VAPOR & GAS SAMPLING OF SST 241S102 USING THE VAPOR SAMPLING SYSTEM
2. To: (Receiving Organization)  
DISTRIBUTION  

3. From: (Originating Organization)  
SAMPLING AND MOBILE LABS  
OMG24  

4. Related EDT No.:  
N/A  

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VAPOR/HTS/SAMPLING AND MOBILE LABS  

6.Cog. Engr.:  
RICKY MAHON 3-7437  

7. Purchase Order No.:  
N/A  

8. Originator Remarks:  
241-S-102, SAMPLING USING THE VAPOR SAMPLING SYSTEM  

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10. System/Bldg./Facility:  
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12. Major Assm. Dwg. No.:  
N/A  

13. Permit/Permit Application No.:  
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14. Required Response Date:  
17 JULY 95  

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<th>(C) Sheet No.</th>
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Reason for Transmittal (G)  
Disposition (H) & (I)  

E.S.O.D. or N/A  
(see WHC-CM-3-5, Sec.12.7)  

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18. Signature of EDT Originator  
GLEN K. CAMPBELL 8/27/95  

19. Authorized Representative Date for Receiving Organization  
20. JOHN J. DORIAN  
21. DOE APPROVAL (if required)  
Ctrl. No.  
☑ Approved  
☑ Approved w/comments  
☑ Disapproved w/comments
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**APPROVED FOR PUBLIC RELEASE**

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### Title
VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-102 USING THE VAPOR SAMPLING SYSTEM

### Key Words
- 241-S-102
- VSS
- SUMMA
- TST
- SORBENT
- TANK

### Abstract
THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE MARCH 14, 1995, SAMPLING OF SST 241-S-102 USING THE VAPOR SAMPLING SYSTEM.
APPROVALS

Document title: Vapor and Gas Sampling of Single-Shell Tank 241-S-102 Using the Vapor Sampling System

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Vapor Sampling Project
Sampling and Mobile Laboratories

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Vapor Sampling Project
Sampling and Mobile Laboratories

Approved by: 
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Vapor Sampling Project
Sampling and Mobile Laboratories

Approved by: 
R. S. Viswanath, Principal Scientist
Vapor Sampling Project
Special Analytical Studies
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 ...................... 3
   3.3 INDUSTRIAL HYGIENE FIELD RESULTS ....................... 3
   3.4 AMBIENT CONDITIONS ...................................... 4
   3.5 SAMPLE COLLECTION ........................................ 4
   3.6 FIELD GC/FID RESULTS .................................... 5
   3.7 RADIATION SCREENING ...................................... 5

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 .................................................... 10

7.0 REFERENCES .................................................. 11

APPENDICES
   A SAMPLE LOG SHEETS .......................................... A-1
   B AMBIENT CONDITIONS ........................................ B-1
   C CHAIN-OF-CUSTODY FORMS .................................... C-1
<table>
<thead>
<tr>
<th></th>
<th>TABLE Description</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Flow Control Calibration</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
<td>Radionuclide Analysis Results</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Oak Ridge National Laboratory Samples</td>
<td>7</td>
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<td>6</td>
<td>Calibration Data</td>
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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)

NH₃
Ammonia

NO₂
Nitrogen Dioxide

NO
Nitric Oxide

H₂O
Water Vapor

OPC
Offsite Property Control

ORNL
Oak Ridge National Laboratory

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
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VAPOUR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-S-102
USING THE VAPOUR 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-102. This document presents sampling data resulting from the March 14, 1995, sampling of SST 241-S-102.

2.0 SAMPLING EQUIPMENT DESCRIPTION

2.1 VAPOUR 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-102 on March 14, 1995. Mahon et al. (1994) describes in detail the VSS, its performance, and its operation. The team used the VSS to collect sorbent traps and SUMMA\(^1\) canister headspace samples from SST 241-S-102; subsequently, the team sent these samples to 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 mass flow, and monitors sample vapor 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 through the tube, which traps (by adsorption) virtually all the target analytes. The sorbent trap is then sent to an analytical laboratory and

\(^1\)SUMMA is a registered trademark of Molexics, Inc., Cleveland, Ohio.
analyzed. 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 water vapor from the vapor before the vapor is metered. Errors associated with the mass flow controllers were determined by the Westinghouse Hanford Company (WHC) Standards Laboratory before the SST 241-S-102 sampling (see Table 1). Flow rates and the duration of flow are specified by the analytical laboratories that supply and analyze the sorbent traps.

<table>
<thead>
<tr>
<th>Flow-indicating control valve</th>
<th>Flow (stdcm³/min)</th>
<th>Error (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>200</td>
<td>±0.7</td>
</tr>
<tr>
<td>3</td>
<td>200</td>
<td>±0.05</td>
</tr>
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</table>

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), 1 mL sample loop, 10 port injection valve, 2 meter chromatographic column, programmable oven, portable computer, and HP-Chemstation software to control the GC. The GC is plumbed to directly transfer sample from the VSS manifold to the 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 total organic carbon (TOC). All the 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 a 0.25 um phenyl methyl silicone phase. The GC oven is programmed to heat from 50°C to 270°C at a rate 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, sampling manifold performance, TOC of ambient air background levels during sampling, and TOC of tank vapor samples. The system is multi-point calibrated and 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 valve, which is then closed to seal the sample inside. SUMMA® canisters essentially 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.

Prior to sampling, a GC/FID confirms that the VSS is free of hydrocarbon contamination to the limit of detection. The GC/FID is part of the VSS and can be used during a sampling event to periodically monitor organic vapor concentrations in the vapor being sampled.

3.0 SAMPLING EVENT DESCRIPTION

3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in WHC-SD-TP-238, 241-S-102 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 S5-015.

3.2 OPERATIONS AND SAMPLING PERSONNEL

E. A. Tamos was the Tank Farm Operations person-in-charge. The other SML vapor team members included:

   E. A. Johnson, Field Scientist
   R. L. Ragan, Field Scientist
   T. B. Utech, VSS Technician.

The VSS was set up at SST 241-S-102 on March 13, 1995 and was allowed to warm up overnight. Sampling began shortly after 10:00 a.m. on March 14, 1995, and was completed by 3:30 p.m. the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Before hooking up to SST-241-S-102, an industrial hygiene technician field tests 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 technician verbally reported an LEL of 3% and a oxygen content of 20.5% using the CGI, and a TOC content of 28.5 ppm using the OVM. The technician also sampled tank vapors for NH₃, 350 ppm, and CO 212 ppm.
3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, March 14, 1995, was cool and cloudy with light rain. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2.5 miles due east of 241-S SST farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

The hot-water-jacketed sampling probe was located in Riser 1 of SST 241-S-102. 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-S-102 on March 13, 1995. The team stabilized the VSS temperature zones by 9:30 a.m. on March 14, 1995, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure and temperature of SST 241-S-102 were 988 mbar (741.2 torr) and 24.3 °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 1 hour after heating began, the team purged the sampling manifold with ambient air for 1,095 minutes. The team collected two SUMMA™ canister samples of ambient air, one manually 10 meters upwind of the VSS connection with SST 241-S-102, and one 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 in-tank sampling probe) was performed. Leakage resulted in an increase of 1.4 mbar (1.05 torr) rise in pressure over the 15 minute test. Given a system volume of not more than 10 L, this pressure rise corresponds to a leak rate of less than 12.5 mL/min at a 284 mbar (213.3 torr) system pressure. This leak rate was 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 VSS was purged with sample vapor from SST 241-S-102 for 30 minutes at a total flow rate of 5.45 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 (ISTs) for organic vapors; and Pacific Northwest Laboratory (PNL) provided SUMMA™ canisters and sorbent traps for organic vapors 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 +/- 2% NIST traceable.

Table 2 displays the Field GC/FID results from the sampling of 241-S-102.

<table>
<thead>
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<th>Number of Runs</th>
<th>Description</th>
<th>Average TOC Concentration (ppmC)</th>
<th>% Standard Deviation</th>
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<td>4</td>
<td>Propane</td>
<td>6.00</td>
<td>1.61</td>
</tr>
<tr>
<td>4</td>
<td>Ambient</td>
<td>2.88</td>
<td>2.14</td>
</tr>
<tr>
<td>4</td>
<td>Tank Vapor</td>
<td>28.96</td>
<td>0.31</td>
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</table>

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 2000 pCi/g of beta-gamma activity and 60 pCi/g 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 all sampling devices from radioactive particulates, all sample vapor for the March 14, 1995, SST 241-S-102 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 headspace vapor, gases, and 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. SST 241-S-102 filter sample results are shown in Table 3. SML scientists use the activity results from the following table to calculate pCi/g of sample media. SML maintains this information in the project specific file.

A water vapor sample was also collected through one of the sorbent station ports and analyzed for tritiated water. SST 241-S-102 tritium sample results are shown in Table 3. The results in Table 3 indicate that the samples collected from SST 241-S-102 met the laboratory acceptance criteria and the DOT definition of a nonradioactive shipment.

<table>
<thead>
<tr>
<th>Filter</th>
<th>Sample Identifier</th>
<th>Activity Results¹ (pCi/sample)</th>
<th>Activity² (pCi/L of tank gas)</th>
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<td>Upstream HEPA filter (VSS)</td>
<td>S5015-A32.OU1</td>
<td>Total Alpha = 16.6</td>
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<tr>
<td>Downstream HEPA filter (box)</td>
<td>S5015-A33.OD1</td>
<td>Total Alpha = 0.514</td>
<td>= 0.002</td>
</tr>
<tr>
<td>Upstream HEPA filter (VSS)</td>
<td>S5015-A34.OU2</td>
<td>Total Alpha = 0.323</td>
<td>= 0.0009</td>
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<tr>
<td>Downstream HEPA filter (VSS)</td>
<td>S5015-A35.OD2</td>
<td>Total Alpha = 34.7</td>
<td>= 0.10</td>
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<tr>
<td>Tritium trap</td>
<td>S5015-A03.OT1</td>
<td>Total activity = &lt;50.0</td>
<td>=&lt;50.0³</td>
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</table>

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

¹All < (0) values represent the minimum detection limits at Laboratory 222-S.

²Numbers 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.

³Number 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 stored in a custody locker 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. 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 sample media was received, inventoried against the COC forms, and the "received by" block on the COC form was signed by SML. The TSTs were maintained at 4 ± 2 °C before and after the sampling event in a 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 for transport on March 29, 1995, and shipped by Federal Express for next-day delivery.

Table 4. Oak Ridge National Laboratory Samples.

<table>
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<tr>
<th>Sample Identifier</th>
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<td>006758</td>
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<td>S5015-A8.530</td>
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<td>S5015-A22.519</td>
<td>TST trip blank</td>
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</tr>
</tbody>
</table>
Sorbent trains and SUMMA™ canister sampling devices were supplied with COC forms by PNL. Sampling devices were picked up from PNL by SML and transported in a government vehicle to a custody locker.

After sampling, the PNL sorbent traps were transported by government vehicle directly to PNL and delivered to J. A. Edwards on March 17, 1995. Table 5 lists the sample identifiers, sample types, and COC form numbers for all PNL samples. The sorbent trains were maintained at 4 ± 2 °C before and after the sampling event in a refrigeration unit.

Table 5. Pacific Northwest Laboratory Samples.

<table>
<thead>
<tr>
<th>Sample Identifier</th>
<th>Sample Type</th>
<th>COC Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5015-A01.049</td>
<td>Ambient upwind SUMMA™</td>
<td>008108</td>
</tr>
<tr>
<td>S5015-A02.050</td>
<td>Ambient SUMMA™ (VSS)</td>
<td>008108</td>
</tr>
<tr>
<td>S5015-A04.056</td>
<td>SUMMA™</td>
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</tr>
<tr>
<td>S5015-A05.065</td>
<td>SUMMA™</td>
<td>008108</td>
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<td>S5015-A06.066</td>
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<td>008108</td>
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<tr>
<td>S5015-A29.18U</td>
<td>NH₃/NOₓ/NO/H₂O sorbent</td>
<td>008109</td>
</tr>
<tr>
<td>S5015-A30.19U</td>
<td>NH₃/NOₓ/NO/H₂O sorbent</td>
<td>008109</td>
</tr>
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<td>S5015-A31.20U</td>
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<td>S5015-A37.26U</td>
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<td>008109</td>
</tr>
</tbody>
</table>

SUMMA™ canisters were also supplied by OGIST. The sample media is shipped to SML without a COC form. The sample media is inventoried at SML, where the COC is initiated.

From the time that samples are received by SML until they are shipped back to the analytical laboratory, COC is maintained by SML in accordance with WHC-IP-1127-1.3, Chain-of-Custody for RCRA and CERCLA Protocol Samples (WHC 1995a). The final COCs for this sampling event are in Appendix C.
5.0 QUALITY ASSURANCE AND CONTROLS

5.1 VAPOR SAMPLING SYSTEM CLEANING

Immediately prior to sampling of SST 241-S-102, the VSS manifold was heated to 60 °C and ambient air was purged through the system for approximately 18 hours. Throughout this purge, 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 by the FID. A second sample confirmed the VSS was free of organic remnants down to ambient levels. Thus, the system was ready to sample SST 241-S-102. 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 1993) the team cleaned the hot-water-jacketed probe before it was installed in SST 241-S-102. 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, using a hand-held organic vapor meter, that the total organic concentration in the sample line is below 1 ppmv.

SUMMA™ canister ambient air samples were also collected to confirm that the VSS sampling manifold was free of trace organic contaminants (or to determine what contaminants were present). One SUMMA™ canister was filled with ambient air upwind of SST 241-S-102, and a second canister was filled with ambient air via the VSS sampling manifold. The canisters were shipped to PNL for analysis. After this purge, an ambient air sample was drawn through the VSS manifold and a GC/FID run was initiated. This first run showed that organic contaminants were still present in the manifold, so a second 1 hour ambient air purge was started. Throughout this purge, various system valves were actuated to release any contaminants hung up in the VSS valves themselves. A second GC run was initiated and no contaminants were detected by the FID. A third sample confirmed the VSS was free of organic remnants down to the detection limits of the system and ready to sample 241-S-102. For further details, refer to Appendix B of LO-080-450/AO (WHC 1993) 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, is 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-102 sampling event.
Table 6. Calibration Data.

<table>
<thead>
<tr>
<th>System</th>
<th>Calibration Date</th>
<th>Expiration Date</th>
<th>WHC Standards Laboratory Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Control System</td>
<td>04/21/94</td>
<td>04/21/95</td>
<td>804-67-74-009</td>
</tr>
<tr>
<td>Mass Flow System</td>
<td>12/08/94</td>
<td>12/08/95</td>
<td>804-28-03-001</td>
</tr>
<tr>
<td>Pressure System</td>
<td>12/07/94</td>
<td>12/07/95</td>
<td>804-67-89-001</td>
</tr>
</tbody>
</table>

5.3 BLANK SAMPLES

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

Field blanks are sampling devices prepared and handled in the same manner as the samples, but no tank gases are drawn through them.

Spiked blanks are samples that are spiked with a known amount of analyte before shipment. These blanks are handled and analyzed with the other samples. 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 surrounding the sampling system or in the waste tank headspace, but not associated with the waste.

Tables 4 and 5 also list sample blanks used during the sampling of SST 241-S-102.

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 (1995b). No other anomalies to the TCP or the operating procedure were noted during the sampling of SST 241-S-102. Further details are available in the project-specific file maintained by SML.

When the SUMMA™ canisters were collected it was evident that the pressure was below normal. Usually the pressure is approximately 400 torr, in this case it dropped to approximately 238 torr. It is suspected that during the 18 hour ambient purge moisture collected on the external HEPA filter, causing more restriction than normal.
7.0 REFERENCES


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APPENDIX A
SAMPLE LOG SHEETS
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Waste Tank 241-S-102

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)

<table>
<thead>
<tr>
<th>Tank Temperature</th>
<th>24.3°C</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PNL</th>
<th>OGI/ORNL</th>
<th>Port</th>
<th>Description</th>
<th>Desired Flow</th>
<th>Desired Duration</th>
<th>Desired Total</th>
<th>Actual Flow</th>
<th>Actual Start</th>
<th>Actual End</th>
<th>Actual Total</th>
<th>Actual Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHC Sample ID</td>
<td>Sample ID</td>
<td>Valve #</td>
<td>Rate</td>
<td>Flow</td>
<td>Rate</td>
<td>Time</td>
<td>Time</td>
<td>Time</td>
<td>Flow</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Group # 1

Purge with ambient air for 30 min.

- S5015- A01. 049
  - 049
  - AMBIENT #1 (PNL)
  - Rate: 5450
  - Flow: 30
  - Total Flow: 163500
  - Desired Flow: 5461
  - Desired Duration: 15:30
  - Actual Flow: 09:37
  - Actual End: 09:38
  - Actual Total: 1.0

- GC Run #1
  - Ambient air/Cleanliness check
  - Rate: 1
  - Flow: 10:08

- S5015- A02. 050
  - 050
  - AMBIENT #2 (PNL)
  - Rate: 1
  - Flow: 10:13
  - Total Flow: 10:14
  - Desired Flow: 1
  - Desired Duration: 1.0
  - Actual Flow: 1.0

- GC Run #2
  - Ambient air
  - Rate: 10:19

Leak check (Appendix A) Leak Rate: 16.8 Torr/Hr.

Purge with tank air for 30 min.

- S5015- A03. 071
  - T1847(2225)
  - Tritium Trap
  - Rate: 200
  - Flow: 5
  - Total Flow: 1000
  - Desired Flow: 200.40
  - Desired Duration: 10:51
  - Actual Flow: 11:26
  - Actual End: 11:31
  - Actual Total: 5.0

- Measure tank pressure
  - PE-1 = 741.2 Torr

- GC Run #3 (Tank run #1)
  - Rate: 11:39

- S5015- A04. 056
  - 056
  - SUMMA #3
  - Rate: 1
  - Flow: 11:46
  - Actual End: 11:47:18
  - Actual Total: 1.18
  - Desired Flow: 6.00

- S5015- A05. 065
  - 065
  - SUMMA #4
  - Rate: 1
  - Flow: 11:51
  - Actual End: 11:52
  - Actual Total: 1.0
  - Desired Flow: 6.00

- S5015- A06. 066
  - 066
  - SUMMA #5
  - Rate: 1
  - Flow: 11:55
  - Actual End: 11:56:17
  - Actual Total: 1.17
  - Desired Flow: 6.00

- GC Run #4 (Tank run #2)
  - Rate: 12:00
<table>
<thead>
<tr>
<th>WHC Sample ID</th>
<th>OGI/ORNL Port</th>
<th>Description</th>
<th>Flow Rate (min.)</th>
<th>Duration (min.)</th>
<th>Actual Flow Rate</th>
<th>Start Time</th>
<th>End Time</th>
<th>Total Flow Rate</th>
<th>Start Time</th>
<th>End Time</th>
<th>Total Flow Rate</th>
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<tbody>
<tr>
<td>S5015-A07.527</td>
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<td>TST #1</td>
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<td>4</td>
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<td>12:12</td>
<td>50.10</td>
<td>12:12</td>
<td>4.0</td>
<td>0.20</td>
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<td>TST #2</td>
<td>50</td>
<td>4</td>
<td>200</td>
<td>12:08</td>
<td>12:12</td>
<td>50.01</td>
<td>12:12</td>
<td>4.0</td>
<td>0.20</td>
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<td>TST #3</td>
<td>50</td>
<td>4</td>
<td>200</td>
<td>12:18</td>
<td>12:22</td>
<td>50.15</td>
<td>12:22</td>
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<td>50</td>
<td>4</td>
<td>200</td>
<td>12:18</td>
<td>12:22</td>
<td>50.10</td>
<td>12:22</td>
<td>4.0</td>
<td>0.20</td>
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<td>TST#533</td>
<td>TST #5</td>
<td>200</td>
<td>5</td>
<td>1000</td>
<td>12:30</td>
<td>12:35</td>
<td>200.40</td>
<td>12:35</td>
<td>5.0</td>
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<td>TST#518</td>
<td>TST #6</td>
<td>200</td>
<td>5</td>
<td>1000</td>
<td>12:30</td>
<td>12:35</td>
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<td>12:35</td>
<td>5.0</td>
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<td>TST #7</td>
<td>200</td>
<td>5</td>
<td>1000</td>
<td>12:41</td>
<td>12:46</td>
<td>200.40</td>
<td>12:46</td>
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<td>1.00</td>
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<td>TST #8</td>
<td>200</td>
<td>5</td>
<td>1000</td>
<td>12:41</td>
<td>12:46</td>
<td>200.40</td>
<td>12:46</td>
<td>5.0</td>
<td>1.00</td>
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<td>TST #9</td>
<td>200</td>
<td>20</td>
<td>4000</td>
<td>12:52</td>
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<td>200.35</td>
<td>13:12</td>
<td>20.0</td>
<td>4.01</td>
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<td>TST #10</td>
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<td>20</td>
<td>4000</td>
<td>12:52</td>
<td>13:12</td>
<td>200.35</td>
<td>13:12</td>
<td>20.0</td>
<td>4.01</td>
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<td>TST#543</td>
<td>TST FIELD BLANK #2</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

GC Run #5 (Tank run #3)

13:44

S5015-A22.18U | 18U | 9 | NH3/NOx/H2O #1 | 200 | 15 | 3000 | 200.40 | 13:50 | 14:05 | 15.0 | 3.01 |
S5015-A24.19U | 19U | 10 | NH3/NOx/H2O #2 | 200 | 15 | 3000 | 200.40 | 13:50 | 14:05 | 15.0 | 3.01 |
S5015-A25.20U | 20U | 8 | NH3/NOx/H2O #3 | 200 | 15 | 3000 | 200.40 | 14:12 | 14:27 | 15.0 | 3.01 |
S5015-A26.21U | 21U | 10 | NH3/NOx/H2O #4 | 200 | 15 | 3000 | 200.40 | 14:12 | 14:27 | 15.0 | 3.01 |
S5015-A27.22U | 22U | 9 | NH3/NOx/H2O #5 | 200 | 15 | 3000 | 200.40 | 14:32 | 14:47 | 15.0 | 3.01 |
S5015-A28.23U | 23U | 10 | NH3/NOx/H2O #6 | 200 | 15 | 3000 | 200.40 | 14:32 | 14:47 | 15.0 | 3.01 |

GC Run #6

14:53

TOTAL TANK GAS USED DURING SAMPLING RUNS

57.88
<table>
<thead>
<tr>
<th>WHC Sample ID</th>
<th>PNL</th>
<th>Description</th>
<th>Desired Flow Rate</th>
<th>Desired Duration (min.)</th>
<th>Desired Total Flow Rate</th>
<th>Actual Start Time</th>
<th>Actual Time</th>
<th>Actual Flow Rate</th>
<th>Actual Total Time</th>
<th>Actual Total Flow Rate</th>
</tr>
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<tbody>
<tr>
<td>S5015-A32.0U1</td>
<td>GCI/ORN</td>
<td>Upstream HEPA(box)</td>
<td>15:20</td>
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<td></td>
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</tr>
<tr>
<td>S5015-A33.0D1</td>
<td>GCI/ORN</td>
<td>Downstream HEPA(box)</td>
<td>15:20</td>
<td></td>
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<tr>
<td>S5015-A34.0U2</td>
<td>GCI/ORN</td>
<td>Upstream HEPA (VSS)</td>
<td>15:20</td>
<td></td>
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<td>GCI/ORN</td>
<td>Downstream HEPA (VSS)</td>
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</table>

**Trip Blanks (DO NOT EXPOSE)**

<table>
<thead>
<tr>
<th>WHC Sample ID</th>
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<th>Description</th>
<th>PNL</th>
<th>Description</th>
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</thead>
<tbody>
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<td>TST#511</td>
<td>TST TRIP #1</td>
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<tr>
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<td>TST TRIP #1</td>
<td>TST#519</td>
<td>TST TRIP #1</td>
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<td>33U</td>
<td>NH₃/NOₓ/H₂O TRIP #1</td>
</tr>
<tr>
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<td>NH₃/NOₓ/H₂O TRIP #2</td>
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<td>S5015-A31.35U</td>
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<td>NH₃/NOₓ/H₂O TRIP #3</td>
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<tr>
<td></td>
<td>NUMBER OF EVENTS</td>
<td>TIME IN MINUTES</td>
<td>VOLUME IN SCCM</td>
<td>TOTAL VOLUME, LITERS</td>
</tr>
<tr>
<td>------------------</td>
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<td>-----------------</td>
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<td>----------------------</td>
</tr>
<tr>
<td>LEAK CHECKS</td>
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<td>0</td>
<td>5600</td>
<td>5.60</td>
</tr>
<tr>
<td>TANK PURGE PUMP DOWNS</td>
<td>3</td>
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<td>16.80</td>
</tr>
<tr>
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<td>1</td>
<td>30</td>
<td>5450</td>
<td>163.83</td>
</tr>
<tr>
<td>GC PURGES</td>
<td>4</td>
<td>3</td>
<td>5000</td>
<td>60.00</td>
</tr>
<tr>
<td>SUMMA PURGES</td>
<td>3</td>
<td>2</td>
<td>5000</td>
<td>30.00</td>
</tr>
<tr>
<td>ALL SAMPLES COLLECTED</td>
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<td>57.88</td>
</tr>
<tr>
<td>TOTAL FOR TANK SAMPLING RUN</td>
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<td></td>
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<td>334.11</td>
</tr>
<tr>
<td>Total Volume</td>
<td>HEPA Box Downstream Filter</td>
<td>L/min</td>
<td>PC/liter</td>
<td>Detector</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td>-------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>334.11 PC/liter</td>
<td>4.74 PC/liter</td>
<td>0.067 ND</td>
<td>&lt; Detectable</td>
<td>ND</td>
</tr>
<tr>
<td>333.11 PC/liter</td>
<td>4.74 PC/liter</td>
<td>0.067 ND</td>
<td>&lt; Detectable</td>
<td>ND</td>
</tr>
<tr>
<td>332.11 PC/liter</td>
<td>4.74 PC/liter</td>
<td>0.067 ND</td>
<td>&lt; Detectable</td>
<td>ND</td>
</tr>
<tr>
<td>331.11 PC/liter</td>
<td>4.74 PC/liter</td>
<td>0.067 ND</td>
<td>&lt; Detectable</td>
<td>ND</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Tritium Trap</th>
<th>Total Volume</th>
<th>Total Activity</th>
<th>Detector</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.58 PC/liter</td>
<td>5.24 PC/liter</td>
<td>0.32 ND</td>
<td>&lt; Detectable</td>
<td>0.32</td>
</tr>
<tr>
<td>1.58 PC/liter</td>
<td>5.24 PC/liter</td>
<td>0.32 ND</td>
<td>&lt; Detectable</td>
<td>0.32</td>
</tr>
<tr>
<td>1.58 PC/liter</td>
<td>5.24 PC/liter</td>
<td>0.32 ND</td>
<td>&lt; Detectable</td>
<td>0.32</td>
</tr>
<tr>
<td>1.58 PC/liter</td>
<td>5.24 PC/liter</td>
<td>0.32 ND</td>
<td>&lt; Detectable</td>
<td>0.32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sorbent Sampling</th>
<th>Total Volume</th>
<th>Alpha per Sample</th>
<th>Beta per Sample</th>
<th>ALL Sorbents NAC (μg)</th>
<th>Beta per Sample</th>
<th>Alpha and Beta per Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.00 L/PC/liter</td>
<td>0.312 PC/liter</td>
<td>0.012 PC/liter</td>
<td>0.42 PC/g</td>
<td>0.25 PC/g</td>
<td>0.03 PC/g</td>
<td>0.25 PC/g</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summary Sampling</th>
<th>Alpha and Beta Per Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.87 PC/liter</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

AMBIENT CONDITIONS
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APPENDIX C

CHAIN-OF CUSTODY FORMS
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Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: J.R. LUTCH

Project Designation: N/A

Ice Chest No.: N/A

Shipped To: 222 S Labs

Possible Sample Hazards/Remarks: None

Preservative: N/A

Type of Container: beaker

Volume: N/A

SAMPLE ANALYSIS

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Matrix*</th>
<th>Date Sampled</th>
<th>Time Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>35015-071</td>
<td>N/A</td>
<td>3/14/95</td>
<td>T- 1847</td>
</tr>
<tr>
<td>35015-081</td>
<td>N/A</td>
<td>3/14/95</td>
<td>T- 1848</td>
</tr>
<tr>
<td>35015-091</td>
<td>N/A</td>
<td>3/14/95</td>
<td>T- 1849</td>
</tr>
<tr>
<td>35015-082</td>
<td>N/A</td>
<td>3/14/95</td>
<td>T- 1850</td>
</tr>
<tr>
<td>35015-092</td>
<td>N/A</td>
<td>3/14/95</td>
<td>T- 1851</td>
</tr>
</tbody>
</table>

SPECIAL INSTRUCTIONS

X = Silicone gel / Harper fillers

Please fax info to Tim Lutchez at 373-7076

Thanks.

DISTRIBUTION: Original - Sample

LABORATORY SECTIONS

FINAL SAMPLE COMPOSITION

Disposal Method

Received By

Date/Time

Title

Disposed By

Date/Time

BC-5000-828 (12/92)
**Westinghouse Hanford Company**

**CHAIN OF CUSTODY**

- **Custody Form Initiator:** Amy Dindal
- **Company Contact:** Roger Jenkins
- **Project Designation/Sampling Locations:** 241-S-102 (VSS)
- **Ice Chest No.:** 5mL 485
- **Bill of Lading/Airbill No.:** 
- **Method of Shipment:** Federal Express
- **Shipped to:** Rick Mahon
- **Possible Sample Hazards/Remarks:** NONE

<table>
<thead>
<tr>
<th>Sample Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5015-A7.527  TST# 527  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A8.530  TST# 530  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A9.531  TST# 531  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A11.532  TST# 532  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A12.533  TST# 533  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A13.518  TST# 518  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A14.506  TST# 506  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A15.513  TST# 513  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A16.514  TST# 514  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A18.515  TST# 515  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A19.516  TST# 516  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A20.517  TST# 517  ORNL Triple Sorbent Trap</td>
</tr>
<tr>
<td>S5015-A21.511  TST# 511  ORNL Trip Blank</td>
</tr>
<tr>
<td>S5015-A22.519  TST# 519  ORNL Trip Blank</td>
</tr>
<tr>
<td>S5015-A10.520  TST# 520  ORNL Field Blank</td>
</tr>
<tr>
<td>S5015-A17.543  TST# 543  ORNL Field Blank</td>
</tr>
</tbody>
</table>

- **Field Transfer of Custody**
  - **Reinforced By:** AB Dindal
  - **Date:** 3/1/95
  - **Time:** 10:55 am
  - **Received By:** AB Dindal
  - **Date:** 3/15/95
  - **Time:** 10:20 pm
  - **Received By:** AB Dindal
  - **Date:** 3/20/95
  - **Time:** 04:00
  - **Received By:** AB Dindal

**Temperature (°C)**

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>When shipped (ORNL)</td>
<td>-40</td>
<td>-2</td>
</tr>
<tr>
<td>When received (WHC)</td>
<td>-3</td>
<td>7</td>
</tr>
<tr>
<td>When shipped (WHC)</td>
<td>-5</td>
<td>5</td>
</tr>
<tr>
<td>When received (ORNL)</td>
<td>-1</td>
<td>9</td>
</tr>
</tbody>
</table>

**C-4**
**Westinghouse Hanford Company**

<table>
<thead>
<tr>
<th>CHAIN OF CUSTODY</th>
<th>WHC 008109</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custody Form Initiator</td>
<td>J. A. Edwards - PNL</td>
</tr>
<tr>
<td>Company Contact</td>
<td>R. D. Mahon - WHC</td>
</tr>
<tr>
<td>Project Designation/Sampling Locations</td>
<td>200 West Tank Farm</td>
</tr>
<tr>
<td>241-S-102 Tank</td>
<td>Vapor Sample SAF S5:015 (VSS Truck)</td>
</tr>
<tr>
<td>Collection date</td>
<td>03-17-95</td>
</tr>
<tr>
<td>Field Logbook No.</td>
<td>WHC-N-07-4</td>
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**Possible Sample Hazards/Remarks**
Unknown at time of sampling

### Sample Identification

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5-015 - A29.18U</td>
<td>NH3/NOx/H2O (Sorbent Trap # 1) Line # 9</td>
</tr>
<tr>
<td>S5-015 - A30.19U</td>
<td>NH3/NOx/H2O (Sorbent Trap # 2) Line # 10</td>
</tr>
<tr>
<td>S5-015 - A31.20U</td>
<td>NH3/NOx/H2O (Sorbent Trap # 3) Line # 8</td>
</tr>
<tr>
<td>S5-015 - A32.21U</td>
<td>NH3/NOx/H2O (Sorbent Trap # 4) Line # 10</td>
</tr>
<tr>
<td>S5-015 - A33.22U</td>
<td>NH3/NOx/H2O (Sorbent Trap # 5) Line # 9</td>
</tr>
<tr>
<td>S5-015 - A34.23U</td>
<td>NH3/NOx/H2O (Sorbent Trap # 6) Line # 10</td>
</tr>
<tr>
<td>S5-015 - A35.24U</td>
<td>NH3/NOx/H2O (Trap Trip Blank # 1)</td>
</tr>
<tr>
<td>S5-015 - A36.25U</td>
<td>NH3/NOx/H2O (Trap Trip Blank # 2)</td>
</tr>
<tr>
<td>S5-015 - A37.26U</td>
<td>NH3/NOx/H2O (Trap Trip Blank # 3)</td>
</tr>
</tbody>
</table>

### Final Sample Disposition

**PNNL (only) Checklist**

- [ ] Media labeled and checked?
- [ ] Letter of instruction?
- [ ] Media in good condition?
- [ ] COC info/signatures complete?
- [X] Sorbents shipped on ice?
- [ ] Rad release stickers on samples?
- [ ] Activity report from 2223?
- [ ] COC copy for LR8, RIDS filed?
- [ ] COC copy for sorbent follow-on?

**Pick-up / Delivery**

<table>
<thead>
<tr>
<th>Field Transfer of Custody</th>
<th>Date</th>
<th>Time</th>
<th>Chain of Possession</th>
<th>Received By</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>G W Dennis</td>
<td>03-10-95</td>
<td>1/2/95</td>
<td>JA Edwards</td>
<td>03-10-95</td>
<td>1/2/95</td>
<td></td>
</tr>
<tr>
<td>J A Edwards</td>
<td>03-10-95</td>
<td>09:00</td>
<td>Neil Buechler</td>
<td>03-10-95</td>
<td>09:00</td>
<td></td>
</tr>
<tr>
<td>JA Edwards</td>
<td>03-10-95</td>
<td>09:00</td>
<td>T L &amp; R</td>
<td>03-10-95</td>
<td>09:00</td>
<td></td>
</tr>
<tr>
<td>JA Edwards</td>
<td>03-10-95</td>
<td>09:00</td>
<td>JA Edwards / JA Edwards</td>
<td>03-10-95</td>
<td>09:00</td>
<td></td>
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Comments:

- **POC**

(Revised 10/17/94 PNNL)

A-6000-407 (12/92) WEP061

1 of 1

C-5
Westinghouse Hanford Company

| Custody Form Initiator | J. A. Edwards - PNL |
| Company Contact       | R. D. Mahon - WHC |
| Project Designation/Sampling Locations | 200 West Tank Farm 241-S-102 Tank Vapor Sample SAF S5-015 (VSS Truck) |
| Ice Chest No.         | N/A |
| Bill of Lading/Airbill No. | N/A |
| Method of Shipment    | Government Truck |
| Shipped to            | PNL |
| Possible Sample Hazards/Remarks | Unknown at time of sampling |

**Sample Identification**

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5-015 - A01 . 049</td>
<td>Ambient Air SUMMA #1 Upwind of S-102</td>
</tr>
<tr>
<td>S5-015 - A02 . 050</td>
<td>Ambient Air SUMMA #2 Through Port 15</td>
</tr>
<tr>
<td>S5-015 - A04 . 056</td>
<td>SUMMA #3 Port 11</td>
</tr>
<tr>
<td>S5-015 - A05 . 065</td>
<td>SUMMA #4 Port 13</td>
</tr>
<tr>
<td>S5-015 - A06 . 066</td>
<td>SUMMA #5 Port 15</td>
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**Field Transfer of Custody**

<table>
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<tr>
<th>Relinquished By</th>
<th>Date</th>
<th>Time</th>
<th>Received By</th>
<th>Date</th>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>J A Edwards</td>
<td>03-10-95</td>
<td>09:45</td>
<td>Neil Buechler</td>
<td>03-10-95</td>
<td>08:30</td>
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<tr>
<td>AP Buechler</td>
<td>03-17-95</td>
<td>10:00</td>
<td>J A Edwards</td>
<td>03-17-95</td>
<td>10:15</td>
</tr>
</tbody>
</table>

**Final Sample Disposition**

- PNL (only) Checklist
- Pick-up / Delivery
- Comments:

- Media labeled and checked: [X] / [N]
- Letter of instruction: [X] / [N]
- Media in good condition: [X] / [N]
- COC info/signatures complete: [X] / [N]
- Rad release stickers on samples: [X] / [N]
- Activity report from 2225? [X] / [N]
- COC copy for LRIS, RIDS filed? [X] / [N]
- COC copy for sorbent follow-on? [X] / [N]

Comments: [signature]

(Revised 10/17/94 PNL)