PNL-10079
UC-606

Final Letter Report

Waste Tank Vapor Project:

Vapor Characterization of Tank 241-C-103: Report for SUMMA™ Canister Samples Received 11/29/93 (Sample Jobs 4 and 5)

T. R. Clauss
R. B. Lucke
B. McVeety
K. J. Allwine
J. S. Fruchter

September 1994

Prepared for Westinghouse Hanford Company
under a Related Services Agreement
with the U.S. Department of Energy
Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Richland, Washington 99352

DISCLAIMER

Waste Tank Vapor Project:

Vapor Characterization of Tank 241-C-103: Report for SUMMA™ Canister Samples Received 11/29/93 (Sample Jobs 4 and 5)

Summary

The purpose of Sample Jobs 4 and 5 was to determine whether the organic nitriles observed on the outside of tank 241-C-103 originated in the tank or from degradation products of the high-efficiency particulate air (HEPA) filter. The plan was to take samples from either side of the HEPA filter. The relative level of organic nitriles would help determine whether they were produced in the filter or the tank. Pacific Northwest Laboratory was responsible for analyzing the SUMMA™ canisters collected in support of this study. The laboratory was to analyze the SUMMA™ canister samples according to letters of instruction and report all semivolatile and volatile organic constituents detected in the tank headspace. Pacific Northwest Laboratory was also to submit a letter report to the Program Manager of all qualitative and quantitative analytical data, and estimate concentrations of any aliphatic nitriles identified.

This was one of the first sampling activities for this program, and a number of errors were made both in the field and in the laboratory. Because of these errors, the samples and results were of questionable value. Therefore, Westinghouse program management asked that the analysis of the samples for this report not be completed. This report describes the few results that were generated before we were asked to stop work on this activity.

In addition to analyzing SUMMA™ canisters, PNL operates a site portable weather station near tank 241-C-103. Pacific Northwest Laboratory was required to collect atmospheric data starting 11/15/93, but the weather station was already collecting data during the time of both these two sample jobs (11/12/93 and 11/16/93). Therefore, a summary of the atmospheric data is also presented in this report.

Sample Collection

In preparation for the sample jobs 4 and 5 (SJ4&5) sampling event, one canister labeled PNL017 was filled with a laboratory gas standard and sent to the field with the rest of the canisters. This sample was intended as a spiked field blank. Unfortunately, this canister was inadvertently opened in the tank sampling line (SJ5). Because it was compromised in this manner, no analyses were performed on this sample. The samples collected immediately after, PNL018 and PNL019, were also thought to be compromised because the sampling line was not flushed out after opening the spiked blank in-line.

Atmospheric Conditions During Sampling

During SJ5 (1330 to 1600 PST on 11/12/93), the average meteorological conditions measured by the tank-vapor portable meteorological station were 10.7°C temperature, 41% relative humidity, 29.30 in. Hg pressure, and winds SE-S at 2 mph. The average meteorological conditions during SJ4 (1130 to 1330 PST on 11/16/93) were 7.7°C temperature, 52% relative humidity, 29.37 in. Hg pressure, and winds NE-E at 1.5 mph. For the first SJ4 sampling conducted on 11/15/93 at approximately 1040 PST, the meteorological conditions were 6.3°C temperature, 52% relative humidity, 29.21 in. Hg pressure, and winds E at 2.5 mph.

Samples Received

SUMMA™ canisters collected from waste tank 241-C-103 for SJ4&5 were received by Pacific Northwest Laboratory (PNL) on 11/29/93. The SUMMA™ canisters consisted of nine collected samples and one spiked field blank. The canisters were logged in and stored in laboratory 329/13A until the time of analysis. The canisters labeled as PNL 012 and PNL 013 were submitted for gamma analysis.

Sample Analysis

The canisters collected for SJ5 were attached to the source auto-sampling manifold on an ENTECH cryo-concentration system and set to inject a 0.5-mL portion of air collected in each canister onto an HP5971 gas chromatograph/mass spectrometer. Initial runs of these canister samples showed nothing detectable in the chromatograms. The samples were then analyzed using 50-mL aliquot of each gas on a second manifold. A scan-mode analysis of these samples showed acetone, n-butanol, and dodecane to be the major constituents in the tank headspace samples. The procedure was repeated with canisters collected for SJ4. It was after this set of analyses that the cryoconcentrator system used exhibited blank contamination problems, which were unresolved until a technical representative from ENTECH could look at the system in January of 1994.

Sample Results/Discussion

The results from gamma analysis, a 48-hour count, showed no activity for the samples counted.

It has subsequently been determined that the semivolatile components in the tank headspace samples from these canisters were trapped in the cryo-concentration system and thus not seen in the gas chromatography/mass spectrometry analysis. Upon further investigation of these samples, it was determined that acetone and n-butanol were not the major components in the tank headspace sample, but that normal paraffin hydrocarbon components (undecane, dodecane, tridecane) were present in the samples at levels 10 to 20 times higher than that of acetone and n-butanol. Because of 1) the large amount of the material that had been used to trouble shoot the cryoconcentrator system that was in the SJ4&5 canisters, 2) the amount of time that passed while the equipment was being repaired, and 3) the fact that some of the samples were compromised, it was determined that quantitative analysis of the SJ4&5 samples should not be pursued.

Distribution

No. of Copies

Offsite

12 DOE/Office of Scientific and Technical Information

Onsite

2 DOE Richland Operations Office

S. O. Branch, S7-54
R. F. Christensen, RE-72

9 Westinghouse Hanford Company

H. Babad, R2-78
R. B. Conrad, H5-09
C. Defigh-Price, R2-31
G. T. Dukelow, R2-78
J. C. Fulton, R2-31
K. A. Gasper, R2-08
J. L. Huckaby, R2-78
G. D. Johnson, R2-78
J. W. Osborne, R2-78

MacTech

S. T. Murff, R3-82

NIS I

M. S. Story, H5-09

No. of Copies

Onsite (contd)

31 Pacific Northwest Laboratory

K. J. Allwine, K6-11
R. M. Bean, P8-08
T.R.W. Clauss, P8-08 (5)
W. C. Cosby, P8-08
J. A. Edwards, P8-08
S. C. Goheen, P8-08
R. J. Hall, K8-28
B. M. Johnson, K1-78
B. D. Lerner, P8-08
M. W. Ligotke, P7-59
R. B. Lucke, P8-08
D. D. Mahlum, P7-56
B. D. McVeety, K6-63
H. S. Miley, P8-08
D. A. Nelson, P8-38
V. P. Ostrander, K7-73
K. H. Pool, P8-44
R. K. Quinn, K1-73
G. F. Schieffelbein, P8-38
P. R. Seesing, B1-34
D. A. Turner, R2-78
Publishing Coordination
Technical Report Files (5)