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VAPOR & GAS SAMPLING OF SST 241SX109 USING THE
VAPOR SAMPLING SYSTEM

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7. Abstract

THIS DOCUMENT PRESENTS SAMPLING DATA RESULTING FROM THE AUGUST 1, 1995, SAMPLING OF SST 241-SX-109 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	Gas Chromatograph
GC/FID	Gas Chromatograph/Flame Ionization Detector
GEA	Gamma Energy Analysis
HEPA	High-Efficiency Particulate Air (filter)
NH ₃	Ammonia
NO ₂	Nitrogen Dioxide
NO _x	Nitric Oxide
H ₂ O	Water Vapor
OPC	Offsite Property Control
OVM	Organic Vapor Meter
PNL	Pacific Northwest Laboratory
SML	Sampling and Mobile Laboratories
SST	Single-Shell Tank
TCP	Tank Characterization Plan
team	SML Vapor Team
TOC	Total Organic Carbon
TST	Triple Sorbent Trap
VSS	Vapor Sampling System
WHC	Westinghouse Hanford Company

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**VAPOR AND GAS SAMPLING OF SINGLE-SHELL TANK 241-SX-109
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-SX-109. This document presents sampling data resulting from the August 1, 1995 sampling of SST 241-SX-109. 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-SX-109 on August 1, 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-SX-109. The team then sent these samples to the analytical laboratories for analysis.

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

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

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

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 concentration of analytes in the vapor sampled is calculated from the quantity of analyte found in the sorbent media and the volume of vapor passed through the sorbent trap.

The sorbent trap station uses highly accurate mass flow controllers to measure and control the flow rate of sample vapor through the sorbent traps. The controllers FICV-1 through FICV-9 are mounted on top of the sorbent station between the inlet and outlet valves. Controllers FICV-10 and FICV-11 are located downstream of the sorbent trap station and the in-line driers, which remove moisture from the sample vapor before it is metered. Errors associated with the mass flow controllers were determined by the Westinghouse Hanford Company (WHC) Standards Laboratory before the SST 241-SX-109 sampling event (see Table 1). Flow rates and the duration of flow are specified by the analytical laboratories that supply and analyze the sorbent traps.

Table 1. Flow Control Calibration.

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

The VSS is also equipped with a gas chromatograph (GC). The Hewlett Packard 5890 Series II GC is equipped with a flame-ionization detector (FID), a 1 mL sample loop, a 10 port injection valve, a 2 meter chromatographic column, a programmable oven, and a portable computer loaded with the HP-Chemstation²

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

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

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

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

3.0 SAMPLING EVENT DESCRIPTION

3.1 SPECIFICATIONS

The Vapor Issue Resolution Program specifies sampling requirements in WHC-SD-MM-TP-335, Rev. 0E, *Vapor Sampling and Analysis Plan* (Horn 1995). The Sampling and Analysis Plan also specifies the types and number of samples to be collected, flow rates, and durations. These key sampling parameters are summarized on the sample log sheets in Appendix A. In addition to the sample log sheets, checksheets for each individual sample help ensure correct sampling procedures. SML retains these documents in the project file. This sample event's project-specific number is S5-048.

3.2 OPERATIONS AND SAMPLING PERSONNEL

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

- G. S. Caprio, VSS Technician
- R. D. Mahon, VSS Lead Scientist
- T. B. Utecht, VSS Technician
- R. A. Westberg, Field Scientist.

The VSS was initially set up on July 27, 1995, and scheduled to be sampled on July 28, 1995. Until approximately 7:30 a.m. on July 28, 1995, it was unknown to the vapor team that the exhauster would be shut down and all vapor sampling would have to stop. The vapor team reassembled on July 31, 1995, set up the VSS, and allowed it to warm up overnight. Sampling began shortly after 7:30 a.m. on August 1, 1995, and was completed by 10:30 a.m. the same day.

3.3 INDUSTRIAL HYGIENE FIELD RESULTS

Prior to hooking up to SST 241-SX-109, an industrial hygiene technician field tested tank vapors. The technician purged the instrument/vent header for 5 minutes and then field measured vapor stream contents using a combustible gas indicator (CGI) and an organic vapor meter (OVM). The measurements were verbally reported, LEL 0%, NH₃ 12 ppm, O₂ 20.7%, and TOC 1.3 ppm.

3.4 AMBIENT CONDITIONS

The weather the day of the sampling event, August 1, 1995 was sunny and clear, with a light breeze coming from the west. Graphs of ambient temperatures and pressures taken at the Hanford Meteorological Station, which is about 2.5 miles northeast of SX-Farm, are provided in Appendix B.

3.5 SAMPLE COLLECTION

There was no hot-water-jacketed sampling probe installed for this job. The VSS sampled through a vent header, near riser R6.

All zones of the VSS were heated to 60 °C during setup of the VSS at SST 241-SX-109 on July 31, 1995. The team stabilized the VSS temperature zones by 8:00 a.m. on August 1, 1995, and the system was ready to collect samples. Measured according to the VSS operating procedure, the pressure of SST 241-SX-109 was 988 mbar (741.3 torr). 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 August 1, 1995,

the team collected two SUMMA[™] canister samples of ambient air, one manually 10 meters upwind of the VSS connection with SST 241-SX-109, 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 vent header) was performed. The system was evacuated to 286 mbar (214.5 torr) and leakage of ambient air into the system was observed by monitoring system pressure for 15 minutes. Leakage resulted in an increase of 6.8 mbar (5.1 torr) in system pressure during the 15 minute test. Given a system volume of not more than 10 L, this pressure increase corresponds to a leak rate of approximately 15.9 mL/min. This leak rate was then estimated for average SUMMA[™], triple sorbent trap (TST), and sorbent sampling pressures. It was found that for the SUMMA[™] canisters, dilution by ambient air was approximately 0.2%, for TSTs sampled at 200 mL/min the dilution was approximately 0.6%, and for sorbent traps the dilution was approximately 0.5%.

The sampling valve was opened and the VSS was purged with sample vapor from SST 241-SX-109 for 30 minutes at a total flow rate of 5.46 L/min. This purge was performed to flush ambient air from the system and saturate the system's active adsorption sites. Because the volume of transfer tubing and the sampling manifold upstream of the sampling devices is estimated to be no more than 10 L, this purge provided about 16.4 air turnovers in the system.

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

3.6 FIELD GC/FID RESULTS

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

Table 2 displays the Field GC/FID results from the sampling of SST 241-SX-109.

Table 2. TOC Results.

Number of Runs	Description	Average TOC Concentration (ppmC)	% Standard Deviation
3	Propane	6.00	0.54
4	Ambient	2.72	1.95
4	Tank Vapor	3.04	1.19

3.7 RADIATION SCREENING

Samples are unconditionally released from the SST farm in accordance with 1995-33300-RSP-03, *Release of Vapor Sampling Equipment* (WHC 1995c). Radiological screening results are used to determine (1) if the samples must be shipped as radioactive or nonradioactive in accordance with U.S. Department of Transportation (DOT) regulations and (2) if the samples meet the laboratory acceptance criteria.

The DOT limits for shipping a nonradioactive sample are 2,000 combined pCi/g of beta-gamma activity and alpha activity. Samples exceeding these DOT limits may be shipped as radioactive material if the samples do not exceed the following laboratory acceptance criteria:

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

To protect the sampling manifold and sampling devices from radioactive particulates, all sample vapor for the August 1, 1995, SST 241-SX-109 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-SX-109 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-SX-109 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)	S5048-A28.OU1	Total Alpha = 1050 Total Beta = 1340 GEA = 855 (¹⁰⁹ Cd) GEA = 29.8 (¹³⁷ Cs) GEA = 202 (²⁰⁸ Tl) GEA = 726 (²¹² Bi) GEA = 634 (²¹² Pb) GEA = 259 (²³⁷ Np) GEA = 92.3 (²⁴³ Am)	= 3.4 = 4.4 = 2.8 = 0.1 = 0.7 = 2.4 = 2.1 = 0.85 = 0.30
Downstream HEPA filter (box)	S5048-A29.OU1	Total Alpha = <1.83 Total Beta = 2.01 GEA = 2490 (⁸⁵ Kr) GEA = 11.3 (⁸⁵ Sr)	= <0.006 = 0.007 = 8.1 0.04
Upstream HEPA filter (VSS)	S5048-A30.OU2	Total Alpha = <1.16 Total Beta = 4.69 GEA = <27.2 (¹³⁷ Cs)	= <0.004 = 0.02 = <0.09
Downstream HEPA filter (VSS)	S5048-A31.OU2	Total Alpha = <0.763 Total Beta = 7.55 GEA = <detectable	= <0.002 = 2.47 = <detectable
Tritium trap	S5048-A03.OT1	Sample Broken No ^c Analysis Done	Sample Broken No Analysis Done

Notes:

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

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

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

^cSample was broken at the 222-S Laboratory and no analysis confirmed. See Anomalies, Section 6.0, for description.

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

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

After sampling, the PNL sorbent tubes and SUMMA[™] canisters were transported by government vehicle directly to PNL and delivered to J. A. Edwards on August 3, 1995. Table 4 lists the sample identifiers, sample types, and COC form numbers for all PNL samples.

Table 4. Pacific Northwest Laboratory Samples.

Sample Identifier	Sample Type	COC Number
S5048-A01.015	Ambient upwind SUMMA [™]	008927
S5048-A02.016	Ambient SUMMA [™] (VSS)	008927
S5048-A04.018	SUMMA [™]	008927
S5048-A12.021	SUMMA [™]	008927
S5048-A20.119	SUMMA [™]	008927
S5048-A08.22T	NH ₃ /NO _x /H ₂ O sorbent	008926
S5048-A09.23T	NH ₃ /NO _x /H ₂ O sorbent	008926
S5048-A10.24T	NO _x /H ₂ O sorbent	008926
S5048-A11.25T	NH ₃ /H ₂ O/H ₂ O sorbent	008926
S5048-A16.26T	NH ₃ /NO _x /H ₂ O sorbent	008926
S5048-A17.27T	NH ₃ /NO _x /H ₂ O sorbent	008926
S5048-A18.28T	NO _x /H ₂ O sorbent	008926
S5048-A19.29T	NH ₃ /H ₂ O/H ₂ O sorbent	008926
S5048-A25.30T	NH ₃ /NO _x /H ₂ O field blank	008926
S5048-A26.31T	NH ₃ /NO _x /H ₂ O field blank	008926
S5048-A27.32T	NH ₃ /NO _x /H ₂ O field blank	008926
S5048-A05.593	PNL TST	008928
S5048-A06.594	PNL TST	008928
S5048-A07.595	PNL TST	008928
S5048-A13.596	PNL TST	008928
S5048-A14.597	PNL TST	008928
S5048-A15.598	PNL TST	008928
S5048-A21.599	PNL TST Field Blank	008928
S5048-A22.600	PNL TST Field Blank	008928
S5048-A23.601	PNL TST Trip Blank	008928
S5048-A24.602	PNL TST Trip Blank	008928

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

5.0 QUALITY ASSURANCE AND CONTROLS

5.1 VAPOR SAMPLING SYSTEM CLEANING

Immediately prior to sampling of SST 241-SX-109, the VSS manifold and vapor sample transfer tubing was heated to 60 °C and ambient air was purged through the system for 22.4 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 significant level of contaminants was detected. A second ambient air GC/FID run confirmed that the VSS manifold and transfer tubing was free of organic remnant residue down to ambient levels. A SUMMA™ canister ambient air sample was then collected to confirm by laboratory analysis that the VSS sampling manifold was free of trace organic contaminants (or to determine which contaminants were present and at what concentration), as discussed in Section 3.5. For further details, refer to Appendix E of WHC-IP-1127-4.10 (WHC 1995b) and the project-specific file located with SML.

5.2 INSTRUMENT CALIBRATION

Instruments located in the VSS are calibrated on an annual basis at the WHC Standards Laboratory. VSS instrumentation calibration data, maintained in files by SML, are summarized in Table 5. According to the calibration schedule shown in Table 5, all instrumentation was within its calibration period during the SST 241-SX-109 sampling event.

Table 5. Calibration Data.

Element	Calibration Date	Expiration Date	WHC Standards Laboratory Code
FICV-1	5/08/95	5/08/96	518-28-03-012
FICV-2	5/08/95	5/08/96	518-28-03-008
FICV-3	5/08/95	5/08/96	518-28-03-004
FICV-4	5/08/95	5/08/96	518-28-03-006
FICV-5	5/08/95	5/08/96	518-28-03-011
FICV-6	5/08/95	5/08/96	518-28-03-009
FICV-7	5/08/95	5/08/96	518-28-03-014
FICV-8	5/08/95	5/08/96	518-28-03-013
FICV-9	5/08/95	5/08/96	518-28-03-007
FICV-10	5/08/95	5/08/96	518-28-03-010
FICV-11	5/08/95	5/08/96	518-28-03-005
PE-1	5/04/95	5/04/96	518-80-02-005
PE-2	5/04/95	5/04/96	518-80-02-006
PE-3	5/04/95	5/04/96	518-80-02-008
PE-4	5/04/95	5/04/96	518-80-02-007
PD-1	5/04/95	5/04/96	518-80-02-004
PD-2	5/04/95	5/04/96	518-80-02-003
Temperature Control System	3/30/95	3/30/96	804-67-74-009

5.3 BLANK SAMPLES

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

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

Spiked blanks are prepared as regular sampling media but also contain a known amount of special analyte. Tank vapors are drawn through these blanks and

they are handled and analyzed just like any other sample. Analysis of the spiked blanks is used to evaluate potential sample loss during shipment or storage.

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

Table 4 lists sample blanks used during the sampling of SST 241-SX-109.

6.0 ANOMALIES

All samples were collected in accordance with the Tank Characterization Plan (TCP) and WHC-IP-1127-4.10, *Collection of Parallel Sorbent Tube Canister Samples Using the Vapor Sampling System* (1995b). There were no anomalies during the sample collection, however, the tritium trap (sample number 55048-A03.0T1) was broken at the 222-S Laboratory. Historical data from the previous 48 tanks sampled with the VSS indicated that all 48 tritium trap samples were <50.0 pCi/L of tank gas. Based on this historical data the sample media was released to ship to PNL for analysis.

7.0 REFERENCES

- 49 CFR 100-177, 1992, "Transportation," *Code of Federal Regulations*, as amended.
- Homi, C. S., 1995, *Vapor Sampling and Analysis Plan*, WHC-SD-WM-TP-335, Rev. 0E, Westinghouse Hanford Company, Richland, Washington.
- Mahon, R. D., C. M. Jones, and M. S. Story, 1994 (draft), *Evaluation of the Capabilities and Use of the Vapor Sampling System for Tank Headspace Sampling and Characterization*, SD-WM-RPT-094, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995a, *Chain-of-Custody/Special Analysis Request for RCRA and CERCLA Protocol Samples*, Procedure WHC-IP-1127-1.3, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995b, *Collection of Parallel Sorbent Tube and Canister Samples Using the Vapor Sampling System*, Procedure WHC-IP-1127-4.10, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995c, *Release of Vapor Sampling Equipment*, Procedure 1995-33300-RSP-03, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A
SAMPLE LOG SHEETS

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Waste Tank
241-SX-108

Date: 8/01/95

VSS Personnel: Rich Westberg and Glenn Caprio

Trailer Personnel: Tim Utecht

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 MA-Sampling from Vent Port

GC Standard Runs

GC Ambient Air Runs through port 10

WHC Sample ID	PNL Sample ID	Port Valve #	Description	Desired Flow Rate sCCM	Desired Duration (min.)	Desired Total Flow sCCM	Actual Flow Rate sCCM	Actual Start Time	Actual End Time	Actual Total Time (min.)	Actual Total Flow Liters
Purge with ambient air for 30 min.											
S5048-A01.015	015		Overnight	5500	30	165000	5500	9:18	7:44	1346	7403.00
S5048-A01.015 AMBIENT #1											
GC Run #1 Ambient air/Cleanliness check											
S5048-A02.016	016	15	AMBIENT #2		1			8:01	8:05	1	
GC RUN#2 Ambient air											
LEAK CHECK(APPENDIX A) Leak Rate: <u>20.4 torr/hr</u>											
Purge with tank air for 30 min											
				5500	30	165000	5500	8:34	9:04	30	165.00
Measure tank pressure PE-1 = 741.3 torr											
GCRUN #3 (Tank run #1)											
S5048-A04.018	018	11	SUMMA #3		1			9:09	9:14	1	6.00

Waste Tank
241-SX-189

WMC Sample ID	PNL Sample ID	Port Valve #	Description	Desired		Actual		Actual Start Time	Actual End Time	Actual Total Time (min.)	Actual Total Flow
				Flow Rate SCCM	Duration (min.)	Flow Rate SCCM	Total Flow SCCM				
S5048-A05.593	TST#593	1	TST #1	200	5	200.00	1000	9:17	9:22	5	1.00
S5048-A06.594	TST#594	2	TST #2	200	5	200.00	1000	9:17	9:22	5	1.00
S5048-A07.595	TST#595	3	TST #3	200	5	199.50	1000	9:17	9:22	5	1.00
S5048-A03.0T1	T-2285 (222-S)	4	Tritium Trap	200	5	200.00	1000	9:17	9:22	5	1.00
S5048-A08.22T	22T	5	NH3/NOx/H2O (#1)	200	15	200.00	3000	9:17	9:32	15	3.00
S5048-A09.23T	23T	6	NH3/NOx/H2O (#2)	200	15	200.00	3000	9:17	9:32	15	3.00
S5048-A10.24T	24T	7	NOx/H2O (#3)	200	15	192.20	3000	9:17	9:32	15	2.88
S5048-A11.25T	25T	8	NH3/H2O/H2O (#4)	200	15	196.00	3000	9:17	9:32	15	2.94
GCRUN #4 (Tank run # 2)											
				13	SUMMA #4	1		9:39	9:40	1	6.00
GCRUN #5 (Tank run # 3)											
S5048-A13.596	TST#596	1	TST #4	200	5	200.00	1000	9:43	9:48	5	1.00
S5048-A14.597	TST#597	2	TST #5	200	5	200.00	1000	9:43	9:48	5	1.00
S5048-A15.598	TST#598	3	TST #6	200	5	189.60	1000	9:43	9:48	5	0.95
S5048-A16.26T	26T	5	NH3/NOx/H2O (#5)	200	15	200.00	3000	9:43	9:58	15	3.00
S5048-A17.27T	27T	6	NH3/NOx/H2O (#6)	200	15	200.00	3000	9:43	9:58	15	3.00
S5048-A18.28T	28T	7	NOx/H2O (#7)	200	15	190.10	3000	9:43	9:58	15	2.85
S5048-A19.29T	29T	8	NH3/H2O/H2O (#8)	200	15	195.40	3000	9:43	9:58	15	2.93
GCRUN #5 (Tank run # 3)											
				15	SUMMA #5	1		10:04	10:05	1	6.00

Waste Tank
241-SX-109

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

S5048-A21.599	TST#599		TST FIELD BLANK #1			9:53	9:54				
S5048-A22.600	TST#600		TST FIELD BLANK #2			9:53	9:54				
S5048-A25.30T	30T		NH3/NOx/H2O FIELD BLANK #1			10:03	10:04				
S5048-A26.31T	31T		NH3/NOx/H2O FIELD BLANK #2			10:03	10:04				
S5048-A27.32T	32T		NH3/NOx/H2O FIELD BLANK #3			10:03	10:04				

GCRUN#6 (Tank run # 4)

10:11

TOTAL TANK GAS USED DURING SAMPLING RUNS

48.55

S5048-A28.0U1	T-2266 (222S)		Upstream HEPA(box)								
S5048-A29.0D1	T-2267 (222S)		Downstream HEPA(box)								
S5048-A30.0U2	T-2268 (222S)		Upstream HEPA(VSS)								
S5048-A31.0D2	T-2269 (222S)		Downstream HEPA (VSS)								

Tip Blanks (DO NOT EXPOSE)

S5048-A23.601	TST#601		TST TRIP #1								
S5048-A24.602	TST#602		TST TRIP #2								

SX-109
TOTAL TANK VAPOR USED

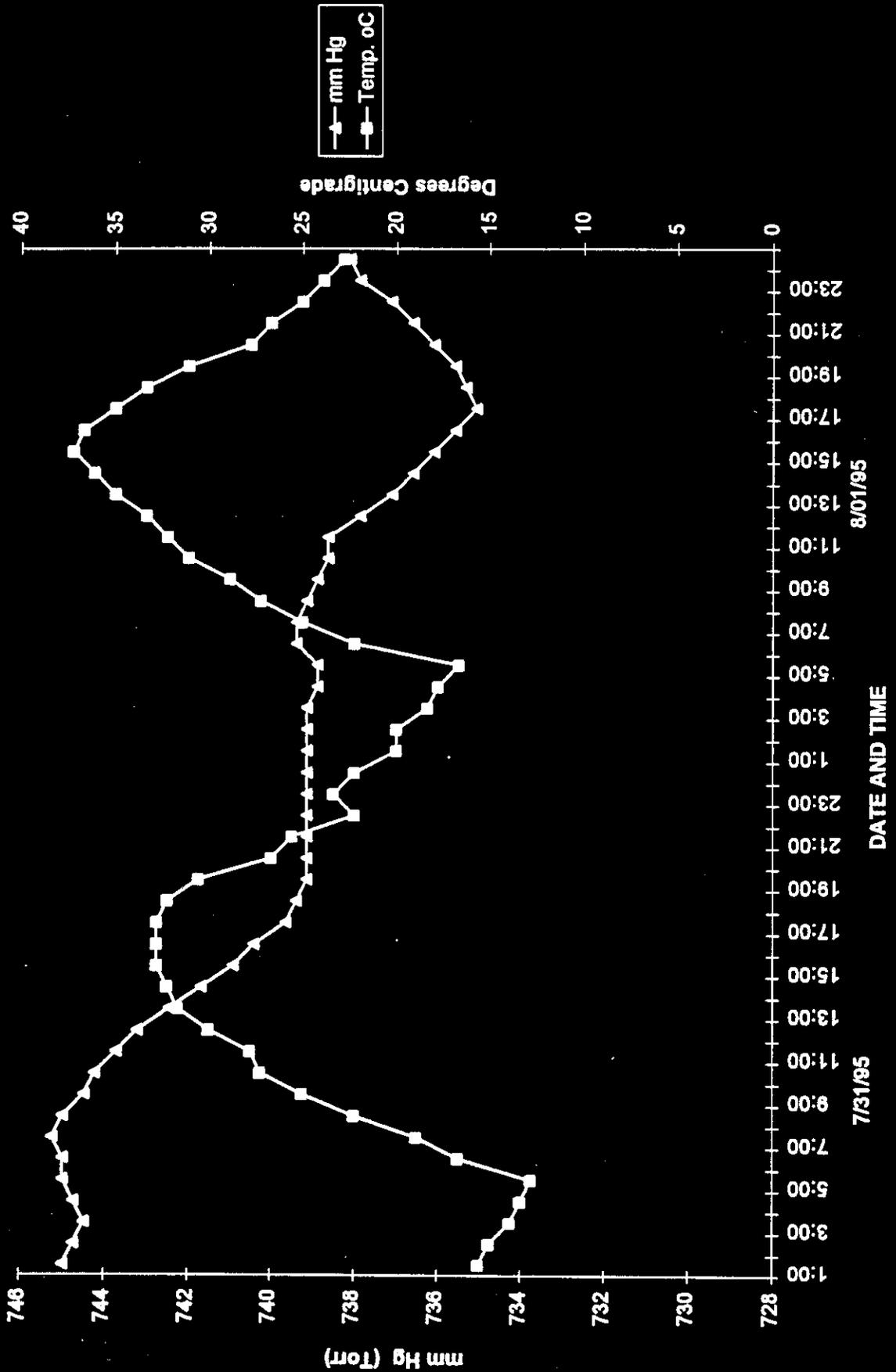
	NUMBER OF EVENTS	TIME IN MINUTES	VOLUME IN SCCM	TOTAL VOLUME, LITERS
LEAK CHECKS	1	0	5600	5.60
TANK PURGE PUMP DOWNS	3	1	5600	16.80
TANK PURGE TIME (From Spreadsheet)	1	30	5450	165.00
GC PURGES	4	2	5000	40.00
SUMMA PURGES	3	2	5000	30.00
ALL SAMPLES COLLECTED				48.55
TOTAL FOR TANK SAMPLING RUN				305.95

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APPENDIX B
AMBIENT CONDITIONS

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WEATHER DURING VSS SAMPLING OF 241-SX-109



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APPENDIX C
CHAIN-OF-CUSTODY FORMS

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COPY

Westinghouse Hanford Company
 C.C.C.# 009423
 Page 1 of 1

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector *T.B. Utsch* Contact/Requestor *R.D. Mickala* Tel. No. *373-2437* MISSN *53-27* FAX *373-7076*
 SAF Number *SS04F* Sample Origin *SX-109* Purchase Order/Charge Code *ELC38*
 Project Title *VAPOR SAMPLING* Logbook# *WHC-N-647 #10* Ice Chest # *N/A* Temp. *N/A*
 Shipped To (Lab) *220-5 Labs* Method of Shipment *boat vehicle # 536* Bill of Lading/Air Bill No. *N/A*
 Protocol *NONE* Data Transmittal *NEXT DAY* Outside Property No. *N/A*

Sample No.	LAB ID	Date	Time	No/Type Container	Sample Analysis	Permeative
<i>SS04F-001</i>	<i>T-2265</i>			<i>(1) Silica Gel</i>	<i>TOTAL ACTIVITY</i>	
<i>SS04F-001</i>	<i>T-2266</i>			<i>(1) HSPA</i>	<i>TOTAL ALPHA TOTAL Beta, GEA</i>	
<i>SS04F-001</i>	<i>T-2267</i>			<i>(1) HSPA</i>	<i>"</i>	
<i>SS04F-002</i>	<i>T-2268</i>			<i>(1) HSPA</i>	<i>"</i>	
<i>SS04F-002</i>	<i>T-2269</i>			<i>(1) HSPA</i>	<i>"</i>	
				<i>()</i>		
				<i>()</i>		
				<i>()</i>		
				<i>()</i>		
				<i>()</i>		
				<i>()</i>		
				<i>()</i>		
				<i>()</i>		
				<i>()</i>		

POSSIBLE SAMPLE HAZARDS/REMARKS MSDS Yes No P
 List all known wastes. *N/A*
 SPECIAL INSTRUCTIONS
PLEASE FAX info to Tim Utsch at 373-7076 Thanks

Subsampled By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix*
<i>Tim R. Utsch</i>			<i>8-25-85 13:25</i>	<i>Tim Utsch</i>			<i>8-25-85 13:25</i>	S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air
								DS - Drums Solids DL - Drums Liquids T - Tank WI - Wipe L - Liquid V - Vegetation X - Other

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

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

**Battelle
Pacific Northwest Lab**

CHAIN OF CUSTODY

WHC 008927

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-SX-109 Tank Vapor Sample SAF S5048
(VSS Truck)

Collection date ~~07-29-95~~ 07-01-95
Preparation date 07-17-95

Ice Chest No.

Field Logbook No. WHC-1-412-10

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

S5048 - A01 . 015 · Ambient Air SUMMA #1 Upwind of SX-109
S5048 - A02 . 016 · Ambient Air SUMMA #2 Through Port # 15

S5048 - A04 . 018 · SUMMA #3 Port # 15
S5048 - A12 . 021 · SUMMA #4 Port # 15
S5048 - A20 . 119 · SUMMA #5 Port # 13

Field Transfer of Custody		Chain of Possession (Sign and Print Names)			
Relinquished By	Date	Time	Received By	Date	Time
J.L. Julia	07-17-95	1330	T.B. Utch	07-17-95	1330
T.B. Utch	8-3-95	1330	J.A. Edwards	8-3-95	1330

Final Sample Disposition

Comments:

PNL (only) Checklist	Pick-up / Delivery	Comments:
<input type="checkbox"/> Media labeled and checked?	<input checked="" type="checkbox"/> Y / <input checked="" type="checkbox"/> N	
<input type="checkbox"/> Letter of instruction?	<input checked="" type="checkbox"/> Y / <input checked="" type="checkbox"/> N	
<input type="checkbox"/> Media in good condition?	<input checked="" type="checkbox"/> Y / <input checked="" type="checkbox"/> N	
<input type="checkbox"/> COC info/signatures complete?	<input checked="" type="checkbox"/> Y / <input checked="" type="checkbox"/> N	
<input type="checkbox"/> Rad release stickers on samples?	<input checked="" type="checkbox"/> Y / <input checked="" type="checkbox"/> N	
<input type="checkbox"/> Activity report from 222S?	<input checked="" type="checkbox"/> Y / <input checked="" type="checkbox"/> N	
<input type="checkbox"/> COC copy for LRB, RIDS filed?	<input checked="" type="checkbox"/> Y / <input checked="" type="checkbox"/> N	
	POC <i>JE</i>	POC <i>AE</i>

(Revised 10/17/94 PNL)

Battelle Pacific Northwest Laboratory

CHAIN OF CUSTODY

WHC 008926

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-SX-109 Tank Vapor Sample SAF S5048
(VSS Truck)**

Collection date ⁰⁸⁻⁰¹⁻⁹⁵
~~07-21-95~~
Preparation date **07-11-95** ^{7:45-5:30}

Ice Chest No.

Field Logbook No. **WHC-A-697-10**

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

Offsite Property No. **N/A**

Method of Shipment **Government Truck**

Shipped to **WHC**

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

Sample Identification

S5048 - A08 . 22T -	NH ₃ /NO _x /H ₂ O	(INORG Sorbent Trap # 1)	Line # <u>5</u>
S5048 - A09 . 23T -	NH ₃ /NO _x /H ₂ O	(INORG Sorbent Trap # 2)	Line # <u>6</u>
S5048 - A10 . 24T -	NO _x /H ₂ O	(INORG Sorbent Trap # 3)	Line # <u>7</u>
S5048 - A11 . 25T -	NH ₃ /H ₂ O/H ₂ O	(INORG Sorbent Trap # 4)	Line # <u>8</u>
S5048 - A16 . 26T -	NH ₃ /NO _x /H ₂ O	(INORG Sorbent Trap # 5)	Line # <u>5</u>
S5048 - A17 . 27T -	NH ₃ /NO _x /H ₂ O	(INORG Sorbent Trap # 6)	Line # <u>6</u>
S5048 - A18 . 28T -	NO _x /H ₂ O	(INORG Sorbent Trap # 7)	Line # <u>7</u>
S5048 - A19 . 29T -	NH ₃ /H ₂ O/H ₂ O	(INORG Sorbent Trap # 8)	Line # <u>8</u>
S5048 - A25 . 30T -	NH ₃ /NO _x /H ₂ O	(INORG Field Blank # 1))	
S5048 - A26 . 31T -	NH ₃ /NO _x /H ₂ O	(INORG Field Blank # 2)	
S5048 - A27 . 32T -	NH ₃ /NO _x /H ₂ O	(INORG Field Blank # 3))	

Field Transfer of Custody			Chain of Possession (Sign and Print Names)		
Relinquished By	Date	Time	Received By	Date	Time
G W Dennis <i>[Signature]</i>	07-12-95	1445	J A Edwards <i>[Signature]</i>	07-12-95	1445
J L Julia <i>[Signature]</i>	07-11-95	1330	T. B. Uhl <i>[Signature]</i>	07-11-95	1330
T. B. Uhl <i>[Signature]</i>	8-3-95	1330	J A Edwards <i>[Signature]</i>	8-3-95	1330

Final Sample Disposition

Comments:

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

(Revised 05/10/95 PNL)

Battelle Pacific Northwest Laboratory

CHAIN OF CUSTODY

WHC 008928

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

Telephone (509) 373-0141
Page 85-3009 / P8-08 / FAX 376-0418

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

Telephone (509) 373-7437
Page 85-9658 / S3-27 / FAX 373-7076

Project Designation/Sampling Locations **200 West Tank Farm
241-SX-109 Tank Vapor Sample SAF S5048
(VSS Truck)**

Collection date ~~07-25-95~~ ⁰⁸⁻⁰¹⁻⁹⁵ **T84**
Preparation date **07-13-95** ⁸⁻¹⁻⁹⁵

Ice Chest No.

Field Logbook No. **WHC-N 447.10**

Erico Hi/Lo thermometer No. **PNL-T-004**

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

Offsite Property No. **N/A**

Method of Shipment **Government Truck**

Shipped to **WHC**

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

Sample Identification

S5048 - A05 . 593 -	PNL Triple Sorbent Trap (TST) Sample # 1	Line # <u>1</u>
S5048 - A06 . 594 -	PNL TST Sample # 2	Line # <u>2</u>
S5048 - A07 . 595 -	PNL TST Sample # 3	Line # <u>3</u>
S5048 - A13 . 596 -	PNL TST Sample # 4	Line # <u>1</u>
S5048 - A14 . 597 -	PNL TST Sample # 5	Line # <u>2</u>
S5048 - A15 . 598 -	PNL TST Sample # 6	Line # <u>3</u>
S5048 - A21 . 599 -	Open, close & store PNL TST Field Blank # 1	In VSS truck
S5048 - A22 . 600 -	Open, close & store PNL TST Field Blank # 2	In VSS truck
S5048 - A23 . 601 -	Store PNL TST Trip Blank # 1	None
S5048 - A24 . 602 -	Store PNL TST Trip Blank # 2	None

Field Transfer of Custody		Chain of Possession (Sign and Print Names)			
Relinquished By	Date	Time	Received By	D7te	Time
J.L. Julya	07-17-95	1330	T B Utecht	07-17-95	1330
<i>[Signature]</i>	8-3-95	1330	<i>[Signature]</i>	8-3-95	1330

Final Sample Disposition

Comments:

ENR (only) Checklist	Pick-up / Delivery
Media labeled and checked?	<input checked="" type="checkbox"/> N
Letter of instruction?	<input checked="" type="checkbox"/> N
Media in good condition?	<input checked="" type="checkbox"/> N
COC info/signatures complete?	<input checked="" type="checkbox"/> N
Sorbents shipped on ice? (<5°C)	<input checked="" type="checkbox"/> N
Hi/Lo thermometer - <i>Keep upright</i>	<input checked="" type="checkbox"/> N
Hi/Lo thermometer	<input checked="" type="checkbox"/> N
Rad release stickers on samples?	<input checked="" type="checkbox"/> N
Activity report from 222S?	<input checked="" type="checkbox"/> N
COC copy for LRB, RIDS filed?	<input checked="" type="checkbox"/> N

Comments:

Cooler Temperature Status	
Hi ___ °C / Lo ___ °C (pick up at PNL to WHC)	
Hi ___ °C / Lo ___ °C (delivery at WHC from PNL)	
Hi ___ °C / Lo ___ °C (at return to PNL from WHC)	
Hi ___ °C / Lo ___ °C (at delivery from WHC to PNL)	

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

(Revised 06/21/95 PNL)