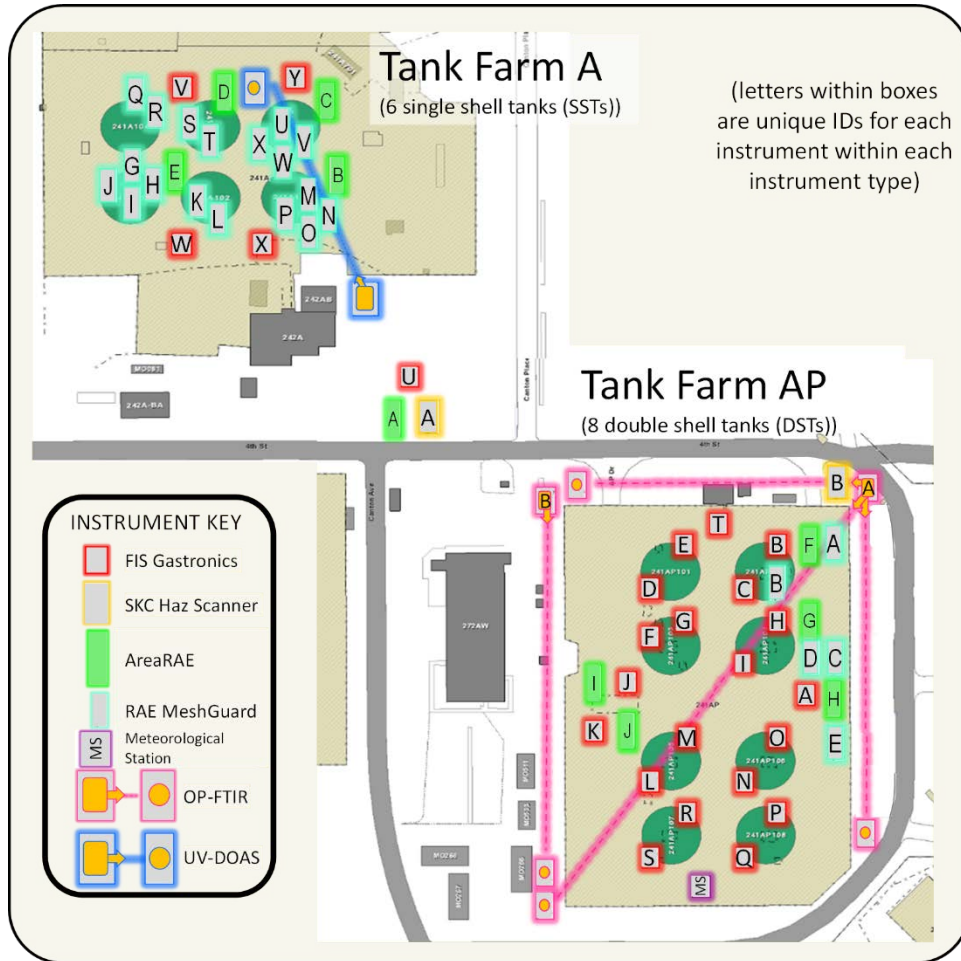


Direct Reading Instrumentation Weekly Summary

11/9/16 6:00 – 11/16/16 6:00

Sampling Location –A & AP-Tank Farms (map below)



This summary contains Vapor Monitoring and Detection System (VMDS) pilot-scale data collected over one week (November 9th at 6:00 a.m. through November 16th at 6:00 a.m.) using direct reading vapor detection instruments. Pilot-scale testing is focused on evaluating component integration and functionality. Data shown may include results for calibration and calibration check (bump test) tests performed to verify sensors are functioning; these tests are visible in the data as spikes. Any direct reading instrument alarms occurring during pilot-scale testing are taken to be actual events and the appropriate actions/notifications are undertaken.

Abbreviations:

- NH₃ = ammonia
- CO = carbon monoxide
- CO₂ = carbon dioxide
- LEL = lower explosive limit
- NO = nitric oxide
- N₂O = nitrous oxide
- NO₂ = nitrogen dioxide
- VOC = volatile organic compounds, which include both volatile and semi-volatile compounds.

Direct Reading Instrumentation Weekly Summary

11/9/16 6:00 – 11/16/16 6:00

Weekly Summary: The ToxiRAE and MultiRAE instruments are personal monitors and were not deployed for use during this week. The AreaRAE systems were taken offline to address calibration issues earlier this month and did not report data during this week.¹

Gastronics instruments (512) have sensors for NH₃, VOCs, and N₂O. The operating software for the instruments was upgraded during the week. The software download caused five of the units to erroneously report NH₃ between 17 and 25 ppm. This error was corrected subsequently by re-zeroing and re-calibrating the instruments (see Figure 1). No ammonia was detected by Gastronics instruments. The N₂O sensors continue to report numerous data peaks up to full scale, and recurring patterns of N₂O at high concentrations (>100 ppm). N₂O has not been detected above background levels (0.3 to 0.4 ppm) by spectroscopic instruments around the farm. The N₂O sensors on the 512 instruments do not hold calibration and the calibration procedure for the N₂O sensor/transmitter is being modified to correct for transmitter output drift. The N₂O data from Gastronics are not considered accurate or reliable.

Four of the VOC sensors on the 512 instruments consistently returned acceptable values during calibration check tests this week (512A, D, S, and U). None of the instruments that met calibration checks reported VOCs above 2 ppm. Instrument 512A reports a consistent value for VOCs of 0.45 ppm during the week (except during the bump tests) and has consistently reported this value over the past month. This consistent value may represent sensor drift from 0. The VOC sensors are overdue for cleaning and maintenance; a number of sensors are failing calibration checks. Replacement sensors have been ordered to switch out existing sensors for cleaning, but until this is accomplished, the reported values are considered questionable. A total VOC limit of 2 ppm currently is employed by the Industrial Hygiene Program Technical Basis².

November 9th – November 16th 2016 Observations By Instrument:

HazScanner (501) – The HazScanners, 501A and 501B, have not been calibrated, and work is ongoing to complete their configuration. Therefore no data is presented from these instruments – other than up-time.

¹ Note that instrument tags (labels) reported in OSI PI and presented in the weekly summary information are captured directly from OSI PI and that all gas monitoring instruments begin with 200-GM, followed by the target analyte (such as NH₃), followed by the instrument type (three digit number), and the instrument unit as sequential letters. For example, “200-GM-NH3-512C” is an ammonia sensor reporting from Gastronics (denoted as “512”) instrument “C”.

² RPP-22491, Rev. 1, “Industrial Hygiene Chemical Vapor Technical Basis”: <http://hanfordvapors.com/wp-content/uploads/2016/10/Industrial-Hygiene-Chemical-Vapor-Technical-Basis-RPP-22491 - Rev 1.pdf>

Direct Reading Instrumentation Weekly Summary

11/9/16 6:00 – 11/16/16 6:00

AreaRAE (502) – Not reporting during this week.

Table 1. AreaRAE Comments.

| Compound (units) | Comment | OEL | Action Level | Detection Range |
|-----------------------|-------------------|-----|--------------|-----------------|
| CO (ppm) | No data reported. | 50 | 25 | 1 – 500 |
| LEL (%) | No data reported. | | | 0 – 100 |
| NH ₃ (ppm) | No data reported. | 25 | 12.5 | 1 – 50 |
| Oxygen (%) | No data reported. | | <19.5 | 1 - 30 |
| VOC (ppm) | No data reported. | | 2 | 1 - 200 |

ToxiRAE (503) – Not used during this week.

Table 2. ToxiRAE Comments.

| Compound (units) | Comment | OEL | Action Level | Detection Range |
|------------------|-------------|-----|--------------|-----------------|
| VOC (ppm) | Not in use. | N/A | 2 | 0.1 - 2000 |

MultiRAE (504) – Not used during this week.

Table 3. MultiRAE Comments.

| Compound (units) | Comment | OEL | Action Level | Detection Range |
|-----------------------|---|-----|--------------|-----------------|
| CO (ppm) | A – Not in use. B – Not in use. C – Not in use. | 50 | 25 | 0 – 500 |
| LEL (%) | A – Not in use. B – Not in use. C – Not in use. | N/A | | 0 – 100 |
| NH ₃ (ppm) | A – Not in use. B – Not in use. C – Not in use. | 25 | 12.5 | 1 – 500 |
| Oxygen (%) | A – Not in use. B – Not in use. C – Not in use. | | <19.5 | 1 – 30 |
| VOC (ppm) | A – Not in use. B – Not in use. C – Not in use. | N/A | 2 | 0.1 – 5000 |

Direct Reading Instrumentation Weekly Summary

11/9/16 6:00 – 11/16/16 6:00

RAE MeshGuard (505) – Ammonia detection instruments located in A Tank Farm (18 sensors) and located in AP Tank Farms (4 sensors).

Table 4. RAE MeshGuard Comments.

| Compound (units) | Comment | OEL | Action Level | Detection Range |
|-----------------------|--|-----|--------------|-----------------|
| NH ₃ (ppm) | Instruments reporting: A, C, D, F, G, H, I, J, L, M, N, O, P, Q, T, U, V, and X. <ul style="list-style-type: none"> • No ammonia detected. • Calibration/check tests on: A, C, D, F,G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W and X. | 25 | 12.5 | 1 – 50 |

FIS-Gastronics (512) – Monitor for ammonia, volatile organic compounds, and nitrous oxide.

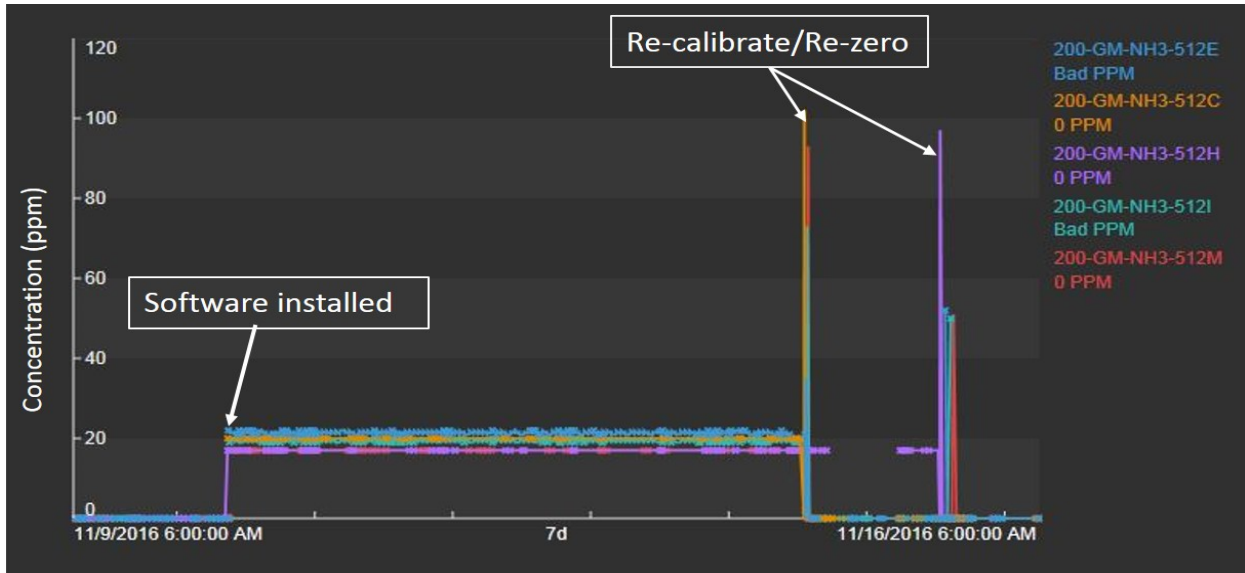
Table 5. Gastronics Comments.

| Compound (units) | Comment | OEL | Action Level | Detection Range |
|------------------------|---|-----|--------------|-----------------|
| NH ₃ (ppm) | No ammonia reported on any instrument (other than calibration tests) | 25 | 12.5 | 1 – 500 |
| VOC (ppm) | <ul style="list-style-type: none"> • VOC sensors are in need of maintenance and only those sensors reporting acceptable values in response to bump tests with calibration gas are included here. • Instruments that reported a maximum value of ≤ 2 ppm: 512A • Instruments that reported a maximum value of ≥ 2 ppm: None of the instruments that met calibration checks reported VOCs above 2 ppm. | N/A | 2 | 0 – 1000 |
| N ₂ O (ppm) | N ₂ O sensors reporting from 512E, F, G, H, I, K, M, N, O, P, Q, and T. The N ₂ O sensors on the 512 instruments do not hold calibration and the calibration procedure for the N ₂ O sensor/transmitter is being modified to correct for transmitter output drift. The N ₂ O data from Gastronics are not considered accurate or reliable. | 50 | 25 | 0 – 1000 |

Direct Reading Instrumentation Weekly Summary

11/9/16 6:00 – 11/16/16 6:00

Figure 1. FIS-Gastronics Ammonia Post Software Update.



November 9th – November 16th 2016 Instrument Operational Status:

Time reporting is calculated using the time sensors are reporting to OSI PI 3 for each instrument:

Table 6. HazScanner (501) Percent Time Reporting By Instrument.

| Instrument | % Time Reporting | Instrument | % Time Reporting |
|------------|------------------|------------|------------------|
| 501A | 16 | 501B | 16 |

Table 7. AreaRAE (502) Percent Time Reporting By Instrument.

| Instrument | % Time Reporting | Instrument | % Time Reporting | Instrument | % Time Reporting | Instrument | % Time Reporting |
|------------|------------------|------------|------------------|------------|------------------|------------|------------------|
| 502A | 0 | 502D | 0 | 502G | 0 | 502J | 0 |
| 502B | 0 | 502E | 0 | 502H | 0 | | |
| 502C | 0 | 502F | 0 | 502I | 0 | | |

Notes: % time reporting is estimated on review of graphs from OSI PI.

³ OSI PI is a data visualization software package from [OSIsoft](http://OSIsoft.com).

Direct Reading Instrumentation Weekly Summary

11/9/16 6:00 – 11/16/16 6:00

**Table 8. ToxiRAE (503) Percent Time Reporting By Instrument.
(personal monitors only used when operators are in the field)**

| Instrument | % Time Reporting | Instrument | % Time Reporting | Instrument | % Time Reporting |
|------------|------------------|------------|------------------|------------|------------------|
| 503A | 0 | 503E | 0 | 503I | 0 |
| 503B | 0 | 503F | 0 | 503J | 0 |
| 503C | 0 | 503G | 0 | 503K | 0 |
| 503D | 0 | 503H | 0 | | |

**Table 9. MultiRAE (504) Percent Time Reporting By Instrument.
(personal monitors only used when operators are in the field)**

| Instrument | % Time Reporting | Instrument | % Time Reporting | Instrument | % Time Reporting |
|------------|------------------|------------|------------------|------------|------------------|
| 504A | 0 | 504B | 0 | 504C | 0 |

Table 10. RAE MeshGuard (505) Percent Time Reporting By Instrument.

| Instrument | % Time Reporting | Instrument | % Time Reporting | Instrument | % Time Reporting | Instrument | % Time Reporting |
|------------|------------------|------------|------------------|------------|------------------|------------|------------------|
| 505A | 78 | 505G | 92 | 505M | 90 | 505S | 0 |
| 505B | 0 | 505H | 93 | 505N | 91 | 505T | 93 |
| 505C | 74 | 505I | 34 | 505O | 92 | 505U | 91 |
| 505D | 86 | 505J | 93 | 505P | 93 | 505V | 92 |
| 505E | 0 | 505K | 0 | 505Q | 93 | 505W | 92 |
| 505F | 75 | 505L | 0 | 505R | 0 | 505X | 93 |

Table 11. Gastronics (512) Percent Time Reporting By Instrument.

| Instrument | % Time Reporting | Instrument | % Time Reporting | Instrument | % Time Reporting | Instrument | % Time Reporting |
|------------|------------------|------------|------------------|------------|------------------|------------|------------------|
| 512A | 35 | 512H | 90 | 512N | 92 | 512T | 92 |
| 512B | 68 | 512I | 89 | 512O | 33 | 512U | 99 |
| 512C | 82 | 512J | 1 | 512P | 82 | 512V | 0 |
| 512D | 74 | 512K | 95 | 512Q | 24 | 512W | 0 |
| 512E | 92 | 512L | 12 | 512R | 0 | 512X | 9 |
| 512F | 90 | 512M | 82 | 512S | 45 | 512Y | 3 |
| 512G | 1 | | | | | | |