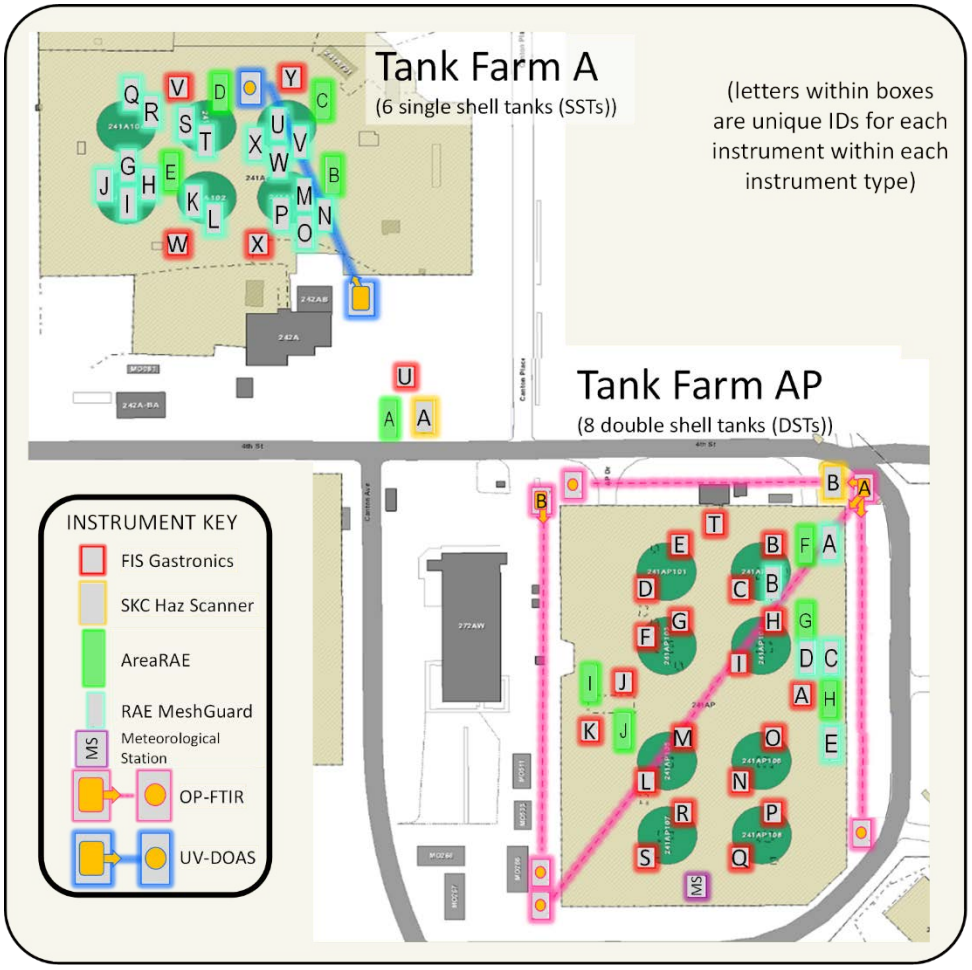
Direct Reading Instrumentation Weekly Summary

11/2/16 6:00 – 11/9/16 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 2nd at 6:00am through November 9th at 6:00am) 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:

NH_3 = ammonia
CO = carbon monoxide
CO_2 = carbon dioxide
LEL = lower explosive limit NO = nitric oxide
N_2O = nitrous oxide
NO_2 = nitrogen dioxide
VMDS = Vapor Monitoring and Detection System
VOC = volatile organic compounds, which include both volatile and semi-volatile compounds.

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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.

Note that instrument tags (labels) reported in OSI PI System[1] and often presented in 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 NH_3), 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".

Gastronics instruments have sensors for NH_3, VOCs and N_2O. No ammonia was detected by Gastronics instruments.

Three Gastronics instruments reported VOCs >2 ppm during the week, all three failed their last few calibration checks.

512I (7.8 ppm), 512Q (2.0 ppm and cyclic), and 512X (ranged from 1.4 to 3.1).

Instrument 512I reported up to 7.8 ppm, 512Q had a daily recurring pattern up to 2.0 ppm, and 512X reported from 1.4 (minimum value reported) to 3.1. Instrument 512I's spike occurred primarily during late evening to early morning, 22:00 to 8:30. Unit 512Q reported values up to 2 ppm, and had the same recurring pattern as see previously – typically starting in the evening and ending in the morning. Instrument 512X was down most of the time. 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 high values are considered questionable. A total VOC limit of 2 ppm currently is employed by the Industrial Hygiene Program Technical Basis[2].

The N_2O sensors continue to show numerous sharp data peaks up to full scale (1,100 ppm), and recurring patterns of N_2O at high concentrations (>100 ppm). N_2O has not been detected above background levels (0.3 to 0.4 ppm) by spectroscopic instruments along the fencelines around the farm. The N_2O sensors on the 512 instruments do not appear to hold calibration and the calibration procedure for the N_2O sensor/transmitter is being modified to correct for transmitter output drift. The N_2O data from the Gastronics sensors are not considered accurate and reliable.

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[1] OSI PI System™ is a data visualization software package from OSIsoft.

[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

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November 2nd – November 9th 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.

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

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Table 3. MultiRAE Comments.

Compound (units)	Comment	OEL	Action Level	Detection Range
VOC (ppm)	A – Not in use. B – Not in use. C – Not in use.	N/A	2	0.1 – 5000

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, M, N, O, P, Q, T, U, V, W, and X. • No ammonia detected. • Calibration/check tests on: Units were removed from the field for bump testing; reinstallation was delayed for a day due to weather.	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). • Calibration/check tests performed on 11/2 and 11/8	25	12.5	1 – 500
VOC (ppm)	• Calibration/check tests performed: 11/2 – A, D, E, F, G, H, I, J, K, L, N, O, P, Q, R, S, T, U, V, and X; 11/8 – A, C, D, E, F, G, H, I, J, K, L, N, O, P, Q, R, S, T, U, V, and X • Most instruments failed their calibration checks. • Instruments A, D, S, and Y report 10x actual values. Instrument 512X is suspected to report 10X actual values based on calibration checks. • Instruments reporting no detection of VOCs: E, F, G, K, M, N, O, U • Instruments that reported a maximum value of ≤ 2 ppm: A, P, T • Instruments reporting maximum values > 2 ppm: I (7.8 ppm), Q (2.0 ppm and cyclic), and X (ranged from 1.4 to 3.1)	N/A	2	0 – 1000
N_2O (ppm)	N_2O sensors reporting from 512E, F, G, H, I, K, M, N, O, P, Q, and T.	50	25	0 – 1000

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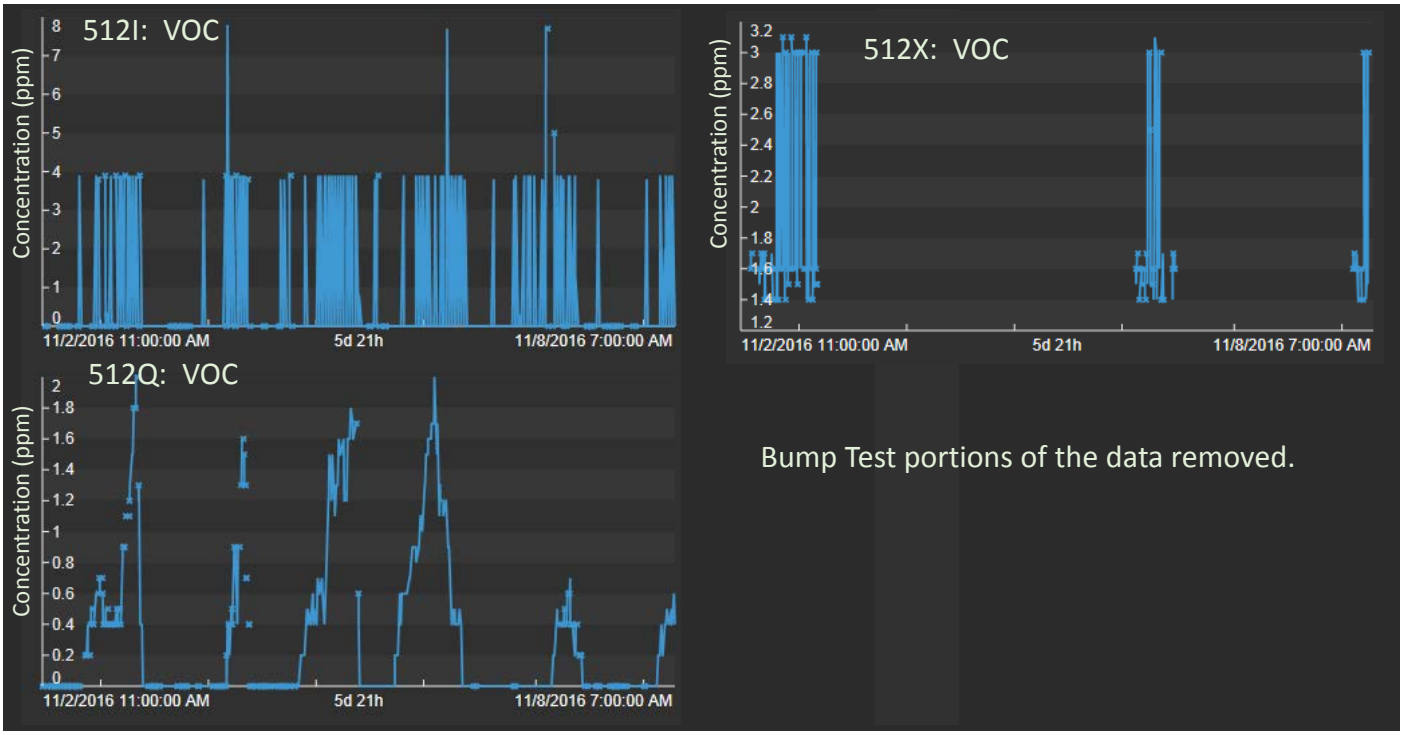
Compound (units)	Comment	OEL	Action Level	Detection Range
	• The N_2O sensors on the 512 instruments do not hold calibration and the calibration procedure for the N_2O sensor/transmitter is being modified to correct for transmitter output drift. • The N_2O data from Gastronics are not considered accurate or reliable.			

Figure 1. FIS-Gastronics VOC Review.
(Note that concentration units are ppm)



<u>November 2nd – November 11th 2016 Instrument Operational Status</u>:

The percent time reporting is calculated using instrument data from OSI PI:

Table 6. HazScanner (501) % Time Reporting by Instrument.

Instrument	% Time Reporting	Instrument	% Time Reporting
501A	28	501B	41

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Table 7. AreaRAE (502) % 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 calculated using instrument data from OSI PI.

Table 8. ToxiRAE (503) % 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) 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) % Time Reporting.

Instrument	% Time Reporting	Instrument	% Time Reporting	Instrument	% Time Reporting	Instrument	% Time Reporting
505A	76	505H	79	505O	83	505V	80
505B	0	505I	51	505P	83	505W	79
505C	78	505J	81	505Q	81	505X	80
505D	79	505K	0	505R	0		
505E	0	505L	0	505S	0		
505F	78	505M	82	505T	81		
505G	79	505N	81	505U	78		

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Table 11. Gastronics (512) % Time Reporting by Instrument – Based Off NH_3.

Instrument	% Time Reporting	Instrument	% Time Reporting	Instrument	% Time Reporting	Instrument	% Time Reporting
512A	90	512H	99	512N	97	512T	98
512B	0	512I	96	512O	5	512U	100
512C	0	512J	0	512P	91	512V	0
512D	0	512K	99	512Q	87	512W	0
512E	92	512L	0	512R	0	512X	18
512F	82	512M	95	512S	0	512Y	0
512G	26						