

REPORT SUMMARY

Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study

RJ Lee Group, Inc. *for*

Washington River Protection Solutions, LLC

September 21, 2017

The Mobile Organic Monitoring Laboratory (ML) developed by RJ Lee Group, Inc. (RJLG) performed two field campaigns in Fiscal Year 2017. These campaigns included area monitoring during waste disturbing activities at the Hanford Tank Farms, and an extended nitrosamines and furans background study.

The ML is equipped with a proton transfer reaction-mass spectrometer (PTR-MS) time of flight model 4000. The instrument can detect a wide range of volatile organic compounds (VOCs) at the part per trillion by volume (pptv) level. Additional equipment in the ML include a carbon dioxide monitor, ammonia monitor, and a full weather station.

The main goals of the studies were to provide analytical support to air quality monitoring in worker breathing spaces during activities that disturb the mixtures of chemical and radioactive wastes stored in tanks at the Hanford Site, and to better understand the furan and nitrosamine background levels across the entire Central Washington Plateau.

Waste Disturbing Findings

Three waste retrieval activities and one evaporator campaign were monitored between December 2016 and July 2017.

Area monitoring conducted during the waste disturbing activities indicated that on all but one occasion, the concentration of some chemicals of potential concern (COPCs) at the Tank Farms briefly peaked above 50% of an occupational exposure limit (OEL) concentration and, in some cases, above an OEL concentration. However, the average concentration of all waste disturbing activities was well below 50% OEL for all COPCs monitored. Additionally, maximum detected concentrations above the OEL concentrations occurred for a total of 38 seconds across all COPCs over hundreds of hours of monitoring.

Background Study

The background study was conducted between July and September 2017 at 10 different locations with four repeat visits to each site. The sampling took place at eight locations around the Tank Farms in the 200-E and 200-W areas that are directly associated with previously reported

chemical vapor odors (documented as Abnormal Operating Procedure-015, or AOP-015 events), and at two sites located in the Tri-Cities; a residential location and a busy intersection.

The background study focused on 18 compounds from the Hanford COPC list: four nitrosamines and fourteen furans. These compounds have OELs of less than or equal to 1 part per billion by volume (ppb) and cannot be measured using conventional analytical methods. The PTR-MS provides rapid and sensitive field screening. The technique identifies chemical compounds by their atomic mass at very low levels of concentration. In some cases, however, there are several compounds with a similar atomic mass that may contribute to a single signal. In these cases, the concentration reported reflects the sum of all compounds contributing to that signal and discrimination of specific chemical species is not provided.

As part of the study, alternative sampling and analysis methods, consisting of NIOSH 2522, EPA TO-17 and EPA TO-11a, were used to assist in providing improved chemical species discrimination. While these methods do not provide the same rapid results, they do provide chemical species identification and corroboration of the PTR-MS results.

Background Study Findings

While the PTR-MS indicated the presence of nitrosamines, these measurements were not confirmed by the alternative sampling methods. This led to the conclusion that interfering compounds were present and measured by the PTR-MS as nitrosamines. The recorded nitrosamine concentrations were consistently below the reporting limit of approximately 10 ppt. (Reporting limits are approximate, as the reporting limit changes each measurement as the result of variances in environmental and concentration conditions.)

Observations from the statistical analysis of the furans sampling results are as follows:

- Active tank farms tend to have higher furan levels than inactive tank farms
- The sampling conducted at the two off-site locations: U.S. Highway 395 and Clearwater Avenue (site 5B) had significantly higher concentrations of furans when compared to the other sites
- Elevated furans are correlated with vehicle traffic at site 5B
- Elevated furans seen on the Hanford Site more likely come from generator and vehicle emissions and not from tank emissions, and
- Furan concentrations are highly correlated with the presence of smoke. Forty percent of the statistical difference in the furan concentrations can be explained by the relationship with environmental smoke.

For additional information, the full report can be found [here](#).