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Waste Retrieval Sluicing System Vapor Sampling and Analysis Plan for Evaluation of Organic Emissions, Process Test Phase II

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Waste Retrieval Sluicing System Vapor Sampling and Analysis Plan for Evaluation of Organic Emissions, Process Test Phase II

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Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

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LIST OF ABBREVIATIONS

CAS	Chemical Abstracts Service
CPO	Characterization Project Operations
DBP	dibutyl phosphate
FID	flame ionization detector
GC/MS	gas chromatography/mass spectrometry
GC/TCD	gas chromatography/thermal conductivity detector
HASQARD	Hanford Analytical Services Quality Assurance Requirements Document
IC	ion chromatography
IDLH	immediately dangerous to life and health
LFL	lower flammability limit
LMHC	Lockheed Martin Hanford Corporation
N/A	not applicable or not available
NEVS	non-electrical sampling system
NHC	Numatec Hanford Corporation
ppmv	parts per million by volume
PUF	polyurethane foam
QA	quality assurance
QC	quality control
SAS	Special Analytical Support
STT	sorbent tube train
TBP	tributyl phosphate
TOC	total organic carbon
TST	triple sorbent trap
TWRS	Tank Waste Remediation System
WSCF	Waste Sampling and Characterization Facility

1.0 SAMPLING AND ANALYSIS OBJECTIVES

This sampling and analysis plan identifies characterization objectives pertaining to sample collection, laboratory analytical evaluation, and reporting requirements for vapor samples obtained to address vapor issued related to the sluicing of tank 241-C-106. Sampling will be performed in accordance with *Waste Retrieval Sluicing System Emissions Collection Phase II* (Jones 1999) and *Process Test Plan Phase II, Waste Retrieval Sluicing System Emissions Collection* (Powers 1999). Analytical requirements include those specified in *Request for Ecology Concurrence on Draft Strategy/Path Forward to Address Concerns Regarding Organic Emissions from C-106 Sluicing Activities* (Peterson 1998).

The Waste Retrieval Sluicing System was installed to retrieve and transfer high-heat sludge from tank 241-C-106 to tank 241-AY-102, which is designed for high-heat waste storage. During initial sluicing of tank 241-C-106 in November 1998, operations were halted due to detection of unexpected high total organic compounds that exceeded regulatory permit limits. Several workers also reported smelling sharp odors and throat irritation. Vapor grab samples from the 296-C-006 ventilation system were taken as soon as possible after the detection; the analyses indicated that volatile and semi-volatile organic compounds were present.

In December 1998, a process test (phase I) was conducted in which the pumps in tanks 241-C-106 and 241-AY-102 were operated and vapor samples obtained to determine constituents that may be present during active sluicing of tank 241-C-106. The process test was suspended when a jumper leak was detected. A goal of phase II of the process test will be to obtain representative vapor samples at higher concentrations than those achieved in phase I of the process test. During phase II of the process test, vapor samples will be obtained from the 296-C-006 ventilation system stack and 241-AZ-702 ventilation system stack. Ambient air samples will also be obtained at several locations. Results will be used to address the following:

- Provide gas composition data that can be used to determine personnel protective measures,
- Provide gas composition data that can be used for control equipment selection and design, if required,
- Substantiate that ammonia and organic emissions are below regulatory thresholds during the test.

The following sections provides the general methodology and procedures to be used in the preparation, retrieval, transport, analysis, and reporting of results from vapor samples retrieved during the process test.

2.0 SAMPLING EVENT REQUIREMENTS

The waste retrieval sluicing system will be operated in accordance with the process test plan and process test procedure (Powers 1999, Jones 1999) to raise the total organic carbon (TOC) concentration in the 296-C-006 ventilation stack to levels above those reached in the phase I of the process test. It is anticipated that stack TOC levels of approximately 300-400 parts per million by volume (ppmv) will be reached. Initially during the test, the effects of sluicer jet direction on the release of volatile organic compounds will be tested. Based on this information, waste agitation will be controlled above 300 ppmv. The pumps will be tripped at 400 ppmv. Emergency evacuation will be conducted at 500 ppmv. The effects of the ventilation recirculation heater may be tested. Sluicing duration for the performance of this testing is limited to approximately 20 hours (9 hours maximum for the next sluice batch and the balance of the operating time for the subsequent batch). Vapor samples will be taken prior to, during, and after pump operation.

2.1 SAMPLE PREPARATION

SUMMA[1] canister samples, triple sorbent trap (TST) samples, sorbent tube train (STT) samples, and polyurethane foam (PUF) samples will be collected and sent to the laboratory for analysis; field and trip blanks will accompany the samples. The analytical laboratory for this sampling event is Numatec Hanford Corporation (NHC) Special Analytical Support (SAS). Particulate filter samples will be collected for radiation screening of the samples. SAS shall prepare the SUMMA canisters, TSTs, STTs, and PUFs for sample collection. Characterization Project Operations (CPO) shall prepare the particulate filter assemblies for use at the 241-AZ-702 stack and SAS shall prepare the particulate filter assemblies for use at the 296-C-006 stack; each particulate filter assembly shall contain two particulate filters mounted in series. SAS will also provide evacuated SUMMA canisters for use in collection of the particulate filter samples at the 241-AZ-702 stack. Sample preparation procedures are listed in Table 2-1.

Table 2-1. Sample Preparation Procedures

Sample container	Organization	Preparation Procedure
SUMMA canister	SAS	LO-080-406
TST	SAS	LA-549-403
STT	SAS	LA-549-402
PUF	SAS	N/A
Particulate filter assembly	CPO, SAS	N/A

Note:
N/A = not applicable

[1]SUMMA is a trademark of Tecktronics of Ohio.

2.2 SAMPLE COLLECTION

CPO will be responsible for the collection of particulate filter samples at the 241-AZ-702 stack and for the collection of all SUMMA canister samples. SAS will be responsible for the collection of particulate filter samples at the 296-C-006 stack and for the collection of all TST, STT, and PUF samples.

CPO sampling activities will be performed in accordance with work package ES-99-0055 for the 296-C-006 stack and ambient air samples and work package ES-99-0054 for sampling at the 241-AZ-702 stack samples. SAS sampling activities will be performed in accordance with work package 2E-99-143 and procedure LO-080-400, *Vapor Sampling Using the Non-Electrical Vapor Sampling System (NEVS)*.

Tubing used in the collection of vapor samples must be stainless steel, Teflon[2], or Teflon-coated and the length of the tubing used should be minimized. No C-flex or tygon tubing should be used upstream of the sample containers.

The samples shall include the following quality control (QC) samples: one TST, STT, and PUF ambient air field blank; and one TST, STT, and PUF trip blank. The trip and field blanks are to accompany the vapor samples to the laboratory. For specific information concerning sample and blank handling, custody, and transport, refer to the requirements in Section 4.0.

CPO and SAS shall record (or calculate) the following information for each sample collected: sample number, start and stop times for the collection of each sample, the TOC reading at the start of the collection of each sample, sample volumes, and any anomalous sampling conditions.

Particulate filter samples shall be shipped by CPO to the Waste Sampling and Characterization Facility (WSCF) for radiation screening analysis. The remaining samples shall be stored by CPO until radiation screening is completed and the samples can be released for analysis. Upon completion of the radiation screening and release of the samples, the samples shall be transferred to SAS for analysis.

Tables 2-2, 2-3, and 2-4 provide the sequence of sampling activities for 296-C-006 stack, ambient air, and 241-AZ-702 stack samples, respectively. The samples are summarized in Table 2-5. Unlike the sampling during Phase I of the process test, SUMMA, TST, STT, and PUF samples will not be collected through particulate filters. The particulate filter samples shall be collected separately, and the filter assembly removed from the sampling port prior to collecting the other samples.

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[2]Teflon is a registered trademark of I. E. DuPont De Nemours and Company

At a minimum, the following samples are required from the 296-C-006 stack:

- One set of samples before the pumps are started (baseline samples)
- One to three sets of samples after the pumps have started, as the stack TOC (as measured by the flame ionization detector [FID]) is increasing
- Two to three sets of samples during peak or steady state TOC concentrations
- One set of samples after the pumps are shut down and when TOC concentrations are subsiding.

To ensure that these samples are obtained, it is recommended that one set of samples be collected from the 296-C-006 stack once per hour (after pump start up) or when the TOC concentration has increased by 50 parts per million by volume (ppmv), whichever comes first (see Table 2-2). When three sets of samples have been collected at the peak/steady state TOC concentration, no further samples (except the set of post-shut-down samples) are required from the 296-C-006 stack. Sample collection or the suspension of sampling activities may also occur at the instruction of the test director. The sampling activities of SAS and CPO shall be coordinated so that, for each set of samples, the SUMMA canisters, TSTs, STTs, and PUFs are obtained at about the same time.

Ambient air samples in the C tank farm will consist of samples at three locations: 1) near the 296-C-006 stack, 2) near the fresh air truck, and 3) downwind of the stack at the fresh air boundary. Samples shall be obtained at these locations before the sluicing pumps are started and again when the TOC concentrations in the stack reach their peak or steady state concentrations.

Samples from the 241-AZ-702 stack will be obtained before the sluicing pumps are started and when the TOC concentration in the 241-AZ-702 stack has reached 25 ppmv and 50 ppmv. If 25 ppmv is not reached, two sets of samples shall be obtained when the TOC concentration in the 241-AZ-702 stack reached peak/steady state concentration. If the TOC concentration exceeds 25 ppmv but not 50 ppmv, one set of samples shall be obtained at 25 ppmv and the other shall be obtained when the TOC concentration in the 241-AZ-702 stack reached peak/steady state concentration.

Any decisions, observations, or deviations affecting this SAP shall be documented in controlled notebooks/or work packages and justified in the deliverable report.

Table 2-2. List of Samples and Activities for 296-C-006 Stack (7 sheets).

Sample Code	Sample/Activity Description	Sampler Position During Collection	Sample Volume	Sample Duration or Flow Rate[1]
---	Perform leak test of NEVS	N/A	N/A	N/A
Baseline samples				
201	Collect particulate filter sample before pump is started	296-C-006 Stack	1 L	≤500 mL/min
202	Collect baseline SUMMA canister before pump is started	296-C-006 Stack	6 L	2 min
203	Collect baseline TST before pump is started	296-C-006 Stack	0.5 L	≤500 mL/min
204	Collect baseline STT before pump is started	296-C-006 Stack	6 L	≤500 mL/min
205	Collect baseline PUF trap before pump is started	296-C-006 Stack	25 L	≤5 L/min
Sampling during sluicing operations				
Collect sample set #1 one hr after pumps start or when TOC rises to 50 ppmv, whichever comes first.				
206	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
207	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
208	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
209	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
210	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #2 one hour after collection of sample set #1 or when TOC is 50 ppmv above the reading when sample set #1 was collected, whichever comes first.				
211	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
212	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
213	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
214	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
215	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min

Table 2-2. List of Samples and Activities for 296-C-006 Stack (7 sheets).

Sample Code	Sample/Activity Description	Sampler Position During Collection	Sample Volume	Sample Duration or Flow Rate[1]
Collect sample set #3 one hour after collection of sample set #2 or when TOC is 50 ppmv above the reading when sample set #2 was collected, whichever comes first.				
216	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
217	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
218	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
219	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
220	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #4 one hour after collection of sample set #3 or when TOC is 50 ppmv above the reading when sample set #3 was collected, whichever comes first.				
221	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
222	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
223	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
224	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
225	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #5 one hour after collection of sample set #4 or when TOC is 50 ppmv above the reading when sample set #4 was collected, whichever comes first.				
226	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
227	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
228	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
229	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
230	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min

Table 2-2. List of Samples and Activities for 296-C-006 Stack (7 sheets).

Sample Code	Sample/Activity Description	Sampler Position During Collection	Sample Volume	Sample Duration or Flow Rate[1]
Collect sample set #6 one hour after collection of sample set #5 or when TOC is 50 ppmv above the reading when sample set #5 was collected, whichever comes first.				
231	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
232	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
233	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
234	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
235	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #7 one hour after collection of sample set #6 or when TOC is 50 ppmv above the reading when sample set #6 was collected, whichever comes first.				
236	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
237	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
238	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
239	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
240	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #8 one hour after collection of sample set #7 or when TOC is 50 ppmv above the reading when sample set #7 was collected, whichever comes first.				
241	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
242	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
243	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
244	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
245	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min

Table 2-2. List of Samples and Activities for 296-C-006 Stack (7 sheets).

Sample Code	Sample/Activity Description	Sampler Position During Collection	Sample Volume	Sample Duration or Flow Rate[1]
Collect sample set #9 one hour after collection of sample set #8 or when TOC is 50 ppmv above the reading when sample set #8 was collected, whichever comes first.				
246	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
247	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
248	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
249	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
250	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #10 one hour after collection of sample set #9 or when TOC is 50 ppmv above the reading when sample set #9 was collected, whichever comes first.				
251	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
252	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
253	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
254	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
255	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #11 one hour after collection of sample set #10 or when TOC is 50 ppmv above the reading when sample set #10 was collected, whichever comes first.				
256	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
257	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
258	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
259	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
260	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min

Table 2-2. List of Samples and Activities for 296-C-006 Stack (7 sheets).

Sample Code	Sample/Activity Description	Sampler Position During Collection	Sample Volume	Sample Duration or Flow Rate[1]
Collect sample set #12 one hour after collection of sample set #11 or when TOC is 50 ppmv above the reading when sample set #11 was collected, whichever comes first.				
261	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
262	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
263	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
264	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
265	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #13 one hour after collection of sample set #12 or when TOC is 50 ppmv above the reading when sample set #12 was collected, whichever comes first.				
266	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
267	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
268	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
269	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
270	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #14 one hour after collection of sample set #13 or when TOC is 50 ppmv above the reading when sample set #13 was collected, whichever comes first.				
271	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
272	Collect SUMMA canister	296-C-006 Stack	6 L	5 min
273	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
274	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
275	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min

Table 2-2. List of Samples and Activities for 296-C-006 Stack (7 sheets).

Sample Code	Sample/Activity Description	Sampler Position During Collection	Sample Volume	Sample Duration or Flow Rate[1]
Collect sample set #15 one hour after collection of sample set #14 or when TOC is 50 ppmv above the reading when sample set #14 was collected, whichever comes first.				
276	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
277	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
278	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
279	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
280	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #16 one hour after collection of sample set #15 or when TOC is 50 ppmv above the reading when sample set #15 was collected, whichever comes first.				
281	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
282	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
283	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
284	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
285	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min
Collect sample set #17 one hour after collection of sample set #16 or when TOC is 50 ppmv above the reading when sample set #16 was collected, whichever comes first.				
286	Collect particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
287	Collect SUMMA canister	296-C-006 Stack	6 L	2 min
288	Collect TST	296-C-006 Stack	0.5 L	≤500 mL/min
289	Collect STT	296-C-006 Stack	6 L	≤500 mL/min
290	Collect PUF trap	296-C-006 Stack	25 L	≤5 L/min

Table 2-2. List of Samples and Activities for 296-C-006 Stack (7 sheets).

Sample Code	Sample/Activity Description	Sampler Position During Collection	Sample Volume	Sample Duration or Flow Rate[1]
Post shut-down samples				
291	Collect post shut-down particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
292	Collect post shut-down SUMMA canister	296-C-006 Stack	6 L	2 min
293	Collect post shut-down TST	296-C-006 Stack	0.5 L	≤500 mL/min
294	Collect post shut-down STT	296-C-006 Stack	6 L	≤500 mL/min
295	Collect post shut-down PUF trap	296-C-006 Stack	25 L	≤5 L/min
296	Collect final particulate filter sample	296-C-006 Stack	1 L	≤500 mL/min
Blanks				
297	Store TST Trip Blank	---	---	---
298	Store STT Trip Blank	---	---	---
299	Store PUF Trip Blank	---	---	---
300	Open, close, and store TST Field Blank	---	---	---
301	Open, close, and store STT Field Blank	---	---	---
302	Open, close, and store PUF Field Blank	---	---	---

Note:
[1]CPO and SAS may adjust sample durations and flow rates as necessary to collect the samples.

Table 2-3. List of Samples and Activities for Ambient Air Sampling in C Tank Farm

Sample Code	Sample/Activity Description	Sampler Position During Collection	Sample Volume	Sample Duration or Rate[1]
Baseline samples				
201	Collect baseline SUMMA before pump is started.	near 296-C-006 stack	6 L	1 min
202	Collect baseline TST before pump is started	near 296-C-006 stack	0.5 L	≤500 mL/min
203	Collect baseline STT before pump is started	near 296-C-006 stack	6 L	≤500 mL/min
204	Collect baseline PUF before pump is started	near 296-C-006 stack	25 L	≤5 L/min
205	Collect baseline SUMMA before pump is started.	near fresh air truck	6 L	1 min
206	Collect baseline SUMMA before pump is started	downwind at the fresh air boundary	6 L	1 min
Samples at peak/steady state TOC concentrations				
207	Collect SUMMA when stack TOC concentration has reached peak/steady state	near 296-C-006 stack	6 L	1 min
208	Collect TST when stack TOC concentration has reached peak/steady state	near 296-C-006 stack	0.5 L	≤500 mL/min
209	Collect STT when stack TOC concentration has reached peak/steady state	near 296-C-006 stack	6 L	≤500 mL/min
210	Collect PUF when stack TOC concentration has reached peak/steady state	near 296-C-006 stack	25 L	≤5 L/min
211	Collect SUMMA when stack TOC concentration has reached peak/steady state	near fresh air truck	6 L	1 min
212	Collect SUMMA when stack TOC concentration has reached peak/steady state	downwind at the fresh air boundary	6 L	1 min

Note:
[1]CPO and SAS may adjust sample durations and flow rates as necessary to collect the samples.

Table 2-4. List of Samples and Activities for 241-AZ-702 Stack

Sample Code	Sample/Activity Description	Sampler Position During Collection	Sample Volume	Sample Duration or Rate[1]
Baseline samples				
201	Collect baseline particulate filter sample	241-AZ-702 Stack	6 L	2 min
202	Collect baseline SAS SUMMA	241-AZ-702 Stack	6 L	2 min
Sample during pump operation				
203	Collect particulate filter sample when stack FID/PID reading is 25 ppmv (or at peak/steady state if 25 ppmv is not reached)	241-AZ-702 Stack	6 L	2 min
204	Collect SAS SUMMA when stack reading is 25 ppmv (or at peak/steady state if 25 ppmv is not reached)	241-AZ-702 Stack	6 L	2 min
205	Collect particulate filter sample when stack FID/PID reading is 50 ppmv (or at peak/steady state if 50 ppmv is not reached)	241-AZ-702 Stack	6 L	2 min
206	Collect SAS SUMMA when stack reading is 50 ppmv (or at peak/steady state if 50 ppmv is not reached)	241-AZ-702 Stack	6 L	2 min
After completion of sampling at 241-AZ-702 stack				
207	Collect final particulate filter sample	241-AZ-702 Stack	6 L	2 min

Note:
[1]CPO and SAS may adjust sample durations and flow rates as necessary to collect the samples.

Table 2-5. Vapor Sampling Summary (2 sheets).

Sample location	Sample time	Sample type	Sample container	Number of samples
---	Baseline	Trip blank	TST	1
			STT	1
			PUF	1
---	Baseline	Field blank	TST	1
			STT	1
			PUF	1
296-C-006 stack	Baseline	Stack vapor	SUMMA	1
			TST	1
			STT	1
			PUF	1
			Particulate filter assembly	1
	During sluicing	Stack vapor	SUMMA	up to 17
			TST	up to 17
			STT	up to 17
			PUF	up to 17
			Particulate filter assembly	up to 17
	Post shut-down	Stack vapor	SUMMA	1
			TST	1
			STT	1
			PUF	1
			Particulate filter assembly	2
Breathing Area, C Tank Farm	Baseline	Ambient air	SUMMA	3
			TST	1
			STT	1
			PUF	1

Table 2-5. Vapor Sampling Summary (2 sheets).

Sample location	Sample time	Sample type	Sample container	Number of samples
Breathing Area, C Tank Farm, (continued)	During sluicing	Ambient air	SUMMA	3
			TST	1
			STT	1
			PUF	1
241-AZ-702 stack	Baseline	Stack vapor	SUMMA	1
			Particulate filter assembly	1
	During sluicing	Stack vapor	SUMMA	2
			Particulate filter assembly	3

Notes:
baseline = prior to pump startup
PUF = polyurethane foam filter
STT = sorbent tube train
TST = triple sorbent tube
Each particulate filter assembly contains two particulate filters mounted in series.

2.3 RADIATION SCREENING

Surveys using particulate filter samples from the 296-C-006 and the 241-AZ-702 ventilation systems will be used periodically during the process test to allow the samples to obtain a radiological release and ensure that the samples meet the SAS laboratory acceptance criteria. The particulate filter samples will be collected by CPO and SAS and sent to WSCF for analysis of both the upstream and downstream particulate filters in each particulate filter assembly. Analytical procedures are specified in Section 3.0. If the limits specified in Section 3.0 are exceeded the survey samples will be recounted every few days until the activity drops below the limits, allowing release of the samples. The results from the radiation screening shall be submitted to SAS and the Process Engineering point of contact for vapor sampling for evaluation. Tritium trap samples were collected and analyzed during phase I of the process test in December 1998. The results of these earlier tritium trap samples are adequate to release the phase II process test samples with regard to potential tritium contamination. Therefore, no tritium trap samples will be obtained during phase II of the process test.

3.0 LABORATORY ANALYSIS REQUIREMENTS

The responsibilities of the analytical laboratories are given in this section. Additional quality control and deliverable requirements are given in Sections 4.0 and 7.0.

Vapor samples shall be analyzed by SAS in accordance with Table 3-1. Sorbent tube trains shall be analyzed for ammonia and oxides of nitrogen (nitric oxide and nitrogen dioxide). SUMMA canisters shall be analyzed for total non-methane hydrocarbons, hydrogen, nitrous oxide, methane, carbon monoxide, carbon dioxide, and selected organic analytes. TSTs shall be analyzed for selected organic analytes. PUF samples shall be analyzed for tri-butyl phosphate (TBP) and di-butyl phosphate (DBP).

Required analytes are those listed in Tables 3-2, 3-3, and 3-4. Quantitation limit goals for the Class A and B toxic air pollutants in these tables are documented in Mulkey (1995). In addition to the compounds listed, a determination is to be made for all other peaks that are at least 10 percent of the nearest internal standard. If possible, peaks smaller than 10 percent of the nearest internal standard should also be identified. All major constituents in the sample should be identified.

It is expected that not all samples will be analyzed. At a minimum, the laboratory shall analyze all trip blanks, field blanks, breathing area samples, baseline samples, post-shut down samples, at least two sets of samples from 296-C-006 stack, and at least one set of samples from the 241-AZ-702 stack. Prior to the receipt of the samples at the laboratory, the Process Engineering point of contact for vapor sampling shall provide SAS with a list identifying the stack samples to be analyzed.

Particulate filter samples shall be analyzed at the WSCF as discussed in Section 2.3 and in accordance with Table 3-1.

If any requested analyses cannot be performed, the Process Engineering point of contact for vapor sampling shall be notified.

Table 3-1. Chemical and Radiological Analytical Requirements

VAPOR ANALYSES			
Project Name	WRRS	Comments	Reporting Formats
Plan Number	HNF-4030, Rev. 0	Field Blank - Required Trip Blank - Required	Format I: Immediate Notification
			Format II: Process Control
Program Contact:	J. W. Lentsch		Format III: Safety Screen
TWRS Contact:	L. M. Sasaki		Format IV: Waste Management
Lab Contact (SAS):	R. S. Viswanath		Format V: RCRA Compliance
			Format VI: Special

PRIMARY ANALYSES							CRITERIA			REPORT FORMAT
ANALYSIS METHOD	PRIMARY ANALYTE	PROCEDURE	LAB	SAMPLE PREP	SAMPLE CONTAINER	SURROGATE SPIKE	NOTIFICATION LIMIT	PRECISION	ACCURACY	
GC/MS	Organic Speciation	LA-523-404	SAS	Direct	SUMMA	none	≥ 20% LFL and/or 50% IDLH	±25%	70-130%	I, VI
GC/TCD	CO_2, CO, CH_4, H_2, and N_2O	LA-523-409	SAS	Direct	SUMMA	none	≥ 20% LFL and/or 50% IDLH	±25%	70-130%	I, VI
GC/FID	Total nonmethane hydrocarbons	LA-523-407	SAS	Direct	SUMMA	none	≥ 20% LFL	±25%	70-130%	I, VI
IC	NH_3	LA-533-402	SAS	H_2O Extraction	STT	none	≥ 150 ppmv	±25%	70-130%	I, VI
IC	Oxides of nitrogen	LA-533-400	SAS	H_2O Extraction	STT	none	≥ 150 ppmv	±25%	70-130%	I, VI
GC/MS	Organic Speciation	LA-523-408	SAS	Thermal Desorption	TST	all	≥ 20% LFL and/or 50% IDLH	±25%	70-130%	I, VI
GC/MS	TBP, DBP	LA-523-428	SAS	Solvent Extraction	PUF	none	≥ 20% LFL and/or 50% IDLH	±25%	70-130%	I, VI
Total α, total β, γ Energy	Radionuclides	LA-548-421 LA-508-415 LA-508-462	WSCF	Direct	Particulate Filter	N/A	N/A	±25%	70-130%	II

Notes:
N/A = not applicable

Table 3-2. Required Analytes: Regulatory

Analyte	CAS Number	LFL (ppmv)	20% LFL (ppmv)	IDLH (ppmv)	50% IDLH (ppmv)
1, 3 Butadiene	106-99-0	20,000	4,000	2,000	1000
Chloroform	67-66-3	N/A	N/A	500	250
1, 4 Dioxane	123-91-1	20,000	4,000	500	250
Benzene	71-43-2	12,000	2,400	500	250
Carbon tetrachloride	56-23-5	N/A	N/A	200	100
Dichloromethane (Methylene chloride)	75-09-2	130,000	26,000	2,300	1,150
Acetaldehyde	75-07-1	40,000	8,000	2,000	1,000
Perchloroethylene	127-18-4	N/A	N/A	150	75
Ammonia	7664-41-7	150,000	30,000	300	150
Tributyl phosphate	126-73-8	N/A	N/A	30	15
Dibutyl phosphate	107-66-4	N/A	N/A	30	15
Hexane	110-54-3	12,000	2,400	1,100	550
Nitric oxide	10102-43-9	N/A	N/A	100	50
Acetone	67-64-1	25,000	5,000	2,500	1,250
n-Butanol	71-36-3	14,000	2,800	1,400	700
Nitrous oxide	10024-97-2	N/A	N/A	N/A	N/A
3-Heptanone (Ethyl butyl ketone)	106-35-4	N/A	N/A	1,000	500
Nonane	111-84-2	8,500	1,700	N/A	N/A
4-Heptanone (Dipropyl ketone)	123-19-3	N/A	N/A	N/A	N/A
n-Heptane	142-82-5	10,500	2,100	750	375
TNMHC	N/A	N/A	N/A	N/A	N/A

Note:
N/A = not applicable or not available

Table 3-3. Required Analytes: Program Requested Analytes/Selected Compounds Observed in Tank 241-C-106 Vapor or Waste Samples

Analyte	CAS Number	LFL (ppmv)	20% LFL (ppmv)	IDLH (ppmv)	50% IDLH (ppmv)
Methane	74-82-8	50,000	10,000	N/A	N/A
Ethane	74-84-0	30,000	6,000	N/A	N/A
Ethylene	74-85-1	30,000	6,000	N/A	N/A
1-Hexene	592-41-6	N/A	N/A	N/A	N/A
Hexane	110-54-3	12,000	2,400	1,100	550
1-Heptene	582-76-7	N/A	N/A	N/A	N/A
3-Heptene, (E)-	14686-14-7	N/A	N/A	N/A	N/A
Heptane	142-82-5	10,500	2,100	750	375
2-Heptene	592-77-8	N/A	N/A	N/A	N/A
3-Heptene	292-78-9	N/A	N/A	N/A	N/A
2,4- Dimethyl-2,3-pentadiene	1000-87-9	N/A	N/A	N/A	N/A
2-Heptyne	1119-65-9	N/A	N/A	N/A	N/A
3-Methyl-heptane	589-81-1	N/A	N/A	N/A	N/A
3-Methylene-heptane	1632-16-2	N/A	N/A	N/A	N/A
3-Methyl-3-heptene	7300-03-0	N/A	N/A	N/A	N/A
3-Ethyl-4-methyl-4-pentene	61847-80-1	N/A	N/A	N/A	N/A
2-Octene	111-67-1	N/A	N/A	N/A	N/A
4-Heptanone	123-19-3	N/A	N/A	N/D	N/D
3-Heptanone	106-35-4	N/A	N/A	1,000	500
Nonane	111-84-2	8,500	1,700	N/A	N/A
Decane	124-18-5	7,500	1,500	N/A	N/A
Decahydro-naphthalene	91-17-8	7,000	1,400	N/A	N/A
Undecane	1120-21-4	N/A	N/A	N/A	N/A
Dodecane	112-40-3	6,000	1,200	N/A	N/A
Tridecane	629-50-5	N/A	N/A	N/A	N/A
Tetradecane	629-59-4	N/A	N/A	N/A	N/A
Pentadecane	629-62-9	N/A	N/A	N/A	N/A

Note:
N/A = not applicable or not available

Table 3-4. Required Analytes: Target Analytes (2 sheets).

Analyte	CAS Number	LFL (ppmv)	20% LFL (ppmv)	IDLH (ppmv)	50% IDLH (ppmv)
Ammonia, NH_3	7664-41-7	150,000	30,000	300	150
Nitric oxide, NO	10102-43-9	N/A	N/A	100	50
Nitrogen dioxide, NO_2	10102-44-0	N/A	N/A	20	10
Methane, CH_4	74-82-8	50,000	10,000	N/A	N/A
Carbon dioxide, CO_2	124-38-9	N/A	N/A	40,000	20,000
Carbon monoxide, CO	630-08-0	125,000	25,000	1,200	600
Nitrous oxide, N_2O	10024-97-2	N/A	N/A	N/A	N/A
Hydrogen, H_2	1333-74-0	40,000	8,000	N/A	N/A
Acetaldehyde	75-07-1	40,000	8,000	2,000	1,000
Dichlorodifluoromethane (Freon 12)	75-71-8	N/A	N/A	15,000	7,500
Methyl chloride	74-87-3	81,000	16,200	2,000	1,000
n-Butane	106-97-8	18,000	3,600	N/A	N/A
Ethyl chloride	75-00-3	38,000	7,600	3,800	1,900
Ethanol	64-17-5	33,000	6,600	3,300	1,650
Trichlorofluoromethane (Freon 11)	75-69-4	N/A	N/A	2,000	1,000
Ethanenitrile (acetonitrile)	75-05-8	30,000	6,000	500	250
Propanone (acetone)	67-64-1	25,000	5,000	2,500	1,250
Furan	110-00-9	N/A	N/A	N/A	N/A
n-Pentane	109-66-0	14,000	2,800	1,500	750
2-Propanol	67-63-0	20,000	4,000	2,000	1,000
Dichloromethane (methylene chloride)	75-09-2	130,000	26,000	2,300	1,150
1-Propanol	71-23-8	22,000	4,400	800	400
2-Methyl pentane	107-83-5	N/A	N/A	N/A	N/A
Propanenitrile	107-12-0	31,000	6,200	N/A	N/A
Butanal	123-72-8	14,000	2,800	1,400	700
1-Hexene	592-41-6	N/A	N/A	N/A	N/A
2-Butanone	78-93-3	14,000	2,800	3,000	1,500
n-Hexane	110-54-3	12,000	2,400	1,100	550
Trichloromethane (chloroform)	67-66-3	N/A	N/A	500	250
Tetrahydrofuran	109-99-9	20,000	4,000	2,000	1,000
1-Butanol	71-36-3	14,000	2,800	1,400	700
Benzene	71-43-2	12,000	2,400	500	250
Tetrachloromethane (carbon tetrachloride)	56-23-5	N/A	N/A	200	100
1-Butanenitrile	109-74-0	16,500	3,300	N/A	N/A
3-Methyl hexane	589-34-4	N/A	N/A	N/A	N/A

Table 3-4. Required Analytes: Target Analytes (2 sheets).

Analyte	CAS Number	LFL (ppmv)	20% LFL (ppmv)	IDLH (ppmv)	50% IDLH (ppmv)
2-Pentanone	107-87-9	15,000	3,000	1,500	750
n-Heptane	142-82-5	10,500	2,100	750	375
1,4-Dioxane	123-91-1	20,000	4,000	500	250
4-Methyl-2-pentanone (hexone)	108-10-1	12,000	2,400	500	250
Toluene	108-88-3	11,000	2,200	500	250
2-Hexanone	591-78-6	N/A	N/A	150	75
n-Octane	111-65-9	9,500	1,900	1,000	500
Tetrachloroethylene	127-18-4	N/A	N/A	150	75
Chlorobenzene	108-90-7	13,000	2,600	1,000	500
Ethylbenzene	100-41-4	8,000	1,600	800	400
m, p-Xylene	106-42-3	11,000	2,200	900	450
3-Heptanone	106-35-4	N/A	N/A	1,000	500
2-Heptanone	110-43-0	11,000	2,200	800	400
Cyclohexanone	108-94-1	11,000	2,200	700	350
Styrene	100-42-5	9,000	1,800	700	350
n-Nonane	111-84-2	8,500	1,700	N/A	N/A
o-Xylene	95-47-6	9,000	1,800	900	450
1,1,2,2-Tetrachloroethane	79-34-5	N/A	N/A	100	50
2-Octanone	111-13-7	N/A	N/A	N/A	N/A
n-Decane	124-18-5	7,500	1,500	N/A	N/A
1,2,4-Trimethylbenzene	95-63-6	9,000	1,800	N/A	N/A

Note:
N/A = not applicable or not available

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

Vapor sampling and analysis shall be performed in accordance with approved quality assurance (QA) plans. These plans are required to meet the *Hanford Analytical Services Quality Assurance Requirements Document* (HASQARD) (DOE 1998) requirements. Validation of this compliance shall be verified either by a HASQARD assessment stating their quality program satisfactorily meets the appropriate requirements, or the quality program plan and applicable procedures will be submitted and approved prior to work performance on sampling or analytical work. Quality requirements for conducting Characterization Project sampling and analysis are described in *Tank Waste Remediation System Characterization Project, Quality Policies* (Board 1998) and this sampling and analysis plan. Characterization Project sampling and analysis shall be conducted in conformance with these QA requirements.

Processes, services, activities, and conditions adverse to quality which do not conform to requirements specified in this sampling and analysis plan or references herein shall be controlled to prevent inadvertent use. Nonconforming sampling and analysis processes shall be identified, controlled, reported, and dispositioned as required by PHMC (1998).

4.1 LABORATORY OPERATIONS

Analytical procedures that are to be used for this sample and analysis plan shall be written and approved prior to the performance of analytical work within the laboratory. Analytical QC requirements are identified in Table 3-1. The laboratory shall also use calibration and calibration check standards appropriate for the analytical instrumentation being used (see DOE [1998] for definitions of QC samples and standards). The criteria presented are goals for demonstrating reliable method performance. It is understood that the laboratory will follow its internal QC system for required actions whenever QC failures occur. If sample QC failures occur or if all analyses cannot be performed (e.g., insufficient sample), analysts shall consult with supervisors/customers to determine the proper action. The laboratory should provide a suggested course of action at that time. All sample QC failures and limitations on the associated data shall be discussed in the narrative of the data report. Proper notification of all data not meeting QC requirements shall be included with the data.

4.2 SAMPLE COLLECTION

Sampling shall be performed in accordance with approved procedures and work plans included within the job control system. All data sheets and log entries completed during the performance of sampling shall be copied and included within the job control system package.

Each sample identification number shall have the following format:

VLXXX-YYY-ZZZZ

where,

V indicates a vapor sample,
L = a letter code identifying the organization that prepared the sample container/sample media
    C= CPO
    S= SAS,
XXX = a three-digit/letter code identifying the sample location
    006 = 296-C-006 stack
    AMB = ambient air samples at C tank farm
    702 = 241-AZ-702 stack,
YYY = a three-digit sample code found in Tables 2-2, 2-3, and 2-4,
ZZZZ = a special lab-assigned or CPO-assigned code.

4.3 SAMPLE CUSTODY

Chain-of-custody will be carefully maintained to assure sample control at all times.

5.0 EXCEPTIONS, CLARIFICATIONS, AND ASSUMPTIONS

Trip Blanks and Field Blanks

Trip Blanks are sampling devices prepared and handled in the same manner as samples, except that they are never opened in the field. Field Blanks are sampling devices prepared and handled in the same manner as the samples, but no tank gases are drawn through them.

6.0 ORGANIZATION

The organization and responsibility of key personnel involved with these tank characterization projects are listed in Table 6-1.

Table 6-1. Project Key Personnel

Responsibility	Organization	Individual
Data Assessment and Interpretation manager	TWRS Process Engineering (LMHC)	K. M. Hall, 376-5029
Process Engineering point of contact for vapor sampling	TWRS Process Engineering (LMHC)	L. M. Sasaki, 373-1027
Waste retrieval sluicing system operations manager	Retrieval Operations Program (NHC)	J. W. Lentsch, 373-5252
Waste retrieval sluicing system technical contact	TWRS Process Engineering, (LMHC)	K. G. Carothers, 373-4556
Vapor sampling cognizant engineer	Characterization Field Engineering (LMHC)	D. D. Wanner, 373-3297
SAS vapor sampling and analysis project manager	Special Analytical Support (NHC)	L. L. Lockrem, 373-4771
SAS vapor sampling and analysis technical contact	Special Analytical Support (NHC)	R. S. Viswanath, 376-9223
Industrial Hygiene and Safety points of contact	Tank Farm Facilities Operations, Field Safety Services (LMHC)	K. M. Bowen, 372-3667 N. K. Butler, 376-5795
Double-Shell Tank Farm point of contact	Tank Farm Operations	Double-Shell Tank Farm Operations shift manager, 373-2689
Senior Supervisory Watch, MO-211	C-106 Sluicing Operations (LMHC)	G. N. Hanson, 376-2182
Test Director, Waste Retrieval Sluicing System Process Test	C-106 Sluicing Operations (LMHC)	K. J. Anderson, 373-6039
Environmental point of contact	Environmental Permits/Policy (LMHC)	G. M. Crummel, 373-5175

7.0 DELIVERABLES

Sampling and analytical results shall be reported as Format VI reports. Any analyte exceeding the notification limit prescribed in Table 3-1 shall also be reported as a Format I report. In addition, Format II reports shall be provided by SAS, CPO, and WSCF as described in Section 7.2.

7.1 FORMAT I REPORTING

Table 3-1 contains the notification limits for specific analytes. Analytes that exceed notification limits shall be reported by the Project Manager or delegate by calling the Double-Shell Tank Farms Operations shift manager as soon as the data are obtained and reviewed by the responsible scientist. This verbal notification must be followed within one hour by electronic notification to the Double-Shell Tank Farms Operations shift manager, the Industrial Hygiene and Safety point of contact, the TWRS Process Engineering Data Assessment and Interpretation manager, the waste retrieval sluicing system point of contact and the Process Engineering point of contact for vapor sampling. A further review of the data, including quality control results and additional analyses for verification purposes may be contracted with the performing laboratory by either a revision to this sampling and analysis plan or by a letter.

7.2 FORMAT II REPORTING

WSCF shall provide the results of radiological analyses using the standard WSCF analytical laboratory report format. The results shall be faxed to SAS and the Process Engineering vapor sampling point of contact within 48 hours of receipt of the samples and followed by transmittal of a copy of the results via plant mail.

CPO shall provide information on its sampling activities (copies of sampling data sheets, J-5 forms, chain of custody forms, and other pertinent documentation) to SAS and the Process Engineering vapor sampling point of contact. The information provided shall include: the sample collection sequence and volumes, start and stop times for the collection of each sample, the TOC reading at the start of the collection of each sample, and any anomalous sampling conditions. This information shall be provided within 48 hours of the collection of the last set of samples.

The SAS sampling team shall provide information on its sampling activities to the Process Engineering vapor sampling point of contact. The information provided shall include: the sample collection sequence and volumes, start and stop times for the collection of each sample, the TOC reading at the start of the collection of each sample, verification of trip and field blank use, and any anomalous sampling conditions. This information shall be provided within 48 hours of the collection of the last set of samples.

7.3 FORMAT VI REPORTING

The Format VI report shall consist of two deliverables, preliminary analytical results and a final data package.

Preliminary sampling and analytical data shall be delivered within two weeks of the receipt of the samples at the laboratory. The preliminary data shall consist of, at a minimum, data tables reporting sample collection data, particulate filter analysis results, and the results of each analysis performed by the analytical laboratory. The following individuals shall be on distribution for the preliminary results: J. W. Bailey, N. K. Butler, K. G. Carothers, G. M. Crummel, J. W. Lentsch, R. L. Powers, and L. M. Sasaki.

A data package shall be issued as a supporting document within seven weeks of the receipt of the samples at the laboratory. The data package shall contain the elements listed in Table 7-1. The following individuals shall be on distribution for the entire data package: R. A. Bechtold, G. M. Crummel, and L. M. Sasaki. The following individuals require only the engineering data transmittal: J. W. Bailey, K. G. Carothers, J. W. Lentsch, N. K. Butler, R. L. Powers, and C. A. Simonen.

In addition to the data package, an electronic version of the analytical results shall be provided to the Tank Vapor Database representative within 4 calendar days from the day that the final data package is issued. The data must be available to the Washington State Department of Ecology within 7 calendar days of release of the data package. The electronic version shall be in the standard electronic format specified in Bobrowski and Simonen (1999).

Table 7-1. Data Package Required Elements (2 sheets).[1]

Prefatory Elements
Executive summary
Table of contents
List of abbreviations and acronyms
Quality assurance data package review results
Non-conformance reports

Table 7-1. Data Package Required Elements (2 sheets).[1]

Sampling Elements
Sampling case narrative
Sample summary and event chronology
Sampling procedures table
Sampling logbook table
Field data
Radiation screening results
Chain of custody forms
Analysis Elements
Analytical case narrative
Analytical procedures table
Data qualifier flag translation table
Target analytes concentration table
Tentatively identified compound concentration table
Laboratory blank summary
Field blank summary
Trip blank summary
Mass spectrometer instrument tune report
Target analyte initial calibration table
Internal standards area counts table
Laboratory control sample results table
Surrogate compounds results table
Quantitation reports
Chromatograms
Mass spectra of reported tentatively identified compounds

Note:
[1]Include all elements as applicable.

8.0 CHANGE CONTROL

Under certain circumstances, it may become necessary for the performing laboratory to make decisions concerning a sample without review of the data by the customer or the Characterization Project. All significant changes shall be documented by TWRS Process Engineering via an engineering change notice to this sampling and analysis plan or by a letter. All changes shall also be clearly documented in the final data report. Insignificant changes may be made by placing a notation in the permanent record (i.e., note change in log book or memo to file). Significance is determined by the Process Engineering point of contact for vapor sampling.

At the request of the Retrieval Operations Project, additional analysis of sample material from this characterization project shall be performed following a revision of this sampling and analysis plan or issuance of a letter.

9.0 REFERENCES

Board, D. C., 1998, *Tank Waste Remediation System, Characterization Project, Quality Policies*, HNF-SD-WM-QAPP-025, Rev. 4, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

Bobrowski, S. F., and C. A. Simonen, 1999, *Standard Electronic Format Specification for Tank Vapor Data MSEXCEL Spreadsheets: Version 1.0*, HNF-3815, Rev. 0, prepared by Pacific Northwest National Laboratory for Lockheed Martin Hanford Corp, Richland, Washington.

DOE, 1998, *Hanford Analytical Services Quality Assurance Requirements Document*, DOE/RL-96-68, Rev. 2, U.S. Department of Energy, Richland Field Office, Richland, Washington.

Jones, J. M., 1999, *Waste Retrieval Sluicing System Emissions Collection Phase II*, PTP-320-001, Rev. A-1, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

Mulkey, C. H., and K. D. Markillie, 1995, *Data Quality Objectives for Regulatory Requirements for Hazardous and Radioactive Air Emissions Sampling and Analysis*, WHC-SD-WM-DQO-021, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Peterson, K. A., 1998, *Request for Ecology Concurrence on Draft Strategy/Path Forward to Address Concerns Regarding Organic Emissions from C-106 Sluicing Activities*, (Meeting Minutes, December 3), Fluor Daniel Hanford, Inc., Richland, Washington.

PHMC, 1998, *Nonconforming Item Reporting and Control*, HNF-PRO-298, Rev. 1, Fluor Daniel Hanford, Inc. Richland, Washington.

Powers, R. L., 1999, *Process Test Plan, Phase II: Waste Retrieval Sluicing System Emissions Collection*, HNF-4034, Rev. 0, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

DISTRIBUTION SHEET

To	From	Page 1 of 2
Distribution	Data Assessment and Interpretation	Date 02/12/99
Project Title/Work Order		**EDT No.** EDT-611450
HNF-4030, Rev. 0, "Waste Retrieval Sluicing System Vapor Sampling and Analysis Plan for Evaluation of Organic Emissions, Process Test Phase II"		**ECN No.** N/A

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