2O #2	200	15	3000	200.40	14:19	14:34	15.0	3.01
S5016- A25. 29U	29U	8	NH3/NOx/H2O #3	200	15	3000	200.40	14:41	14:56	15.0	3.01
S5016- A26. 30U	30U	10	NH3/NOx/H2O #4	200	15	3000	200.40	14:41	14:56	15.0	3.01
S5016- A27. 31U	31U	9	NH3/NOx/H2O #5	200	15	3000	200.40	15:02	15:17	15.0	3.01
S5016- A29. 32U	32U	10	NH3/NOx/H2O #6	200	15	3000	200.40	15:02	15:17	15.0	3.01
GC Run # 6 (Tank run # 4)								13:26			
TOTAL TANK GAS USED DURING SAMPLING RUNS											57.92

WHC Sample ID	PNL OGI/ORNL Sample ID	Port Valve #	Description	Desired		Actual		Actual		Actual	
				Flow	Rate	Total	Flow	Start	End	Total	Time
						Duration (min.)		Time	Time	Time	Flow
S5016- A32. 0U1	T1857(222S)		Upstream HEPA(box)								
S5016- A33. 0D1	T1858(222S)		Downstream HEPA(box)								
S5016- A34. 0U2	T1859(222S)		Upstream HEPA (VSS)								
S5016- A35. 0D2	T1860(222S)		Downstream HEPA (VSS)								

Trip Blanks (DO NOT EXPOSE)

S5016- A21. 501	TST#501		TST TRIP #1								
S5016- A22. 539	TST#539		TST TRIP #1								
S5016- A29. 33U	33U		NH3/NOx/H2O TRIP #1								
S5016- A30. 34U	34U		NH3/NOx/H2O TRIP #2								
S5016- A31. 35U	35U		NH3/NOx/H2O TRIP #3								

S-111

[illegible]

VSS SAMPLING RADIOLOGICAL SCREENING RESULTS

HEPA BOX UPSTREAM FILTER		HEPA BOX DOWNSTREAM FILTER		TOTAL VOLUME PER CANISTER		TOTAL VOLUME PER CANISTER	
Liters	pci / liter	Liters	pci / liter	Liters	pci	Liters	pci
BETA	274.00	BETA	0.82	334.12		6	< Detectable
ALPHA	174.00	ALPHA	0.52				
GEA - Am-243	ND	< Detectable					
BI-212	ND	< Detectable					
NP-237	ND	< Detectable					
Pb-212	ND	< Detectable					
Th-229	ND	< Detectable					
TL-208	34.30	0.10					
CD-109	ND	< Detectable					
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
BETA	1.97	BETA	< Detectable				
ALPHA	< 1.16	ALPHA	< Detectable				
GEA - Am-243	ND	< Detectable					
BI-212	ND	< Detectable					
NP-237	ND	< Detectable					
Pb-212	ND	< Detectable					
Th-229	ND	< Detectable					
TL-208	ND	< Detectable					
CD-109	< Detectable		< Detectable				
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
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334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334.12	pci / liter	334.12	pci / liter	334.12	pci / liter
TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME		TOTAL VOLUME	
334.12	pci / liter	334					

A-7

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APPENDIX B
AMBIENT CONDITIONS

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WEATHER DURING VSS SAMPLING OF 241-S-111

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APPENDIX C
CHAIN-OF-CUSTODY FORMS

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Westinghouse Hanford Company	CHAIN OF CUSTODY	ORNL-006759
Custody Form Initiator Amy Dindal		
Company Contact Roger Jenkins		Telephone (615) 576-8594
Project Designation/Sampling Locations 241-S-111 (VSS)		Collection Date 3-21-95
Ice Chest No. 201 SML-485		Field Logbook No. WHC-N-447-10
Bill of Lading/Airbill No.		Offsite Property No.
Method of Shipment Federal Express		
Shipped to Rick Mahon		
Possible Sample Hazards/Remarks NONE		

Sample Identification		
S5016-A7.502	TST# 502	ORNL Triple Sorbent Trap ✓
S5016-A8.503	TST# 503	ORNL Triple Sorbent Trap ✓
S5016-A9.504	TST# 504	ORNL Triple Sorbent Trap ✓
S5016-A11.505	TST# 505	ORNL Triple Sorbent Trap ✓
S5016-A12.507	TST# 507	ORNL Triple Sorbent Trap ✓
S5016-A13.509	TST# 509	ORNL Triple Sorbent Trap ✓
S5016-A14.510	TST# 510	ORNL Triple Sorbent Trap ✓
S5016-A15.542	TST# 542	ORNL Triple Sorbent Trap ✓
S5016-A16.512	TST# 512	ORNL Triple Sorbent Trap ✓
S5016-A18.536	TST# 536	ORNL Triple Sorbent Trap ✓
S5016-A19.537	TST# 537	ORNL Triple Sorbent Trap ✓
S5016-A20.538	TST# 538	ORNL Triple Sorbent Trap ✓
S5016-A21.501	TST# 501	ORNL Trip Blank ✓
S5016-A22.539	TST# 539	ORNL Trip Blank ✓
S5016-A10.540	TST# 540	ORNL Field Blank ✓
S5016-A17.541	TST# 541	ORNL Field Blank ✓

[] Field Transfer of Custody		Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
AB Dindal	3/9/95	10 56 AM	JP Brumley / JP Brumley	3-10-95	1445
JP Brumley / JP Brumley	3/13/95	0800	TB LUTCH / T. R. LUTCH	3-13-95	0800
TB LUTCH / T. R. LUTCH	3-29-95	0900	AB Dindal / AB Dindal	3-30-95	1601

Inspected cooler
& trays OK
ASD
3/30/95

Temperature (°C)	Min	Max
When shipped (ORNL)	-4°	-2°
When received (WHC)	-3°C	7°C
When shipped (WHC)	-4°C	5°C
When received (ORNL)	-1°	9°

Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 008110

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 West Tank Farm
241-S-111 Tank Vapor Sample SAF S5-016
(VSS Truck)

Collection date 03 - 21 - 95

Preparation date 03 - 08 - 95

Ice Chest No.

Field Logbook No. WHC-N-647-10

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

S5-016 - A01 . 127

Ambient Air SUMMA #1 Upwind of S-111

S5-016 - A02 . 128

Ambient Air SUMMA #2 Through Port 15

S5-016 - A04 . 129

SUMMA #3 Port 11

S5-016 - A05 . 133

SUMMA #4 Port 13

S5-016 - A06 . 134

SUMMA #5 Port 15

Field Transfer of Custody			Chain of Possession (Sign and Print Names)		
Relinquished By	Date	Time	Received By	Date	Time
J A Edwards <i>J A Edwards</i>	03-10-95	0940	Neil Buechler <i>N Buechler</i>	03-10-95	2-10-95
<i>N Buechler</i>	3-29-95	1345	<i>J A Edwards</i>	3-29-95	1345

Final Sample Disposition

Comments:

PNL (only) Checklist	Pick-up / Delivery	Comments:
Media labeled and checked?	☒ / N	
Letter of instruction?	☒ / N	
Media in good condition?	☒ / ☒ / N	
COC info/signatures complete?	☒ / ☒ / N	
Rad release stickers on samples?	☒ / ☒ / N	
Activity report from 222S?	☒ / ☒ / N	
COC copy for LRB, RIDS filed?	☒ / ☒ / N	
COC copy for sorbent follow-on?	☒ / ☒ / N/A	
POC <i>(Signature)</i>	POC <i>(Signature)</i>	

(Revised 10/17/94 PNL)

Westinghouse
Hanford Company

CHAIN OF CUSTODY

WHC 008111

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 West Tank Farm
241-S-111 Tank Vapor Sample SAF S5-016
(VSS Truck)Collection date 03 - 21 - 95

Preparation date 03 - 08 - 95

Ice Chest No.

Field Logbook No. WHC- N - 647-10

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

S5-016 - A29 . 27U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 1)	Line # 9
S5-016 - A30 . 28U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 2)	Line # 10
S5-016 - A31 . 29U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 3)	Line # 8
S5-016 - A32 . 30U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 4)	Line # 10
S5-016 - A33 . 31U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 5)	Line # 9
S5-016 - A34 . 32U	NH ₃ /NO _x /H ₂ O (Sorbent Trap # 6)	Line # 10
S5-016 - A35 . 33U	NH ₃ /NO _x /H ₂ O (Trap Trip Blank # 1)	
S5-016 - A36 . 34U	NH ₃ /NO _x /H ₂ O (Trap Trip Blank # 2)	
S5-016 - A37 . 35U	NH ₃ /NO _x /H ₂ O (Trap Trip 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>GW Dennis</i>	03-10-95	1315	J A Edwards <i>JA Edwards</i>	03-10-95	1315		
J A Edwards <i>JA Edwards</i>	03-10-95	0940	Neil Buechler <i>Neil Buechler</i>	03-10-95	0940		
<i>Neil Buechler</i>	3-29-95	1345	<i>JA Edwards</i>	3-29-95	1345		
<i>Neil Buechler</i>							

Final Sample Disposition

Comments:

	Pick-up / Delivery	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?	☒ 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

POC

(Revised 10/17/94 PNL)

COC # 009095

Westinghouse Hanford Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST										Page <u>1</u> of <u>1</u>																																																																							
Collector <u>T.B. UTECHT</u>		Company Contact <u>R.D. Mahon</u>				Telephone No. <u>373-2891</u>				Data Turnaround ☐ Priority ☒ Normal																																																																									
Project Designation <u>NA</u>		Sampling Location <u>241 S III</u>				SAF No. <u>55016</u>																																																																													
Ice Chest No. <u>NA</u>		Field Logbook No. <u>WHC-N-467-4</u>				Method of Shipment <u>Govt Vehicle</u>				<u>929</u>																																																																									
Shipped To <u>222 S Labs</u>		Offsite Property No. <u>NA</u>				Bill of Lading/Air Bill No. <u>NA</u>																																																																													
Possible Sample Hazards/Remarks <u>None</u>		Preservative <u>NA</u>		Type of Container <u>Silica Gel / HEPA Filters</u>		No. of Container(s) <u>5</u>		Volume <u>47 mL</u>		<div style="border: 2px solid black; padding: 5px; display: inline-block; font-weight: bold;">COPY</div>																																																																									
Special Handling and/or Storage <u>NA</u>																																																																																			
SAMPLE ANALYSIS																																																																																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sample No.</th> <th>Matrix*</th> <th>Date Sampled</th> <th>Time Sampled</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>S 5016-0T1</td> <td>Silica Gel</td> <td>3-21-95</td> <td>T- 1856</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>S 5016-0U1</td> <td>HEPA</td> <td>3-21-95</td> <td>T- 1857</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>S 5016-0D1</td> <td>HEPA</td> <td>3-21-95</td> <td>T- 1858</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>S 5016-0U2</td> <td>HEPA</td> <td>3-21-95</td> <td>T- 1859</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>S 5016-0D2</td> <td>HEPA</td> <td>3-21-95</td> <td>T- 1860</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </tbody> </table>												Sample No.	Matrix*	Date Sampled	Time Sampled									S 5016-0T1	Silica Gel	3-21-95	T- 1856									S 5016-0U1	HEPA	3-21-95	T- 1857									S 5016-0D1	HEPA	3-21-95	T- 1858									S 5016-0U2	HEPA	3-21-95	T- 1859									S 5016-0D2	HEPA	3-21-95	T- 1860								
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CHAIN OF POSSESSION		Sign/Print Names				SPECIAL INSTRUCTIONS				Matrix*																																																																									
Relinquished By <u>JP Brubaker</u>		Date/Time <u>3-22-95 1430</u>		Received By <u>EP Dukes</u>		Date/Time <u>3-22-95 1430</u>						S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other																																																																							
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LABORATORY SECTION		Received By				Title				Date/Time																																																																									
FINAL SAMPLE DISPOSITION		Disposal Method				Disposed By				Date/Time																																																																									