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Sampling and Analysis Plan for Catch Tank 241-ER-311 Vapor

Duc M. Nguyen

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SAMPLING AND ANALYSIS PLAN FOR CATCH TANK 241- ER-311 VAPOR

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Lockheed Martin Hanford Corporation

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LIST OF TERMS

CGM	combustible gas monitor
CPO	Characterization Project Operations
DB	diversion box
gal	gallon
LFL	lower flammability limit
OVM	organic vapor monitor
PNNL	Pacific Northwest National Laboratory
ppm	parts per million
%	percent
psig	pounds per square inch gauge
RQL	required quantitation limits
SAS	Special Analytical Support
SOP	standard operating procedure
RPP	River Protection Project
WSCF	Waste Sampling and Characterization Facility

SAMPLING AND ANALYSIS PLAN FOR CATCH TANK 241-ER-311 VAPOR

1.0 SAMPLING AND ANALYSIS OBJECTIVES

This tank sampling and analysis plan (TSAP) identifies the sample collection, laboratory analysis, quality assurance/quality control (QA/QC) objectives for the characterization of catch tank 241-ER-311 vapor space.

2.0 SAMPLING EVENT REQUIREMENTS

Catch tank 241-ER-311 is a 18,000 gallon, stainless steel tank. The tank may have received waste for the 241-ER-151 and 241-ER-152 Diversion Boxes due to leaks and decontamination activities. It may also have collected water runoff from snow and rain. The waste may contain flushes of contamination fixant and pesticides.

Combustible gas, ammonia, and organic vapor levels in the headspace of the catch tanks will be field-measured using combustible gas meter (CGM), Dragger tube, and organic vapor monitor (OVM), respectively. Grab samples (Hoke sampler and SUMMA¹ canisters) of vapor in the tank headspace will be collected for more extensive analysis. In addition, grab samples of the liquid waste will be taken.

Measurements and sampling of the tank vapor space will be taken from five depths: 1 foot, 5 ft, 15ft, 20 ft, and 23 ft below a riser. At each depth, one CGM measurement, one OVM measurement, one ammonia measurement, and one Hoke sample. In addition, a SUMMA sample will be taken from the following locations: 1 ft, 15 ft, and 23 ft. The required analyses for the Hoke and SUMMA samples are listed in Table 2-1 and 2-2, respectively.

To allow continued monitoring of the flammable gas level in the tank, sampling lines shall be left in the tank: one in the riser (at 5 ft below the top of the riser) and one in the headspace (at 23 ft).

Table 2-1. Required Analysis for Hoke samples

Carbon Monoxide Carbon Dioxide Hydrogen Argon	Oxygen Methane Nitrogen
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¹ SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

Table 2-2. Required Analyses for SUMMA samples

Analyte	Suggested Analytical Method	VPRQL ¹ (ppbv)	Precision (%RSD or %RPD) ²	Accuracy (% Recovery)
Carbon monoxide	GC ³	5.0	25	70 to 130
Carbon dioxide	GC ³	5.0	25	70 to 130
Helium	GC ³	5.0	25	70 to 130
Hydrogen	GC ³	5.0	25	70 to 130
Methane	GC ³	5.0	25	70 to 130
Oxygen	GC ³	5.0	25	70 to 130
Nitrous oxide	GC ³	5.0	25	70 to 130
Nitrogen	GC ³	5.0	25	70 to 130
Freon 12	GC/MS ⁵	5.0	25	70 to 130
Methyl chloride	GC/MS ⁵	5.0	25	70 to 130
n-Butane	GC/MS ⁵	5.0	25	70 to 130
Ethyl chloride	GC/MS ⁵	5.0	25	70 to 130
Ethanol	GC/MS ⁵	5.0	25	70 to 130
Freon 11	GC/MS ⁵	5.0	25	70 to 130
Acetonitrile	GC/MS ⁵	5.0	25	70 to 130
Acetone	GC/MS ⁵	5.0	25	70 to 130
Furan	GC/MS ⁵	5.0	25	70 to 130
n-Pentane	GC/MS ⁵	5.0	25	70 to 130
2-Propanol	GC/MS ⁵	5.0	25	70 to 130
Dichloromethane	GC/MS ⁵	5.0	25	70 to 130
1-Propanol	GC/MS ⁵	5.0	25	70 to 130
2-Methyl-pentane	GC/MS ⁵	5.0	25	70 to 130
Propanenitrile	GC/MS ⁵	5.0	25	70 to 130
Butanal	GC/MS ⁵	5.0	25	70 to 130
1-Hexene	GC/MS ⁵	5.0	25	70 to 130
2-Butanone	GC/MS ⁵	5.0	25	70 to 130
n-Hexane	GC/MS ⁵	5.0	25	70 to 130
Chloroform	GC/MS ⁵	5.0	25	70 to 130
Tetrahydrofuran	GC/MS ⁵	5.0	25	70 to 130
1-Butanol	GC/MS ⁵	5.0	25	70 to 130
Benzene	GC/MS ⁵	5.0	25	70 to 130
Carbon tetrachloride	GC/MS ⁵	5.0	25	70 to 130
Butanenitrile	GC/MS ⁵	5.0	25	70 to 130
3-Methyl-hexane	GC/MS ⁵	5.0	25	70 to 130

Table 2-2. Required Analyses for SUMMA samples

Analyte	Suggested Analytical Method	VPRQL ¹ (ppbv)	Precision (%RSD or %RPD) ²	Accuracy (% Recovery)
2-Pentanone	GC/MS ⁵	5.0	25	70 to 130
n-Heptane	GC/MS ⁵	5.0	25	70 to 130
1,4-Dioxane	GC/MS ⁵	5.0	25	70 to 130
4-Methyl-2-pentanone	GC/MS ⁵	5.0	25	70 to 130
Toluene	GC/MS ⁵	5.0	25	70 to 130
2-Hexanone	GC/MS ⁵	5.0	25	70 to 130
n-Octane	GC/MS ⁵	5.0	25	70 to 130
Tetrachloroethylene	GC/MS ⁵	5.0	25	70 to 130
Chlorobenzene	GC/MS ⁵	5.0	25	70 to 130
Ethylbenzene	GC/MS ⁵	5.0	25	70 to 130
m,p-Xylene	GC/MS ⁵	5.0	25	70 to 130
3-Heptanone	GC/MS ⁵	5.0	25	70 to 130
2-Heptanone	GC/MS ⁵	5.0	25	70 to 130
Cyclohexanone	GC/MS ⁵	5.0	25	70 to 130
Styrene	GC/MS ⁵	5.0	25	70 to 130
n-Nonane	GC/MS ⁵	5.0	25	70 to 130
o-Xylene	GC/MS ⁵	5.0	25	70 to 130
1,1,2,2-Tetrachloroethane	GC/MS ⁵	5.0	25	70 to 130
2-Octanone	GC/MS ⁵	5.0	25	70 to 130
n-Decane	GC/MS ⁵	5.0	25	70 to 130
1,2,4-Trimethylbenzene	GC/MS ⁵	5.0	25	70 to 130

¹VPRQL: Vapor Program Required Quantitation Limit²RSD: Relative Standard Deviation; RPD: Relative Percent Difference³GC: Gas Chromatography⁴IC: Ion Chromatography⁵GC/MS: Gas Chromatography/Mass Spectrometry

3.0 QUALITY ASSURANCE

All sampling and analysis activities shall be performed in accordance with the requirements in this TSAP and the appropriate references. Data resulting from activities and conditions that do not conform to requirements specified in this TSAP or references herein shall be controlled to prevent inadvertent use or flagged with appropriate cautions. Nonconforming sampling and analysis processes and information shall be identified, controlled, reported, and dispositioned as required by *Nonconformance Item Reporting and Control* (LMHC 1999).

LABORATORY ANALYSIS

Laboratories performing analyses in support of this TSAP shall have approved and implemented quality assurance project plans. The laboratories shall use calibration and calibration check standards appropriate for the analytical instrumentation being used. The criteria presented are goals for demonstrating reliable method performance. It is understood that the laboratories will follow established internal protocols for addressing QC failures. If sample QC failures occur or if some analyses cannot be performed (e.g., because of insufficient sample), analysts shall consult with the tank coordinator to determine the proper action. The performing 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.

SAMPLE COLLECTION

Before sampling can be performed on a tank, a riser must be selected, inspected, and prepared for sampling. Safety hazards must be identified and special precautions must be taken if needed.

A particulate air filter will be installed upstream of each SUMMA canister. The filters will be shipped by CPO to the Waste Sampling and Characterization Facility (WSCF) for analysis. The filters will be analyzed for total alpha, total beta, and gamma energy analyses. Radiation Protection will use the data to determine whether or not the SUMMA samples can be radiologically released (and therefore can be accepted by the laboratory). CPO will store the SUMMA until they are released and will immediately ship them to the laboratory at that time.

Samples shall be taken and shipped to the laboratories by CPO in accordance with the Job Control System (JCS) work package. Due to the urgent need for the data, the samples shall be delivered to the laboratories immediately upon release by HPT. Also, CPO will verbally notify the laboratories in advance of an expected shipment.

SAMPLE CUSTODY

The SUMMA samples shall be identified as follows: ER311-A2-027, ER311-A3-028, and ER311-A4-030. Identification numbers for the Hoke samples shall be provided in the field work package.

The sampling team shall initiate a chain-of-custody form as described in the work package. The identification number unique to each sample as assigned in this TSAP shall be recorded. The location (riser and elevation) at which the sample was obtained shall be recorded. Also, pertinent sampling information (e.g., unusual waste characteristics or sampling problems) should be noted in the Comments section of the chain-of custody form.

A chain-of-custody form shall accompany each sample. The receipt and control of samples in the 222-S Laboratory are described in laboratory procedure LO-090-101. Chain-of-custody requirements for samples to be analyzed at the sub-contracted laboratory will be addressed in the SOW.

4.0 ROLES AND RESPONSIBILITIES

The main functions for this activity include an Overall Activity Lead, Field Measurements/Sampling, Laboratory Analysis, and Data Evaluation. All functions must be executed well in order to achieve the test objectives. The relationships among these functions are shown in Figure 3. The functions and the responsible organizations are further discussed below.

Activity Lead: RPP Process Engineering, representing Safety Issue Resolution, will act in this role. The Activity Lead shall coordinate the entire effort to assure that the desired data will be obtained as scheduled. Specific responsibilities include establishing test specification (i.e., prepare this test plan), assigning task responsibilities, and resolving sampling issues as they occur.

Field Measurement/Sampling: This function consists of pre-work planning activities and the actual field sampling. RPP Characterization Engineering will be responsible for completing the pre-work planning. Specific responsibilities include preparing work packages, performing Unreviewed Safety Question (USQ) screening, conducting field verification of sampling locations, and verifying final configuration of the test equipment. In addition, RPP Characterization Engineering will communicate and obtain necessary approvals from RPP Double-Shell Tank and Single-Shell Tank Engineering groups.

Characterization Project Operations (CPO) will be responsible for coordinating and performing the fieldwork. Specific responsibilities include arranging the necessary resources (personnel, materials, and equipment) for each sampling event and collecting data and samples as specified in this test plan. In addition to ensuring the availability of primary personnel (i.e., sampler and Industrial Hygiene), CPO will coordinate secondary support such as Radiation Protection and Crafts as needed. CPO will assure that field measurements are taken and recorded properly and that SUMMA™ samples will be traceable through proper identification and chain-of-custody.

Figure 1. Lead Roles for the Sampling Activity

Laboratory Analysis: Hoke samples will be analyzed at the Pacific Northwest National Laboratory for analytes listed in Table 2-1. SUMMA™ samples will be analyzed for analytes listed in Table 2-2. Special Analytical Support (SAS) will supply clean SUMMA™ canisters and tritium traps and be responsible for performing the analysis.

Preliminary data will be made available to RPP Process Engineering as soon as they become available. The preliminary data shall be transmitted electronically via e:mail.

A final report shall be transmitted to the Activity Lead and shall contain the following information at a minimum:

- A brief narrative of the sample preparation, analysis, and quality control/quality assurance measures,
- Concentration(s) of target analyte(s) for each sample,
- Quality control data to document achieved precision and accuracy, and
- Appropriate RQL if an analyte is not detected.

In addition, the data report shall include a discussion of every characterization issue or data anomaly, resolution of each issue/anomaly, and the impact on the data. All analytical data shall be independently reviewed and approved by qualified personnel.

Data Evaluation: Analytical data will be evaluated against process knowledge and existing data. RPP Process Engineering will be responsible for performing this evaluation. Results of the evaluation and a summary of the data will be documented in a report.

5.0 SAFETY CONSIDERATIONS

The catch tank may contain flammable gas, hazardous vapor, and radionuclides. A survey for hazardous vapor will be performed prior to gaining access to a tank. Also, radiation and hazardous vapor will be monitored during the test as necessary.

6.0 REFERENCES

LMHC, 1999, *Nonconformance Item Reporting and Control*, LMH-PRO-298, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.

DISTRIBUTION SHEET

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