WEEKLY REPORT FOR WEEK 13
(OCTOBER 28, 2018 – NOVEMBER 3, 2018)

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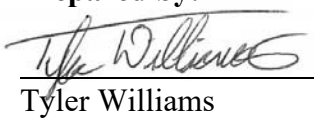

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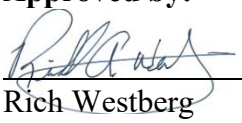

Date: 09/20/2019

Rich Westberg

Record of Revision

Revision	Date	Pages/Sections Changed	Brief Description
0	09/2019	N/A	Original Issue.

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Tables

Acronyms

AOP	Abnormal Operating Procedure
COPC	Chemical of Potential Concern
CSO	Central Shift Office
DNPH	2,4-dinitrophenylhydrazine
ML	Mobile Laboratory
NDMA	N-nitrosodimethylamine
NEMA	N-nitrosomethylethylamine
NMOR	N-nitrosomorpholine
OEL	Occupational Exposure Limit
PTR-MS	Proton Transfer Reaction – Mass Spectrometer
QA	Quality Assurance
QC	Quality Control
WRPS	Washington River Protection Solutions, LLC

1.0 OCTOBER 28, 2018 – OCTOBER 29, 2018 – STUDY SITE #2

1.1 Quality Assessment

Data from October 28, 2018, were assessed using Procedure 17124-DOE-HS-102, "Mobile Laboratory Data Processing – Analysis." A Data Exchange Checklist was completed. The data were accepted by TerraGraphics with the following comments. Report No. 66409-RPT-004, *Mobile Laboratory Operational Procedure*, was adequately documented and all checks passed the acceptance limits.

1.2 Summary

The Mobile Laboratory (ML) personnel performed background sampling using the ML from October 28, 2018, to October 29, 2018 at Study Site 2. Site 2 is located near the southern end of the 200W Tank Farms. The ML arrived at Site 2 at 07:11 on October 28, 2018. The quality assurance/quality control (QA/QC) zero-air/sensitivity checks were performed on the LI-COR®[1] CO_2 monitor, the Picarro NH_3 analyzer, and the Proton Transfer Reaction – Mass Spectrometer (PTR-MS) beginning at 06:26 prior to arrival at Site 2. Collection of confirmatory sorbent samples began at 07:21. The ML staff departed the monitoring site at 08:05 and checked out with the Central Shift Office (CSO).

The ML staff returned to Site 2 at 06:10 on October 29, 2018. The ML staff moved to Site 2 by 07:04.

Figure 1-1. Mobile Laboratory Site #2 for the Duration of the Monitoring Period.

[1] LI-COR is a registered trademark of LI-COR, Inc., Lincoln, Nebraska.

Figure 1-2. Location of the Mobile Laboratory for the Duration of the Monitoring Period.

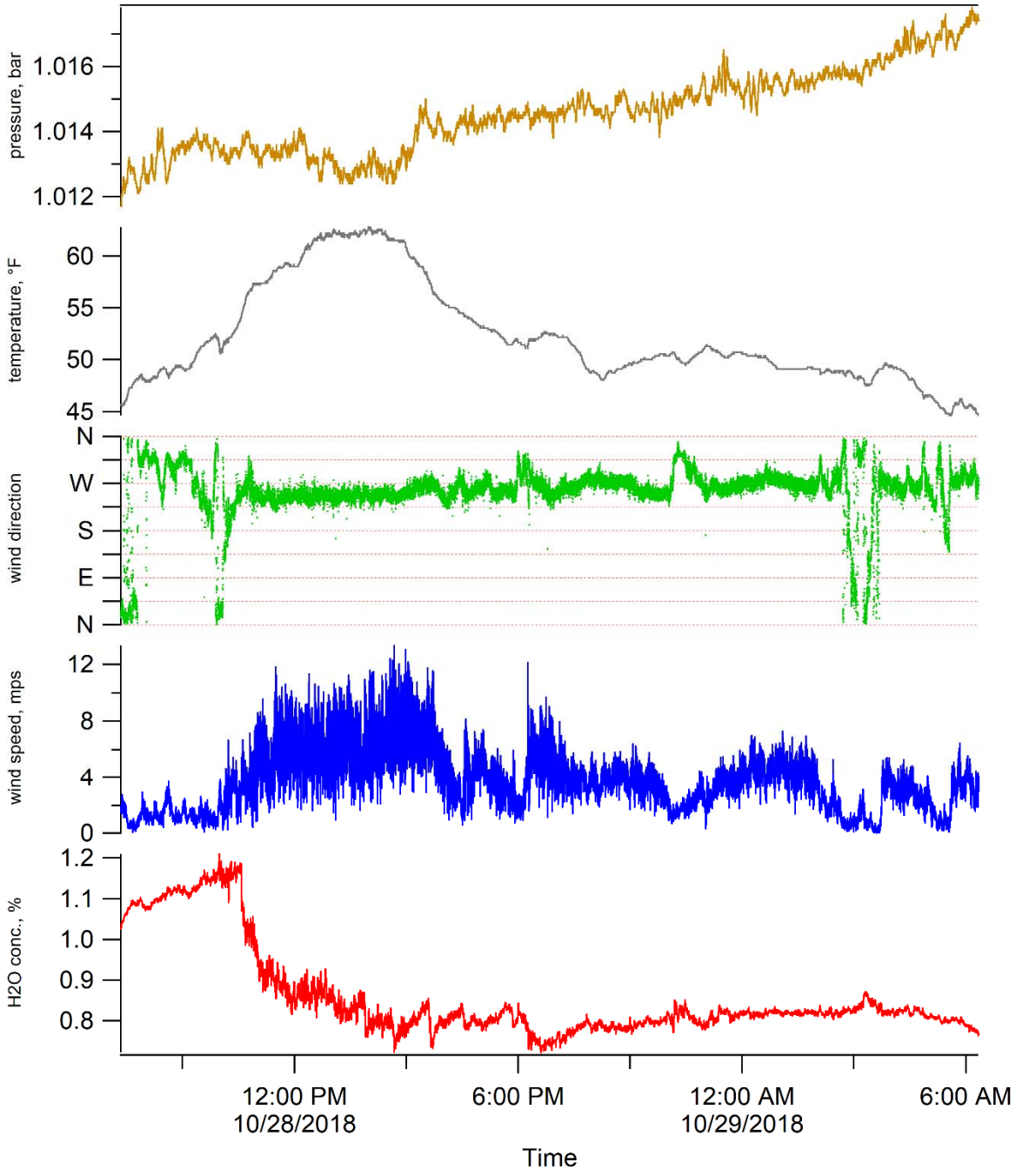

Figure 1-3. Weather Data.

1.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-MS,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were collected as follows.

Table 1-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
2	10/28/18	Thermosorb®[2]/N	EL33201	07:21	10:21	180
2	10/28/18	Carbotrap®[3]-300	A052448	07:21	13:21	360

Table 1-2 displays the statistical information for the monitoring period of October 28, 2018, to October 29, 2018. By definition, the occupational exposure limit (OEL) is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

[2] Thermosorb is a registered trademark of Ellutia Limited Company, Cambridgeshire, United Kingdom.
[3] Carbotrap is a registered trademark of Sigma-Aldrich Co., LLC, St. Louis, Missouri.

Table 1-2. Statistical Information for the Monitoring Period of October 28, 2018 – October 29, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	Ammonia	25000	4.984	1.713	34.374	22.477	4.634
2	formaldehyde	300	0.366	0.106	28.876	1.732	0.338
3	Methanol	200000	4.426	4.059	91.696	24.507	2.858
4	acetonitrile	20000	0.280	0.097	34.740	0.510	0.321
5	acetaldehyde	25000	1.456	0.301	20.691	5.631	1.480
6	ethylamine	5000	0.010	0.005	47.566	0.038	0.010
7	1,3-butadiene	1000	0.062	0.039	63.378	0.575	0.058
8	propanenitrile	6000	0.025	0.008	32.376	0.085	0.024
9	2-propenal	100	0.061	0.041	67.095	1.421	0.052
10	1-butanol + butenes	20000	0.053	0.020	38.145	0.294	0.048
11	methyl isocyanate	20	0.025	0.010	39.487	0.109	0.023
12	methyl nitrite	100	0.039	0.018	45.569	0.632	0.036
13	furan	1	0.021	0.009	41.419	0.122	0.019
14	butanenitrile	8000	0.008	0.005	60.402	0.043	0.007
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.025	0.020	82.112	N/A*	N/A*
16	butanal	25000	0.060	0.020	33.832	0.192	0.055
17	NDMA**	0.3	0.011	0.011	97.779	0.111	0.009
18	benzene	500	0.071	0.024	33.305	0.391	0.065
19	2,4-pentadienenitrile + pyridine	300, 1000	0.019	0.010	49.313	0.080	0.017
20	2-methylene butanenitrile	300	0.014	0.014	94.498	0.099	0.009
21	2-methylfuran	1	0.021	0.013	65.418	0.193	0.016
22	pentanenitrile	6000	0.006	0.004	68.302	0.032	0.005
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.017	0.011	65.849	0.147	0.014
24	NEMA**	0.3	0.006	0.007	112.755	0.055	0.004
25	2,5-dimethylfuran	1	0.016	0.014	88.527	0.116	0.011
26	hexanenitrile	6000	0.002	0.002	90.581	0.020	0.001
27	2-hexanone (MBK)	5000	0.007	0.004	58.863	0.034	0.006
28	NDEA**	0.1	0.002	0.003	142.052	0.024	0.000
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.011	0.004	35.783	0.029	0.010
30	2,4-dimethylpyridine	500	0.008	0.012	147.435	0.073	0.003
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.010	0.010	99.689	0.077	0.006

Table 1-2. Statistical Information for the Monitoring Period of October 28, 2018 – October 29, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
32	heptanenitrile	6000	0.002	0.002	87.335	0.013	0.001
33	4-methyl-2-hexanone	500	0.005	0.003	67.855	0.028	0.004
34	NMOR**	0.6	0.002	0.003	149.884	0.032	0.000
35	butyl nitrate	2500	0.002	0.002	103.544	0.015	0.001
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.004	0.003	79.683	0.026	0.003
37	6-methyl-2-heptanone	8000	0.005	0.004	72.732	0.027	0.004
38	2-pentylfuran	1	0.016	0.014	90.386	0.084	0.010
39	Biphenyl	200	0.003	0.003	106.842	0.031	0.002
40	2-heptylfuran	1	0.013	0.010	73.843	0.058	0.009
41	1,4-butanediol dinitrate	50	0.004	0.002	66.536	0.016	0.003
42	2-octylfuran	1	0.001	0.002	193.284	0.016	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.001	0.002	269.961	0.020	0.000
44	PCB	1000	0.007	0.003	46.073	0.031	0.007
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.001	0.001	126.975	0.011	0.000
46	furfural acetophenone	1	0.007	0.003	44.767	0.022	0.006

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.318 ppb and the median value was 0.017 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

** Nitrosamine results are suspect due to isobaric interferants causing positive bias that have been encountered during previous background [53005-81-RPT-007, *PTR-MS Mobile Laboratory Vapor Monitoring Background Study, (3/18/2018 – 4/20/2018)*, and *Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study*, RJ Lee Group, Inc., 2017].

The following figures display a selection of 16 chemical of potential concern (COPC) signals, overlaid with the same signal smoothed using a 1-minute moving average (in cases where a moving average assists with data visualization), and CO_2, for the monitoring period October 28, 2018, to October 29, 2018. If within range of the plot's left axis, a green horizontal line representing 50% of the COPC's OEL and a blue horizontal line representing the COPC's OEL are shown.

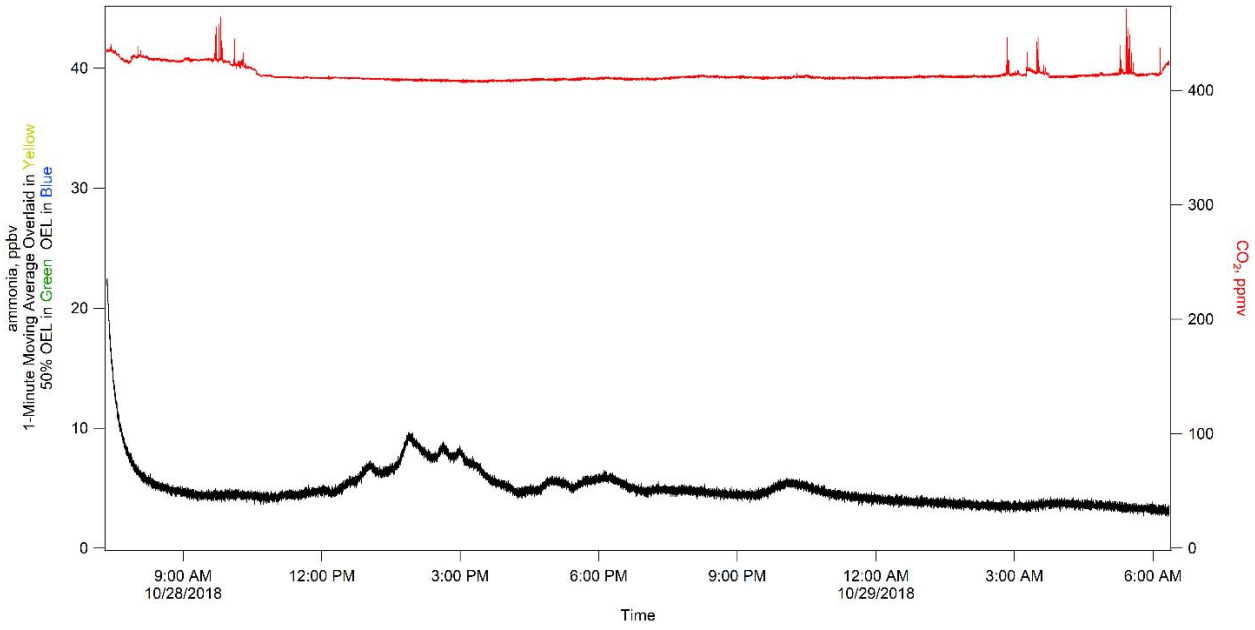

Figure 1-4. Ammonia.

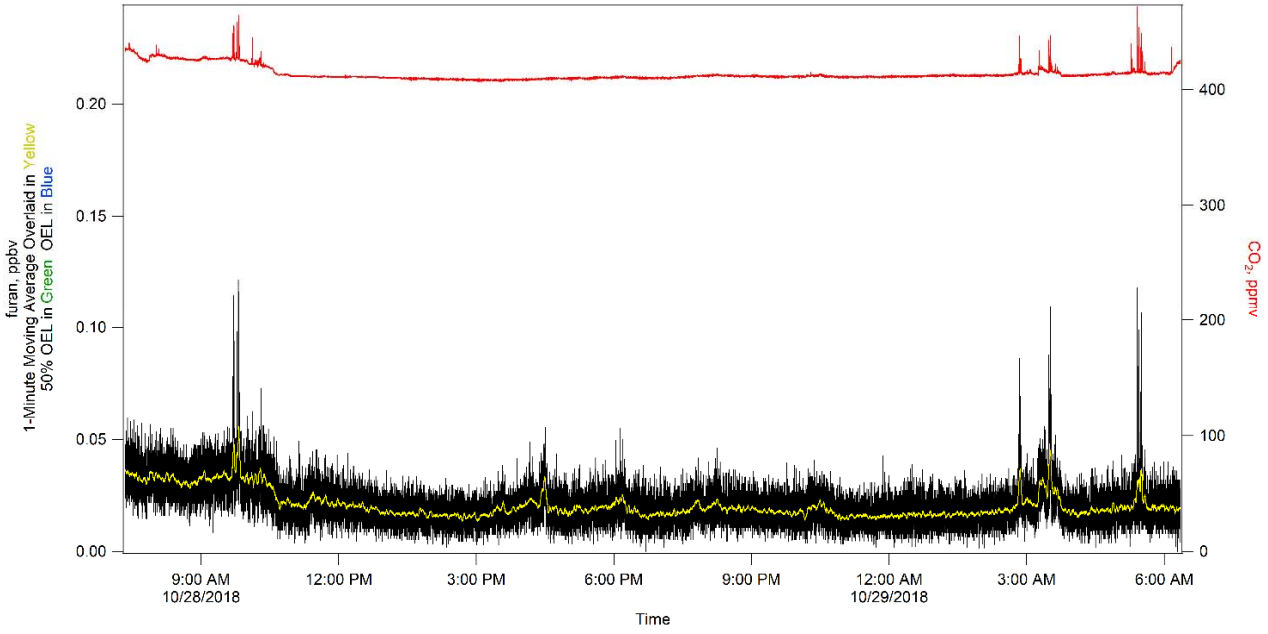

Figure 1-5. Furan.

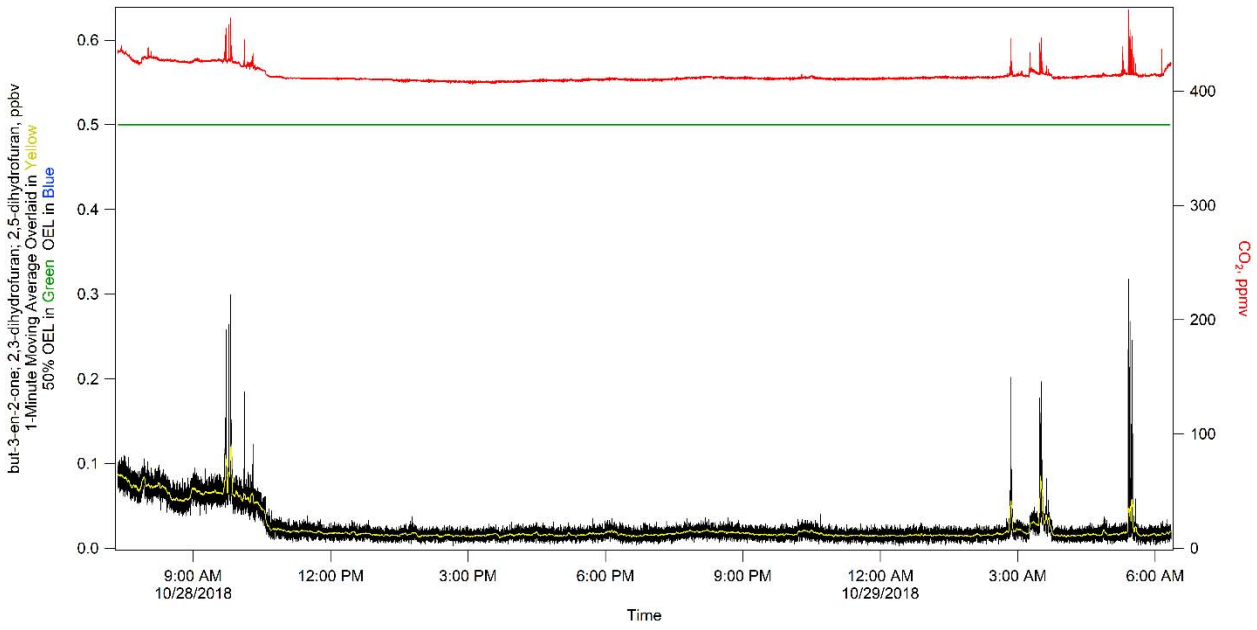

Figure 1-6. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

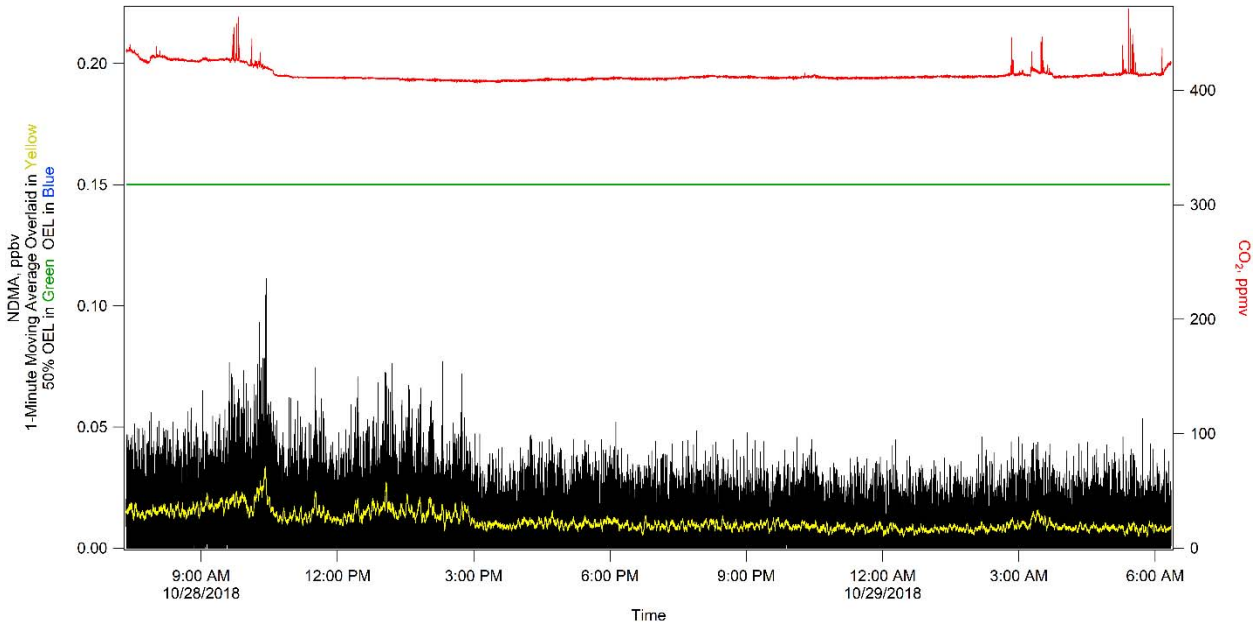

Figure 1-7. N-nitrosodimethylamine (NDMA).

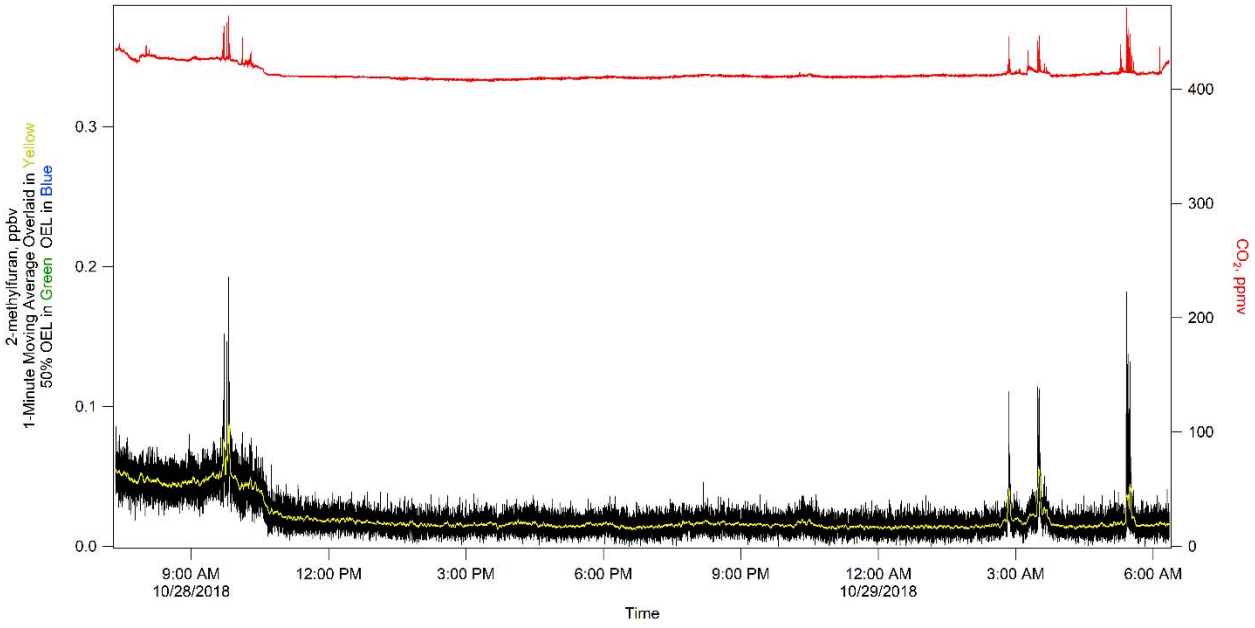

Figure 1-8. 2-methylfuran.

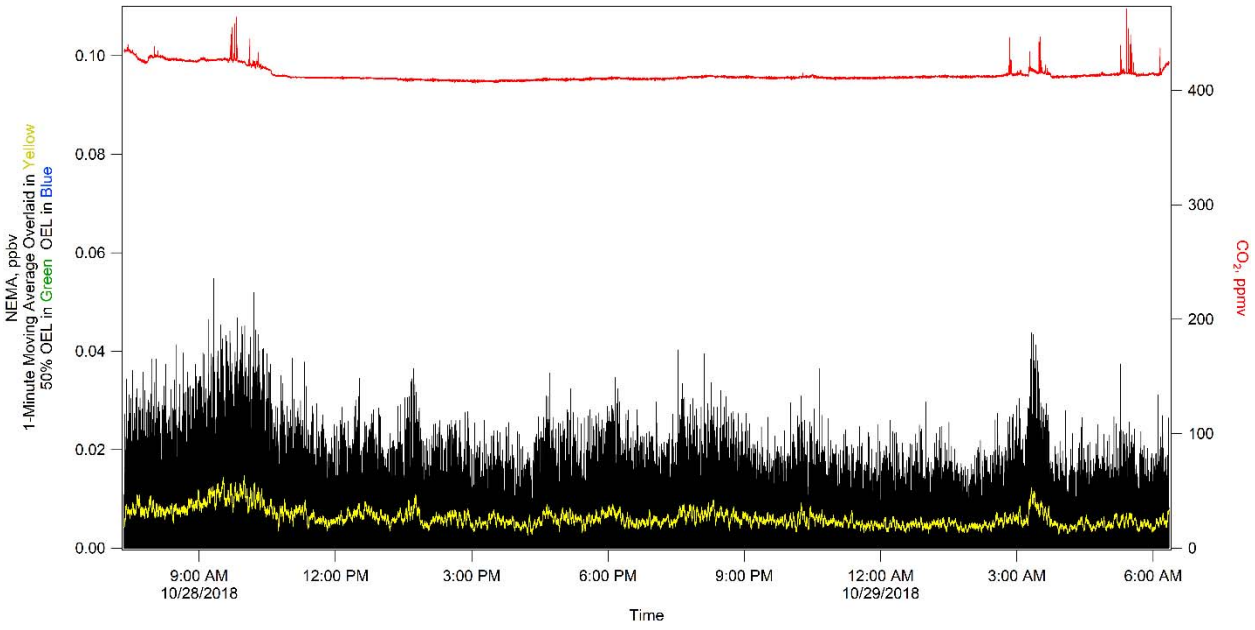

Figure 1-9. N-nitrosomethylethylamine (NEMA).

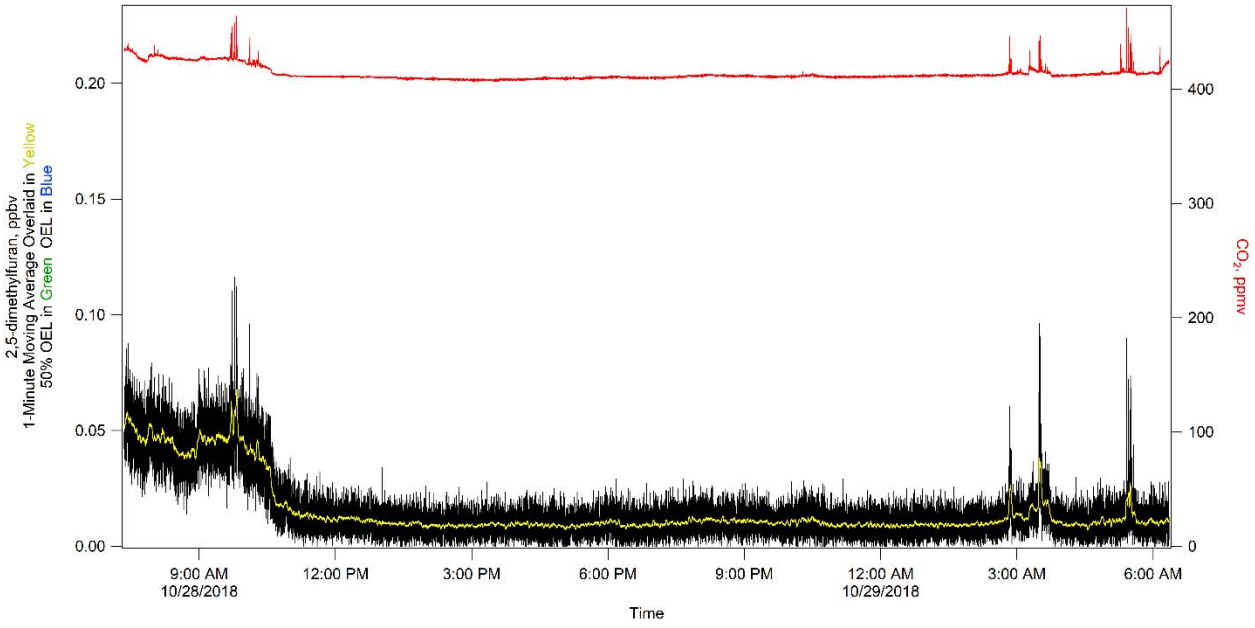

Figure 1-10. 2,5-dimethylfuran.

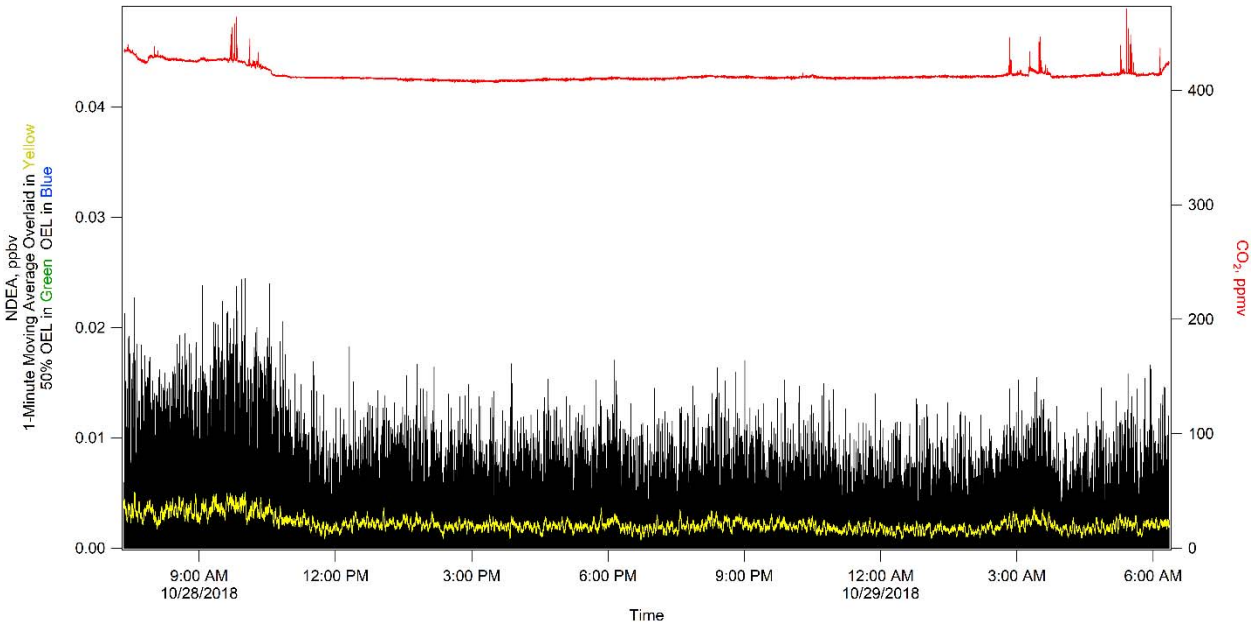

Figure 1-11. N-nitrosodiethylamine (NDEA).

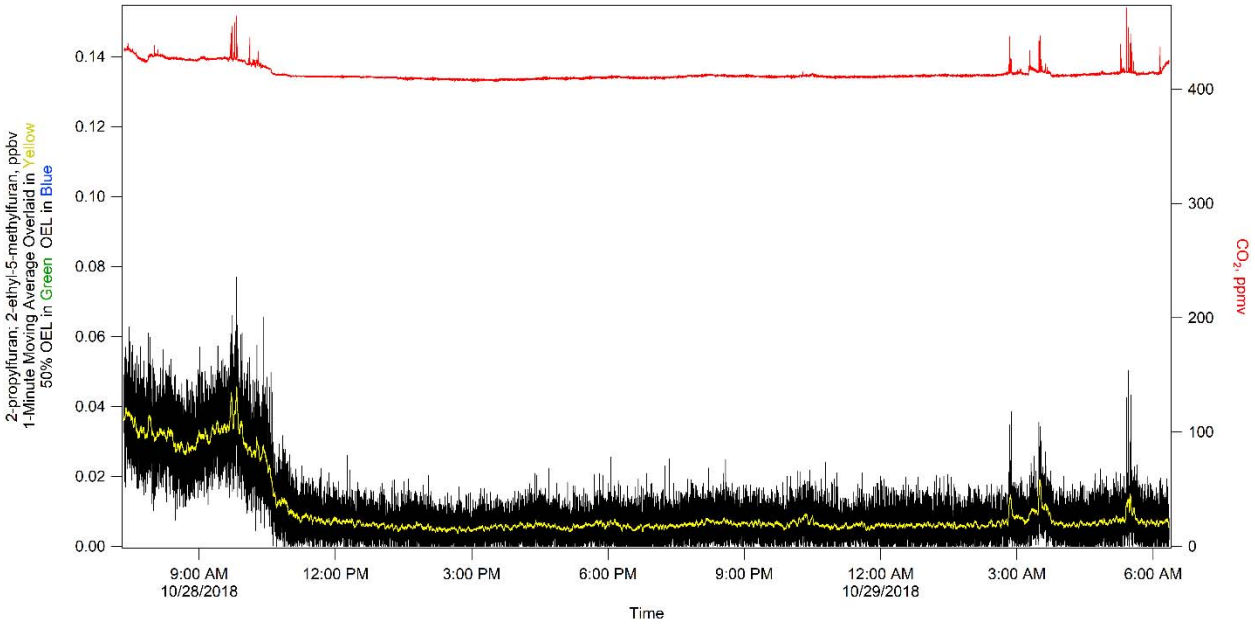

Figure 1-12. 2-propylfuran + 2-ethyl-5-methylfuran.

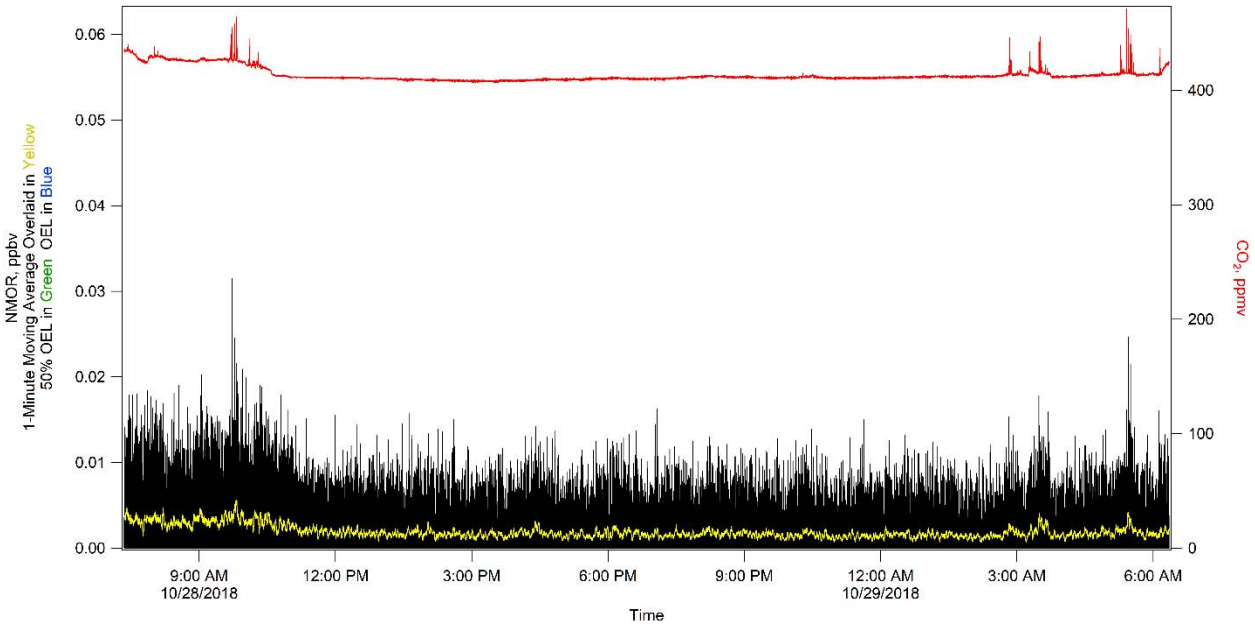

Figure 1-13. N-nitrosomorpholine (NMOR).

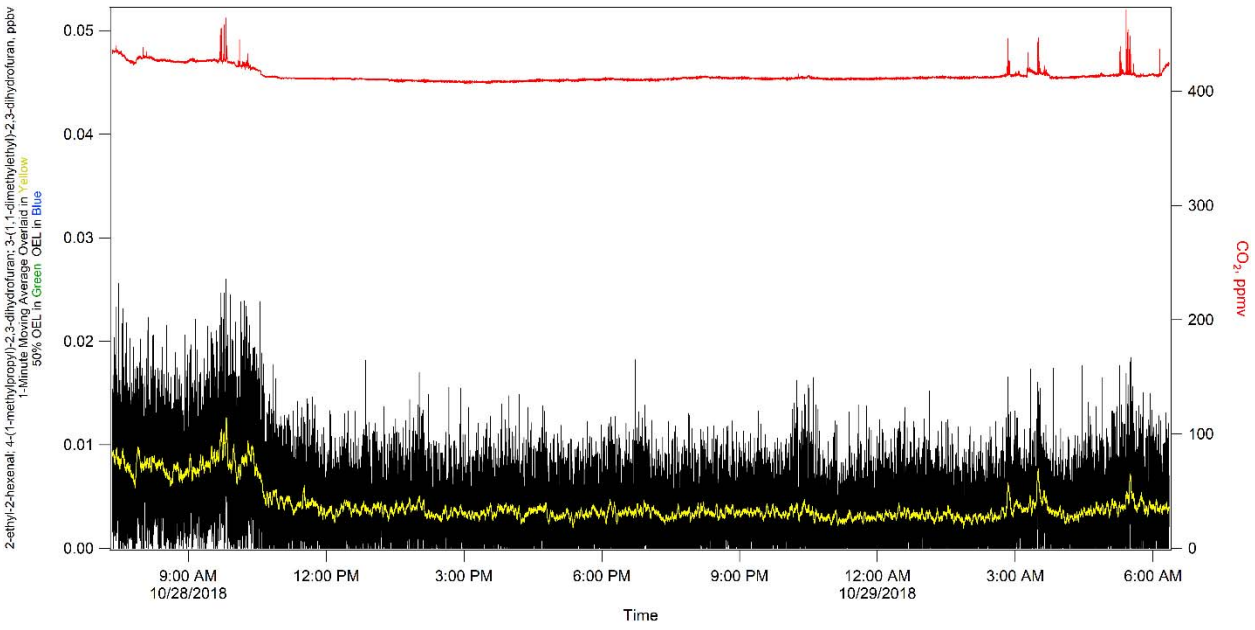

Figure 1-14. 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1-1-dimethylethyl)-2,3-dihydrofuran + 2-ethyl-2-hexenal.

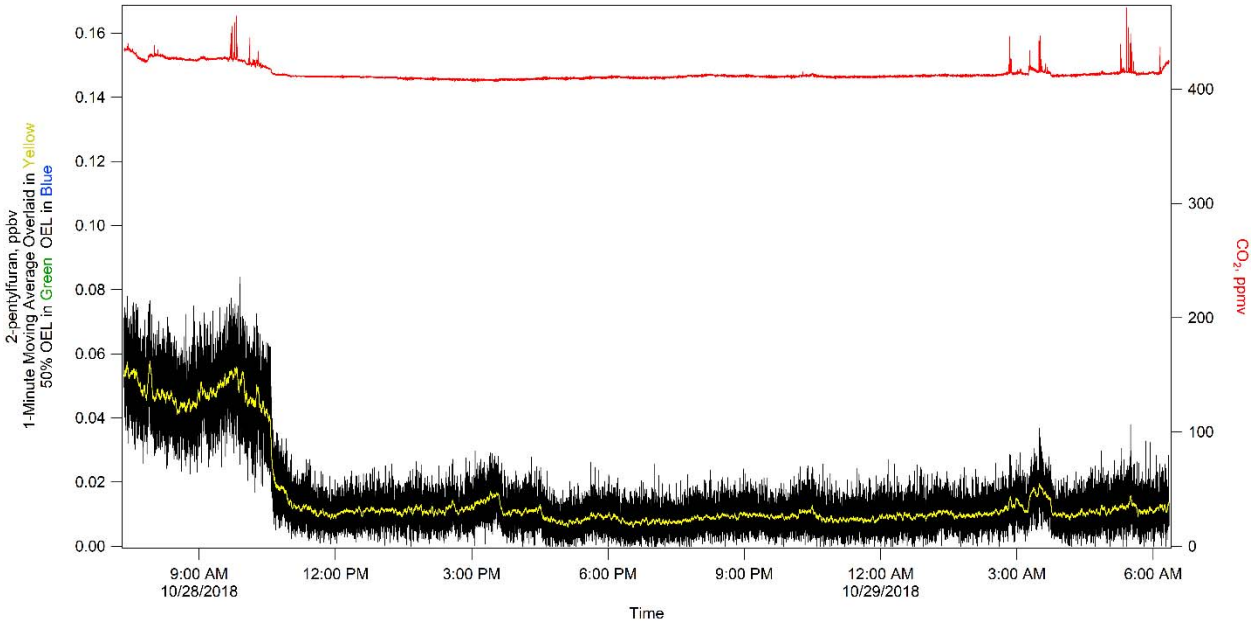

Figure 1-15. 2-pentylfuran.

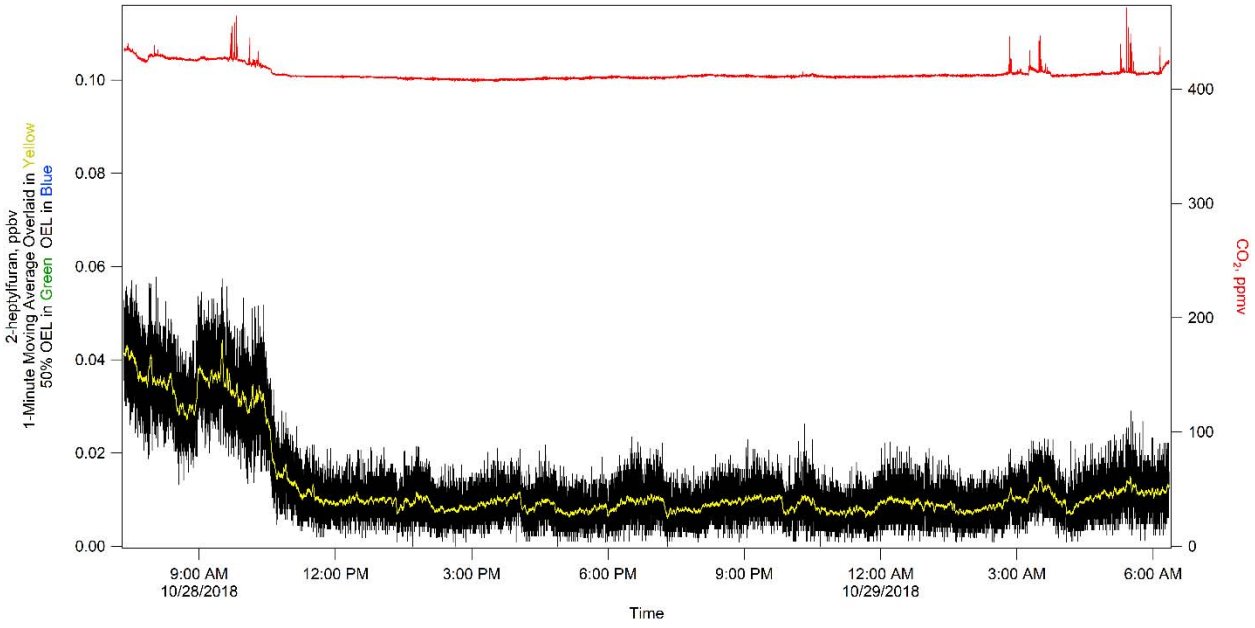

Figure 1-16. 2-heptylfuran.

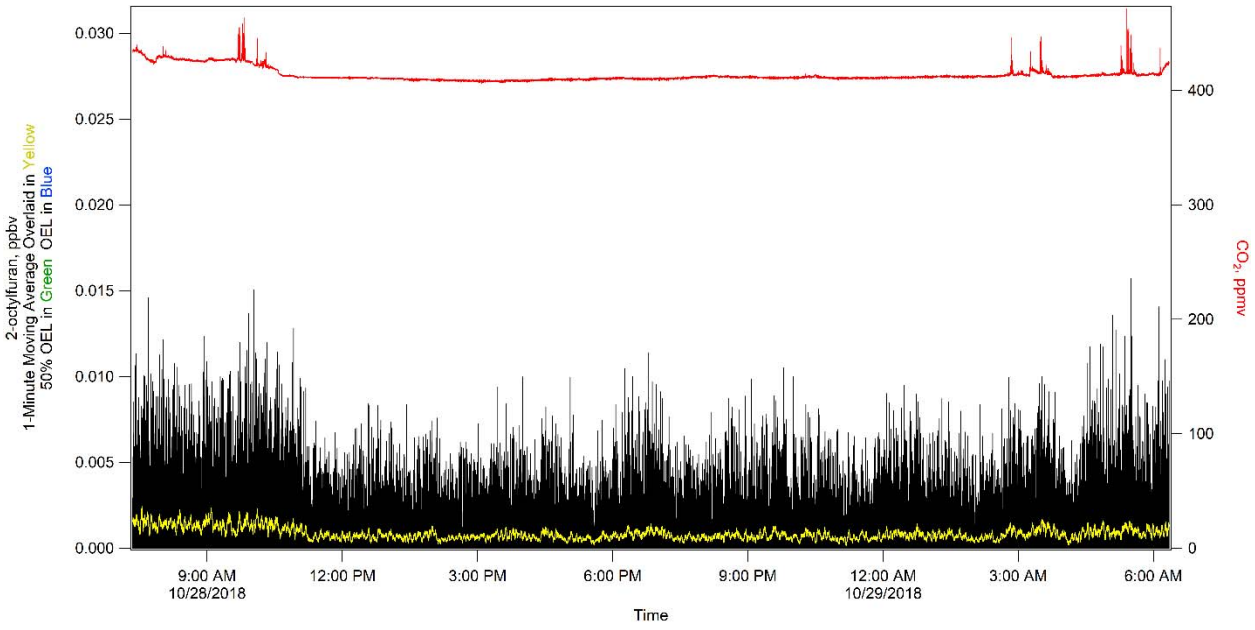

Figure 1-17. 2-octylfuran.

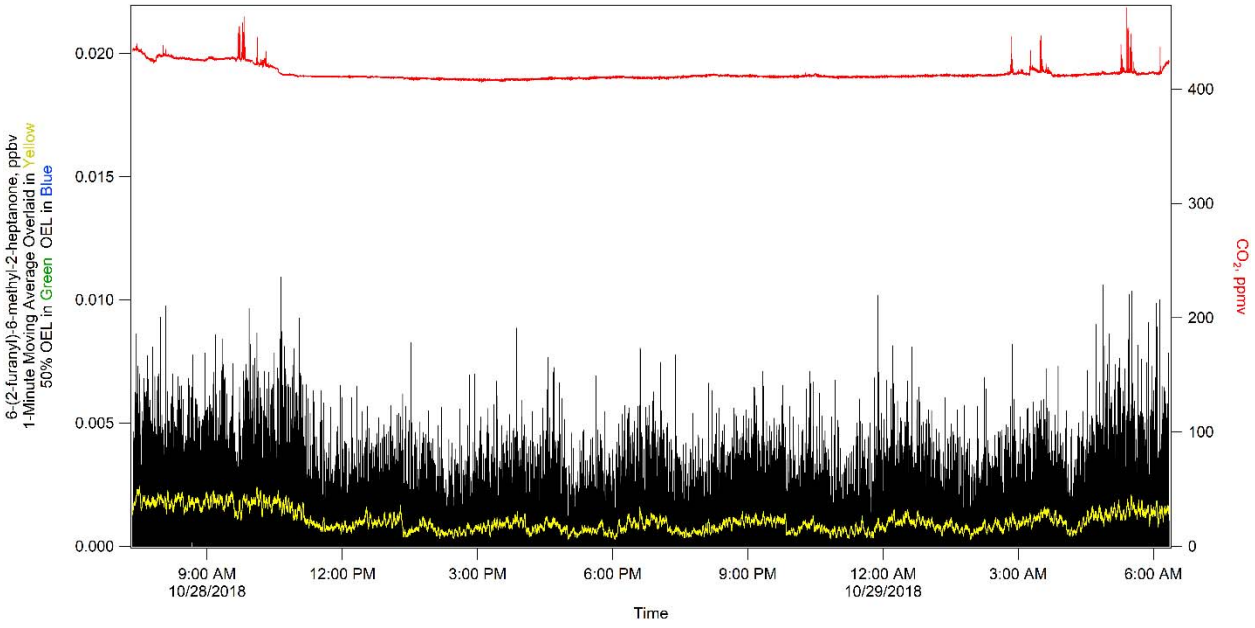

Figure 1-18. 6-(2-furanyl)-6-methyl-2-heptanone.

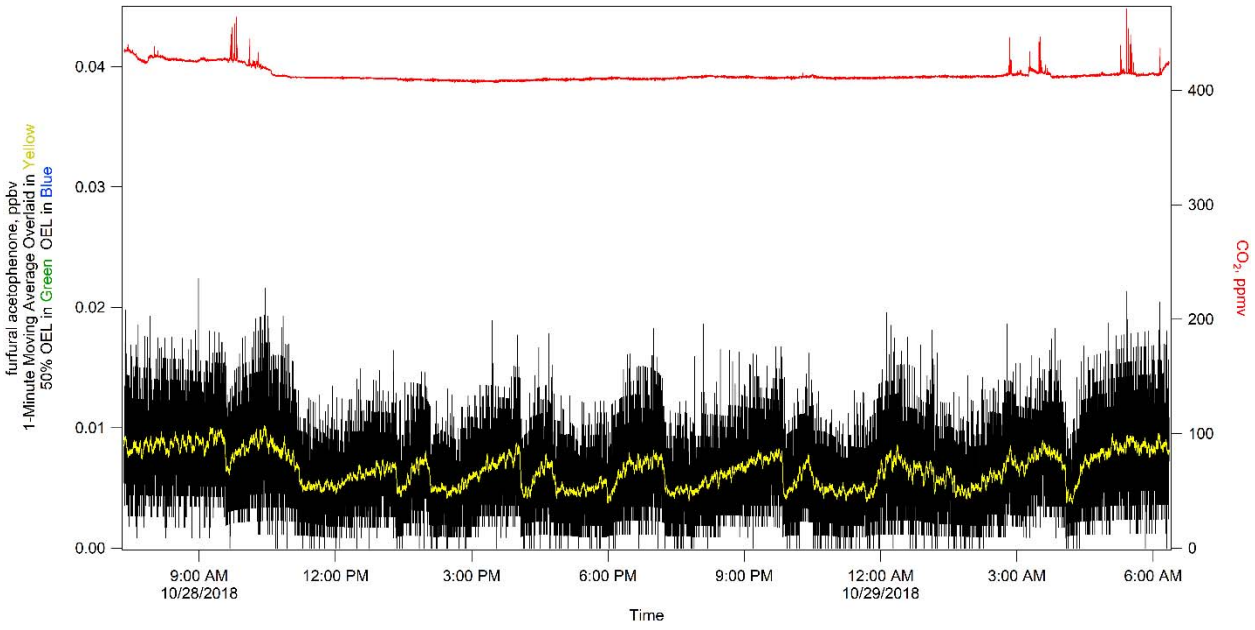

Figure 1-19. Furfural Acetophenone.

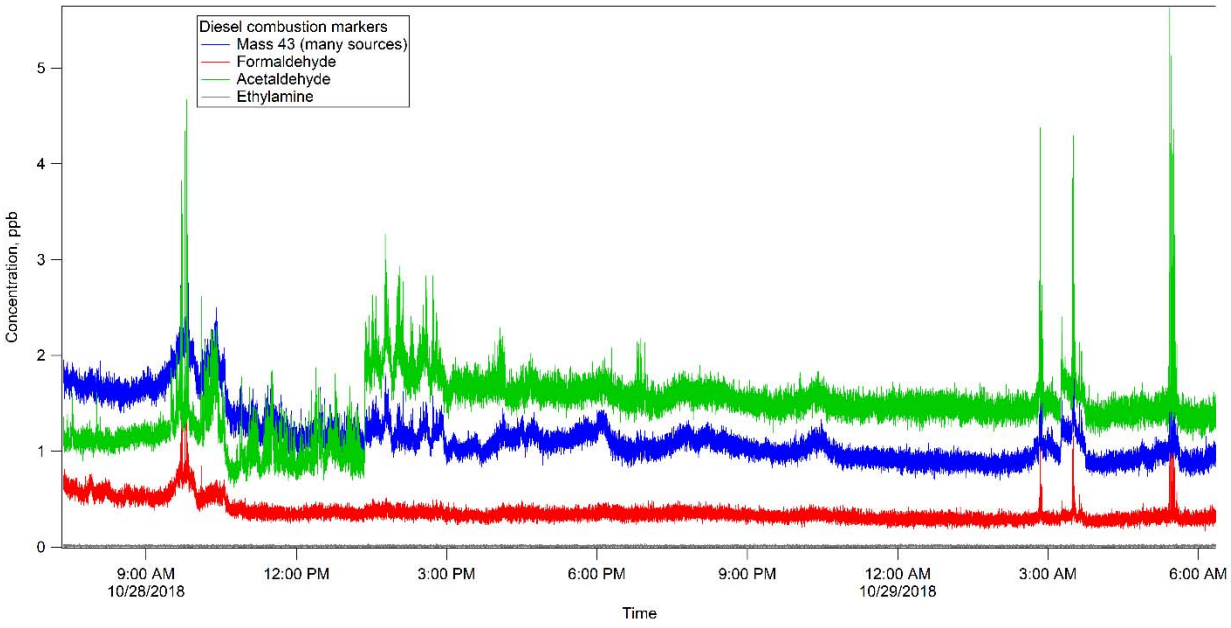

Figure 1-20. Diesel Combustion Markers.

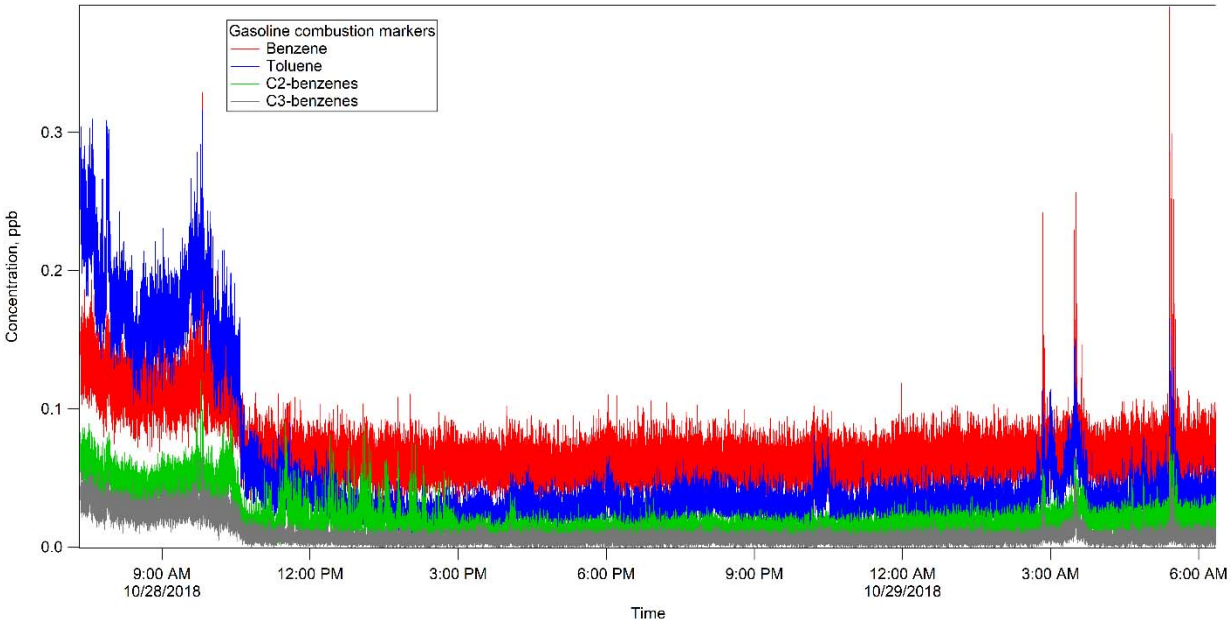

Figure 1-21. Gasoline Combustion Markers.

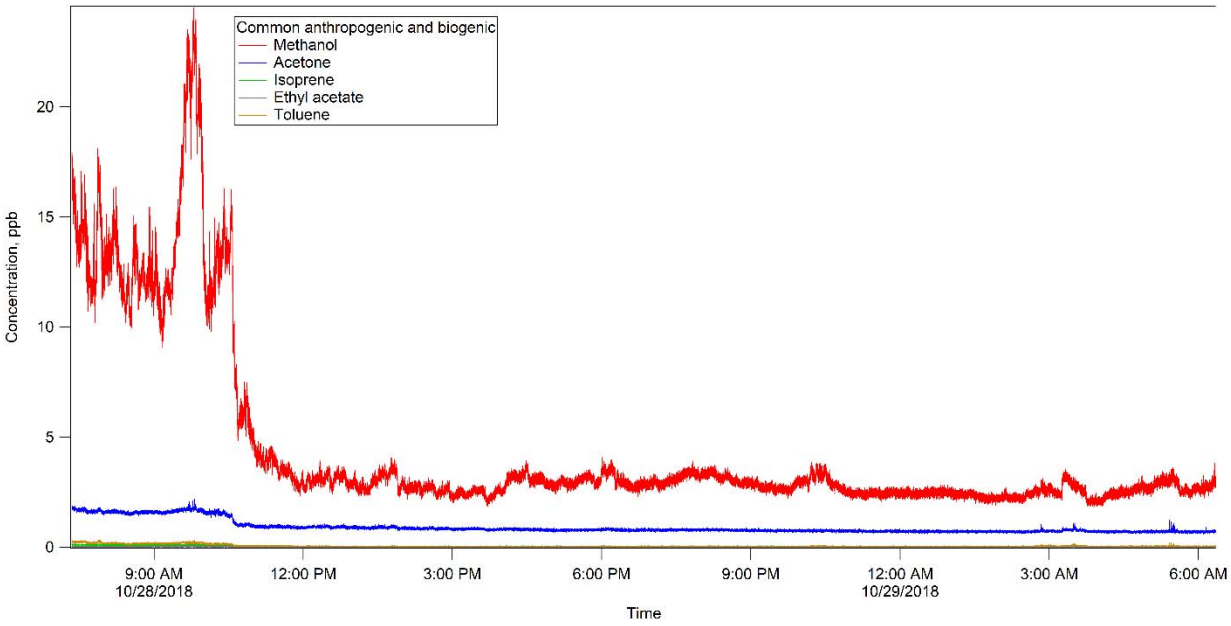

Figure 1-22. Plant and Human Markers.

2.0 OCTOBER 29, 2018 – OCTOBER 30, 2018 – STUDY SITE #3

2.1 Quality Assessment

Data from October 29, 2018, were assessed using Procedure 17124-DOE-HS-102. A Data Exchange Checklist was completed. The data were accepted by TerraGraphics with the following comments. Report No. 66409-RPT-004 was adequately documented and all checks passed the acceptance limits.

2.2 Summary

The ML personnel performed background sampling using the ML from October 29, 2018, to October 30, 2018, at Study Site 3. Site 3 is located near the corner of 4th and Buffalo just to the west of the 242-A Evaporator. This site historically has seen the occurrence of several Abnormal Operating Procedure (AOP)-015 events (reports of unusual odors). The ML arrived at Site 3 at 07:04 on October 29, 2018. The QA/QC zero-air/sensitivity checks were performed on the LI-COR CO_2 monitor, Picarro NH_3 analyzer, and the PTR-MS at 07:19. The collection of confirmatory samples began at 08:41. The ML staff departed the monitoring site at 11:46 and checked out with the CSO.

The ML staff returned to Site 3 at 06:13 on October 30, 2018. The ML moved to Site 4 by 06:57.

Figure 2-1. Mobile Laboratory Site #3 for the Duration of the Monitoring Period.

Figure 2-2. The Location of the Mobile Laboratory for the Duration of the Monitoring Period.

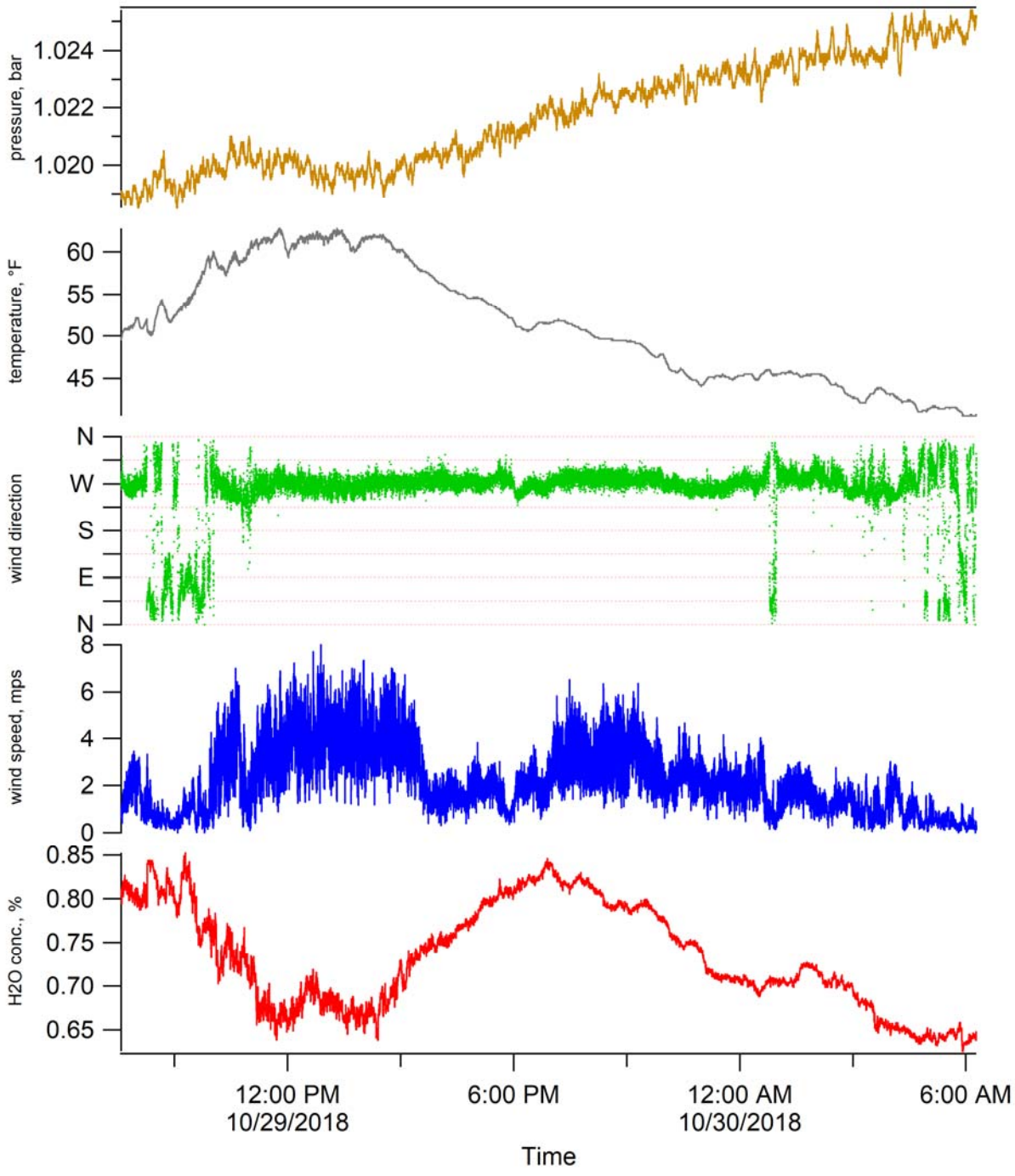

Figure 2-3. Weather Data.

2.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-MS,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were collected as follows.

Table 2-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
3	10/29/18	LpDNPH	181029-A	08:41	11:41	180
3	10/29/18	LpDNPH	181029-B	08:41	11:41	180

Table 2-2 displays the statistical information for the monitoring period of October 29, 2018, to October 30, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 2-2. Statistical Information for the Monitoring Period of October 29, 2018 – October 30, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	Ammonia	25000	3.865	1.445	37.397	14.713	3.607
2	formaldehyde	300	0.397	0.101	25.412	1.736	0.380
3	Methanol	200000	2.762	1.043	37.759	21.966	2.441
4	acetonitrile	20000	0.184	1.158	627.426	120.924	0.157
5	acetaldehyde	25000	1.117	0.812	72.713	32.677	0.979
6	ethylamine	5000	0.010	0.005	51.969	0.042	0.010
7	1,3-butadiene	1000	0.067	0.045	66.530	1.167	0.062
8	propanenitrile	6000	0.025	0.013	52.869	0.480	0.023
9	2-propenal	100	0.078	0.039	50.159	0.618	0.067
10	1-butanol + butenes	20000	0.063	0.064	100.378	2.414	0.051
11	methyl isocyanate	20	0.024	0.009	39.320	0.071	0.023
12	methyl nitrite	100	0.042	0.016	38.268	0.336	0.039
13	furan	1	0.024	0.013	51.502	0.089	0.021
14	butanenitrile	8000	0.008	0.006	78.943	0.205	0.007
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.027	0.014	49.491	N/A*	N/A*
16	butanal	25000	0.056	0.019	33.164	0.355	0.052
17	NDMA**	0.3	0.011	0.011	102.790	0.080	0.008
18	benzene	500	0.095	0.102	107.457	5.479	0.076
19	2,4-pentadienenitrile + pyridine	300, 1000	0.018	0.009	50.151	0.398	0.016
20	2-methylene butanenitrile	300	0.010	0.005	50.892	0.046	0.009
21	2-methylfuran	1	0.022	0.010	44.553	0.091	0.020
22	pentanenitrile	6000	0.006	0.004	65.827	0.075	0.005
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.017	0.008	47.930	0.086	0.016
24	NEMA**	0.3	0.006	0.007	120.020	0.057	0.003
25	2,5-dimethylfuran	1	0.014	0.008	55.806	0.070	0.012
26	hexanenitrile	6000	0.002	0.002	101.291	0.037	0.001
27	2-hexanone (MBK)	5000	0.008	0.005	60.363	0.057	0.007
28	NDEA**	0.1	0.002	0.003	146.623	0.023	0.000
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.010	0.004	39.773	0.045	0.009
30	2,4-dimethylpyridine	500	0.006	0.012	182.637	0.460	0.004
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.008	0.005	67.578	0.042	0.006

Table 2-2. Statistical Information for the Monitoring Period of October 29, 2018 – October 30, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
32	heptanenitrile	6000	0.002	0.002	92.794	0.020	0.001
33	4-methyl-2-hexanone	500	0.005	0.003	68.343	0.025	0.004
34	NMOR**	0.6	0.003	0.004	161.135	0.123	0.000
35	butyl nitrate	2500	0.002	0.002	110.146	0.021	0.001
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.004	0.003	78.019	0.026	0.003
37	6-methyl-2-heptanone	8000	0.004	0.003	70.592	0.022	0.003
38	2-pentylfuran	1	0.014	0.007	52.424	0.056	0.012
39	Biphenyl	200	0.003	0.003	97.740	0.025	0.002
40	2-heptylfuran	1	0.011	0.005	42.306	0.105	0.010
41	1,4-butanediol dinitrate	50	0.004	0.003	68.450	0.020	0.003
42	2-octylfuran	1	0.001	0.002	198.365	0.015	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.001	0.002	281.677	0.019	0.000
44	PCB	1000	0.007	0.003	46.152	0.025	0.007
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.001	0.001	132.887	0.012	0.000
46	furfural acetophenone	1	0.007	0.003	46.895	0.027	0.006

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.160 ppb and the median value was 0.024 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

** Nitrosamine results are suspect due to isobaric interferants causing positive bias that have been encountered during previous background studies [53005-81-RPT-007, *PTR-MS Mobile Laboratory Vapor Monitoring Background Study, (3/18/2018 – 4/20/2018)*, and *Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study*, RJ Lee Group, Inc., 2017].

The following figures display a selection of 16 COPC signals, overlaid with the same signal smoothed using a 1-minute moving average (in cases where a moving average assists with data visualization), and CO_2, for the monitoring period October 29, 2018, to October 30, 2018. If within range of the plot's left axis, a green horizontal line representing 50% of the COPC's OEL and a blue horizontal line representing the COPC's OEL are shown.

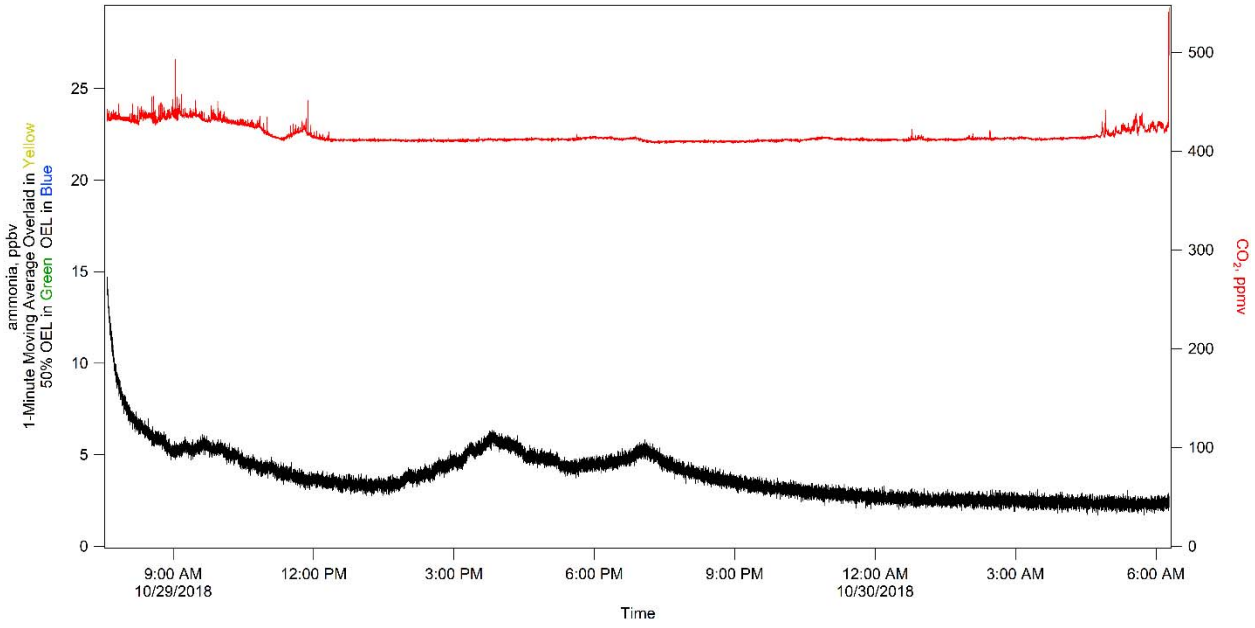

Figure 2-4. Ammonia.

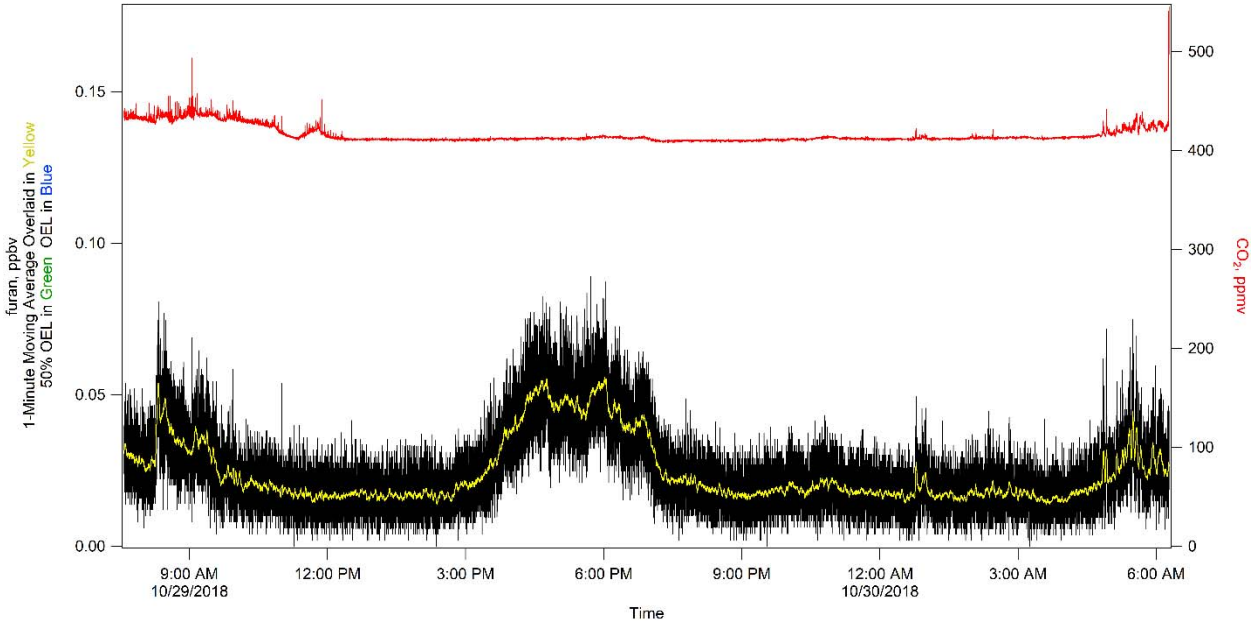

Figure 2-5. Furan.

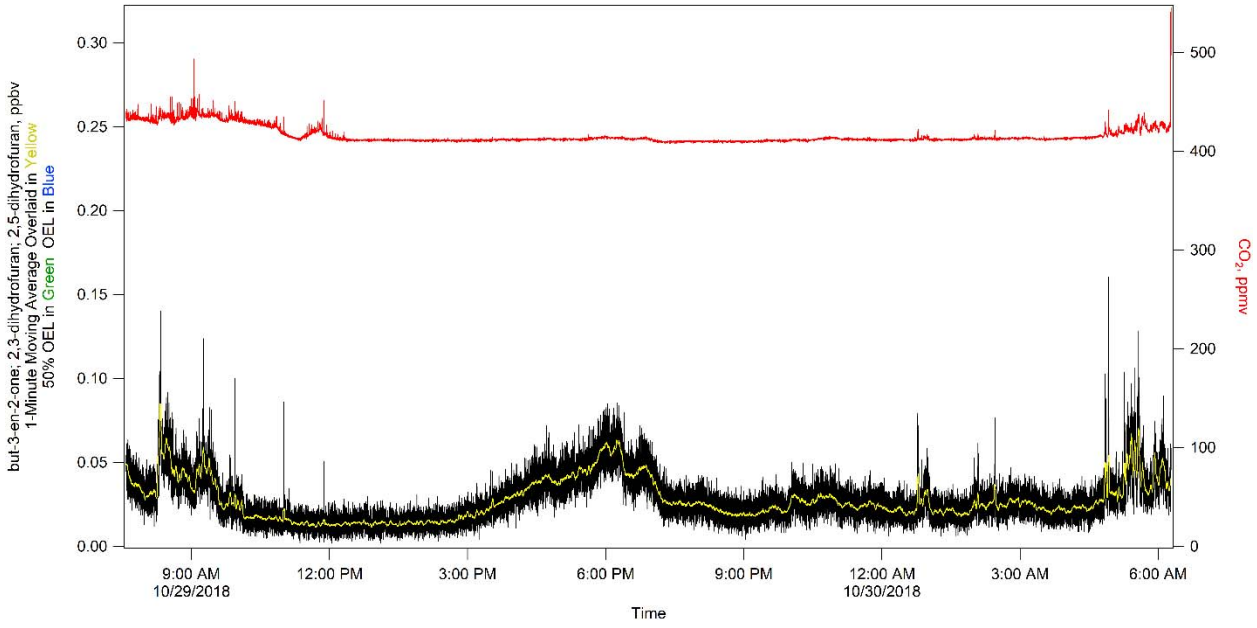

Figure 2-6. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

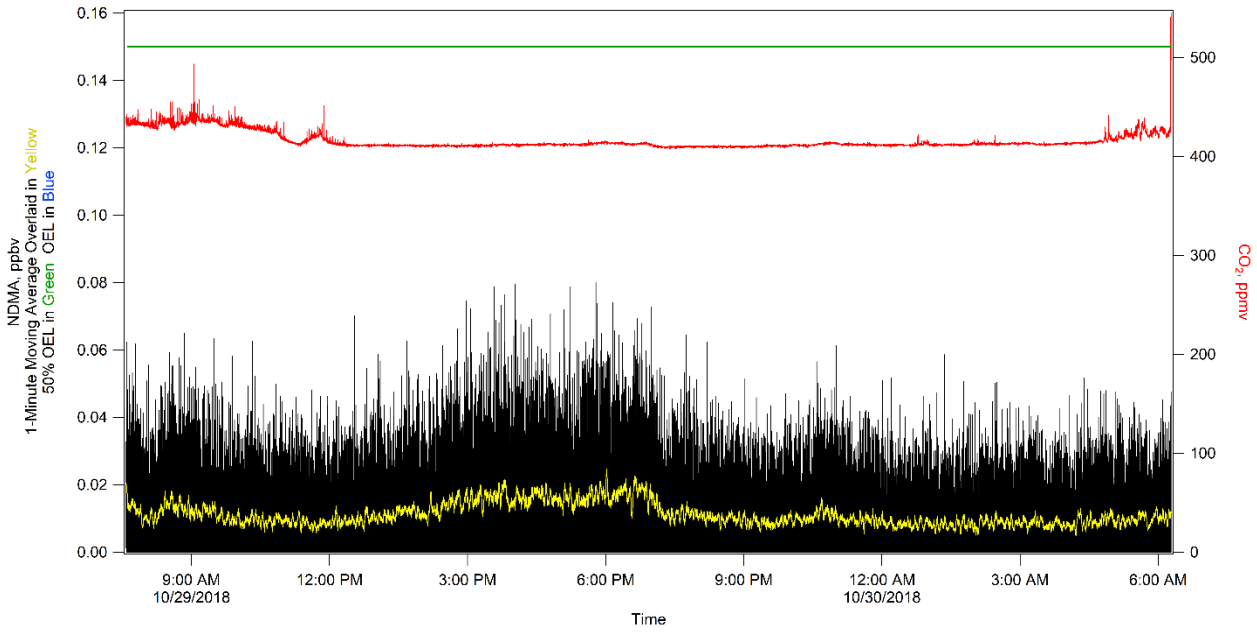

Figure 2-7. N-nitrosodimethylamine (NDMA).

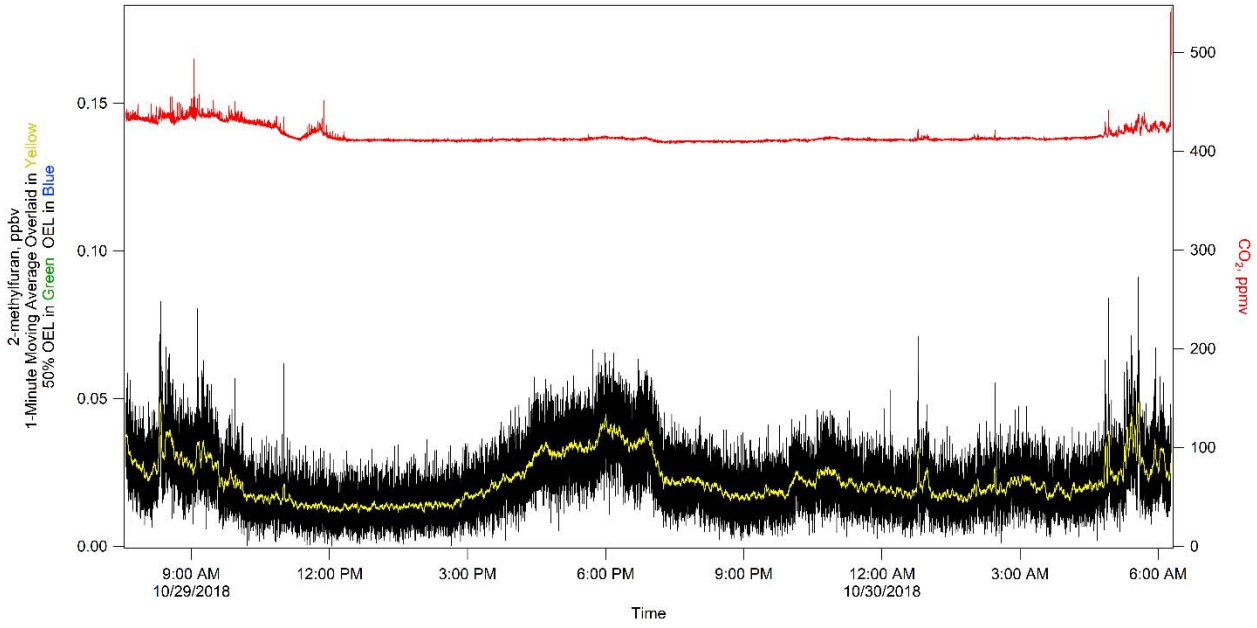

Figure 2-8. 2-methylfuran.

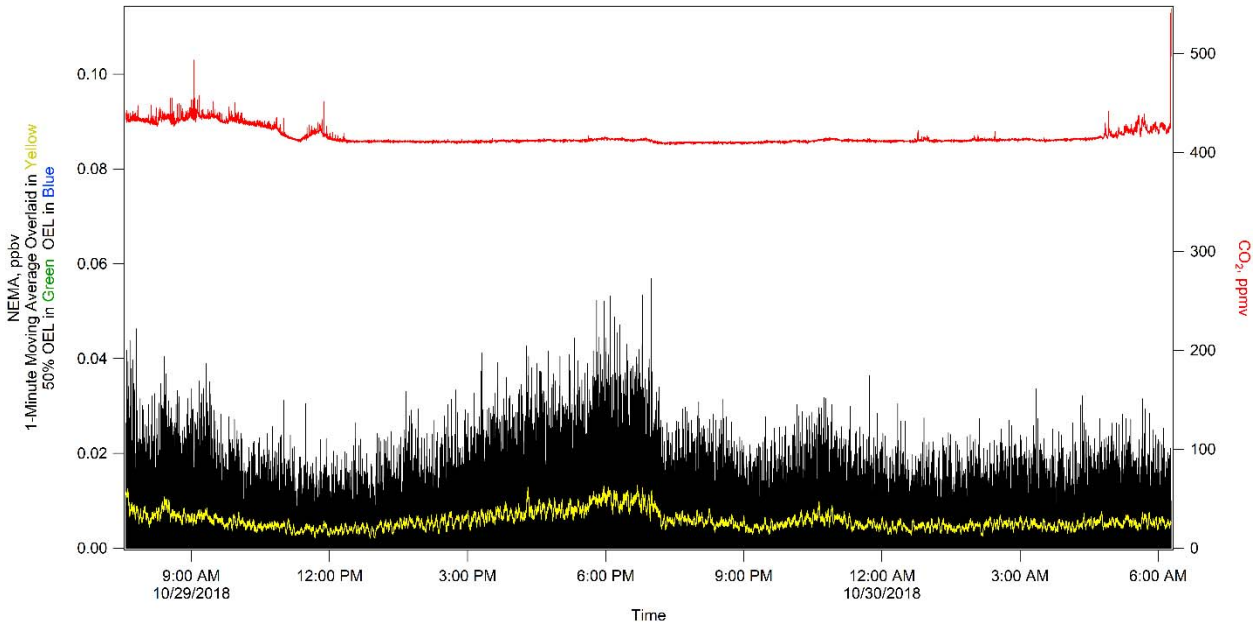

Figure 2-9. N-nitrosomethylethylamine (NEMA).

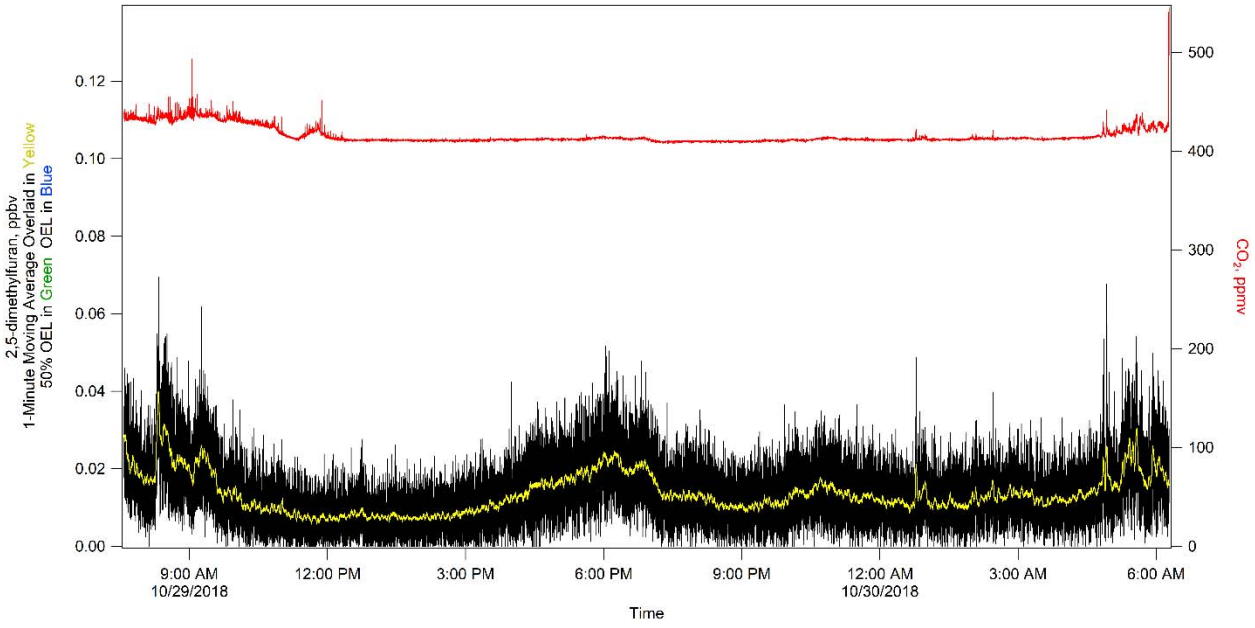

Figure 2-10. 2,5-dimethylfuran.

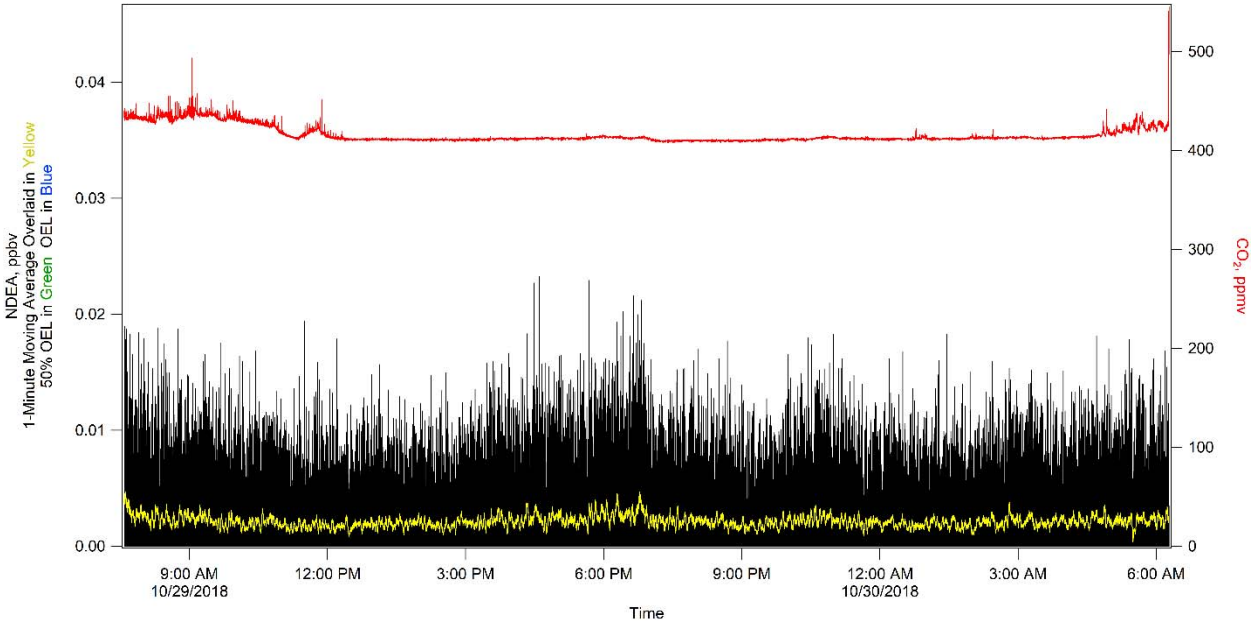

Figure 2-11. N-nitrosodiethylamine (NDEA).

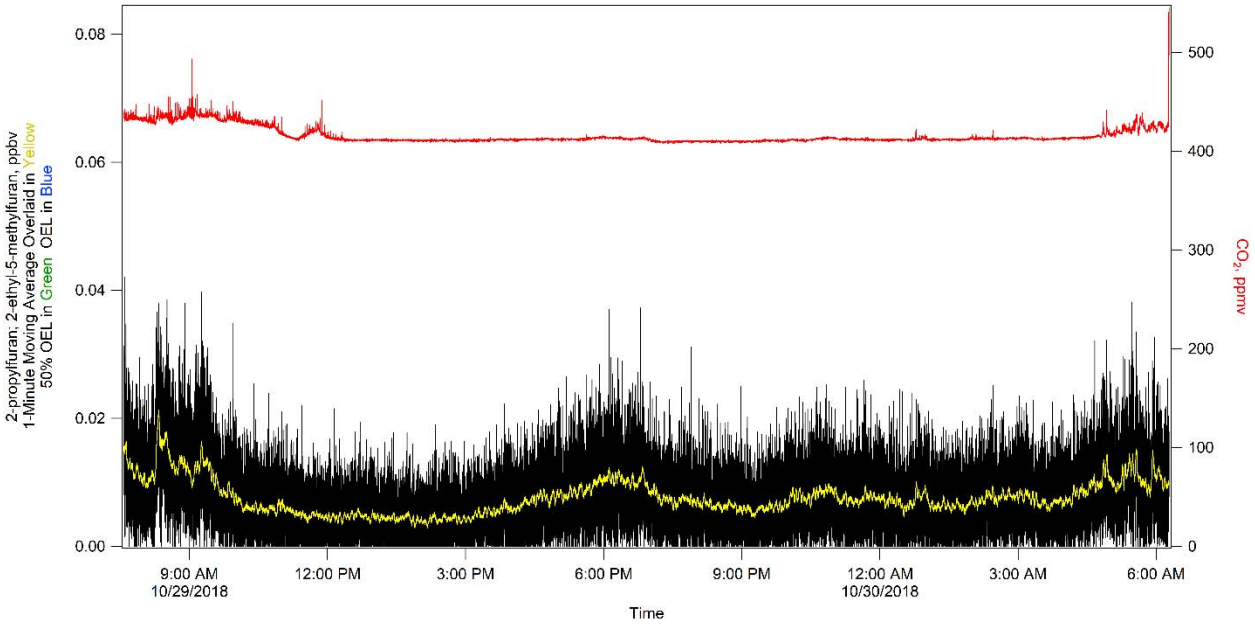

Figure 2-12. 2-propylfuran + 2-ethyl-5-methylfuran.

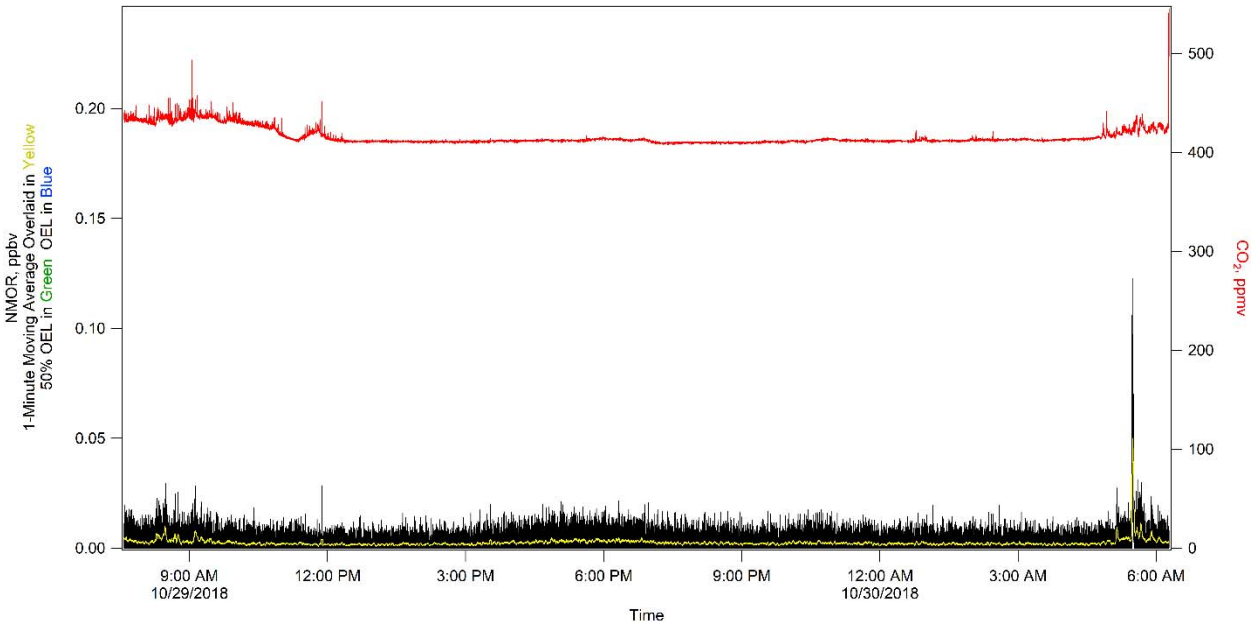

Figure 2-13. N-nitrosomorpholine (NMOR).

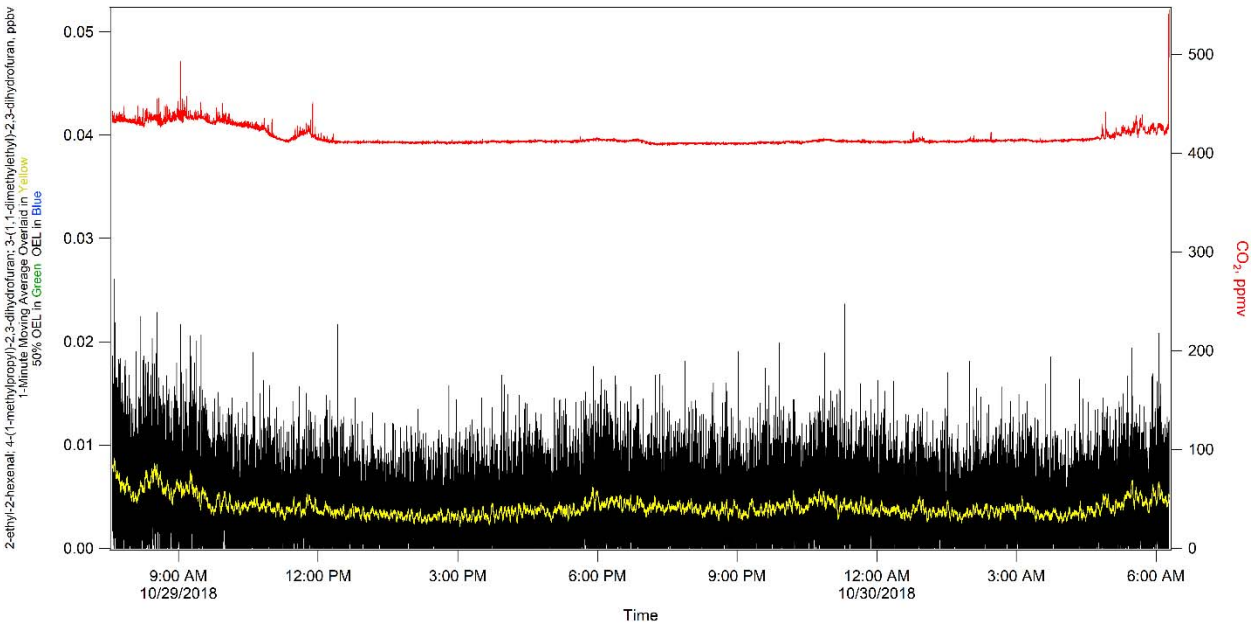

Figure 2-14. 2-ethyl-2-hexenal;4-(1-methylpropyl);2,3-dihydrofuran; 3-1(1,-1-dimethylethyl)-2,3-dihydrofuran.

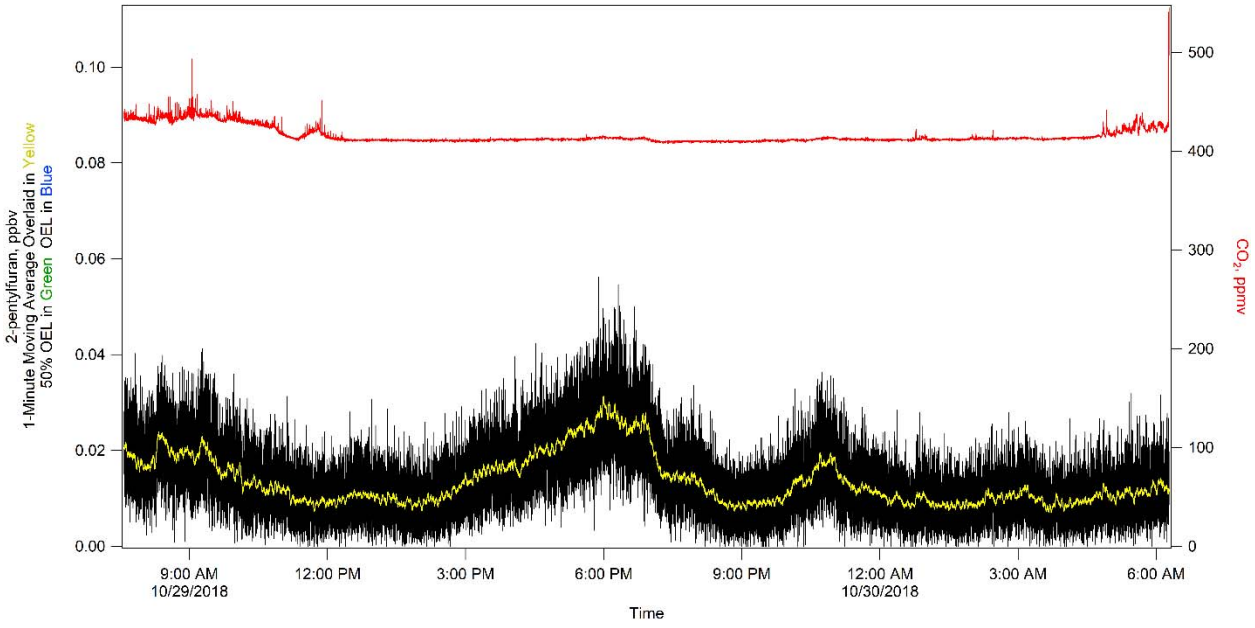

Figure 2-15. 2-pentylfuran.

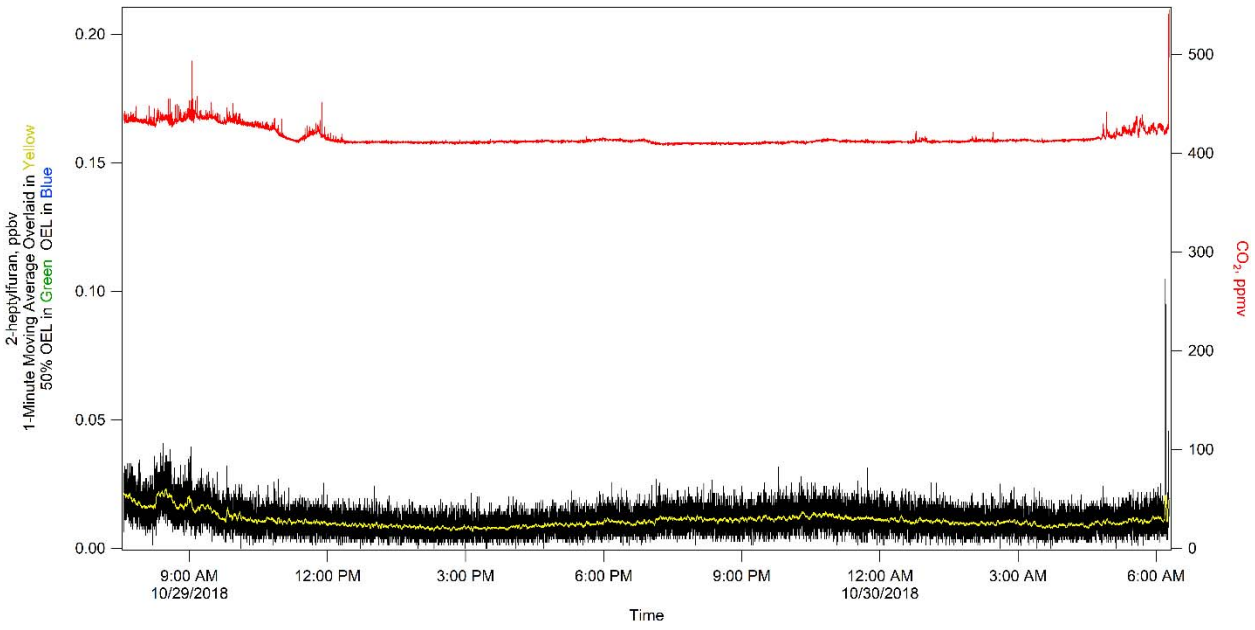

Figure 2-16. 2-heptylfuran.

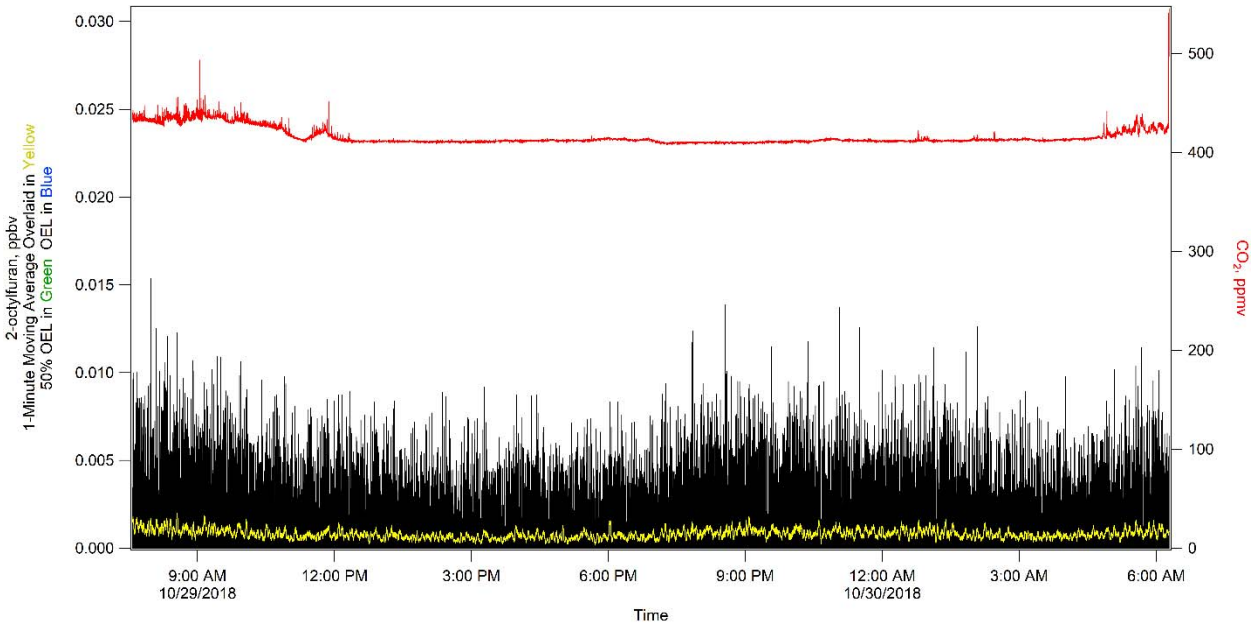

Figure 2-17. 2-octylfuran.

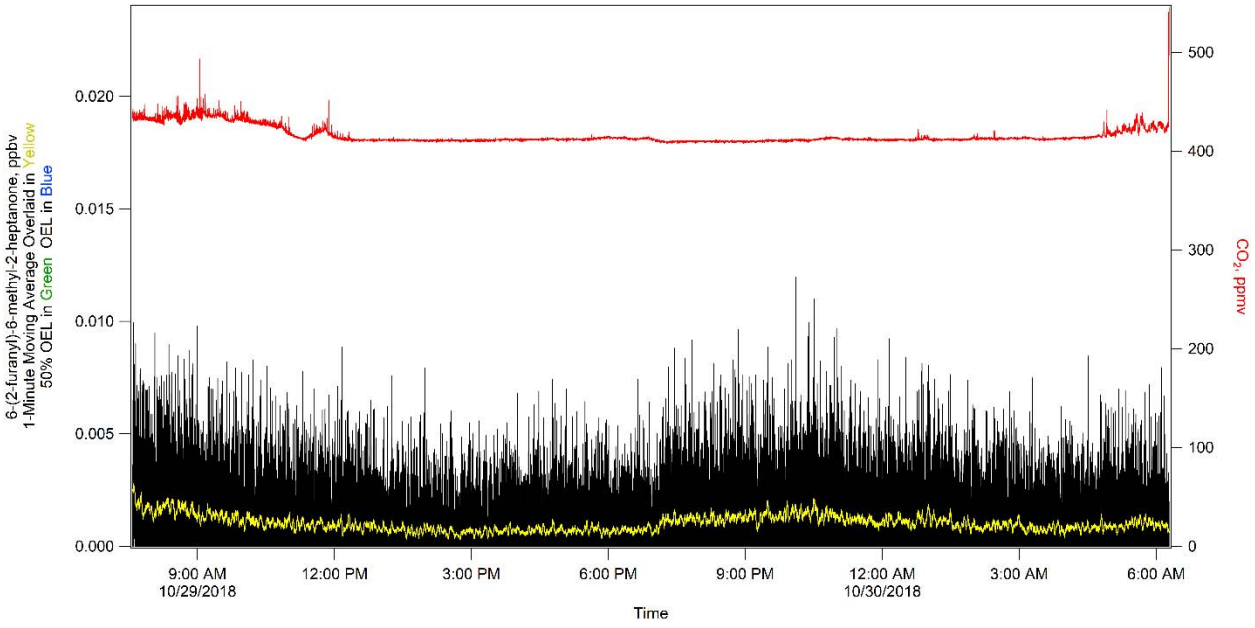

Figure 2-18. 6-(2-furanyl)-6-methyl-2-heptanone.

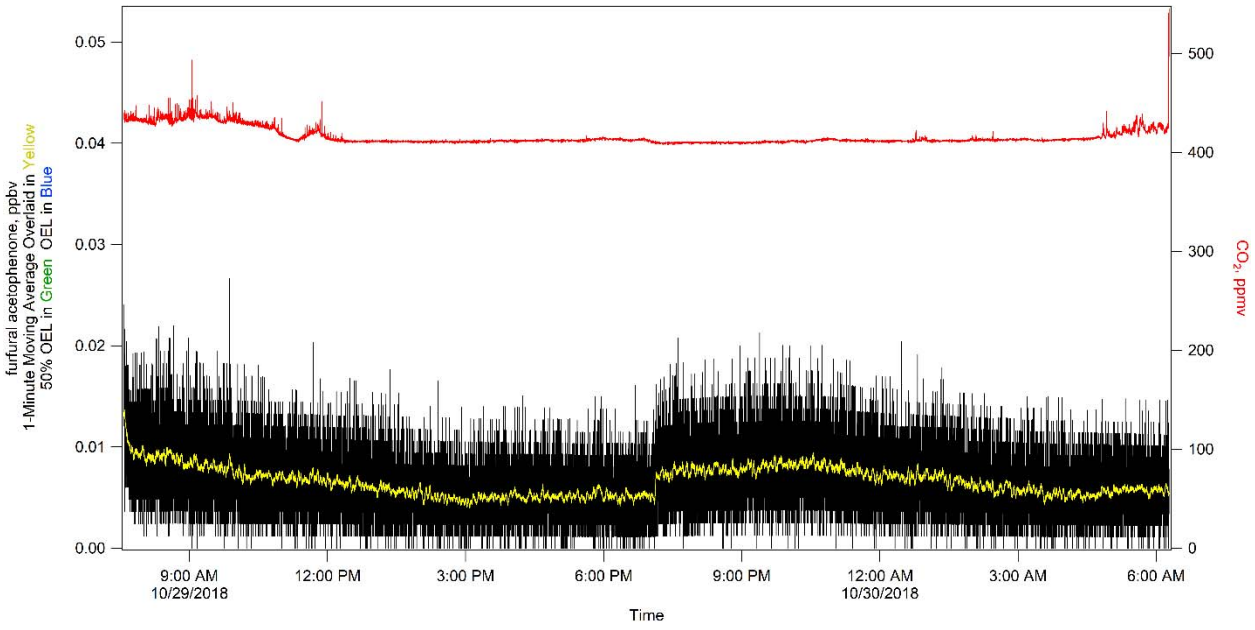

Figure 2-19. Furfural Acetophenone.

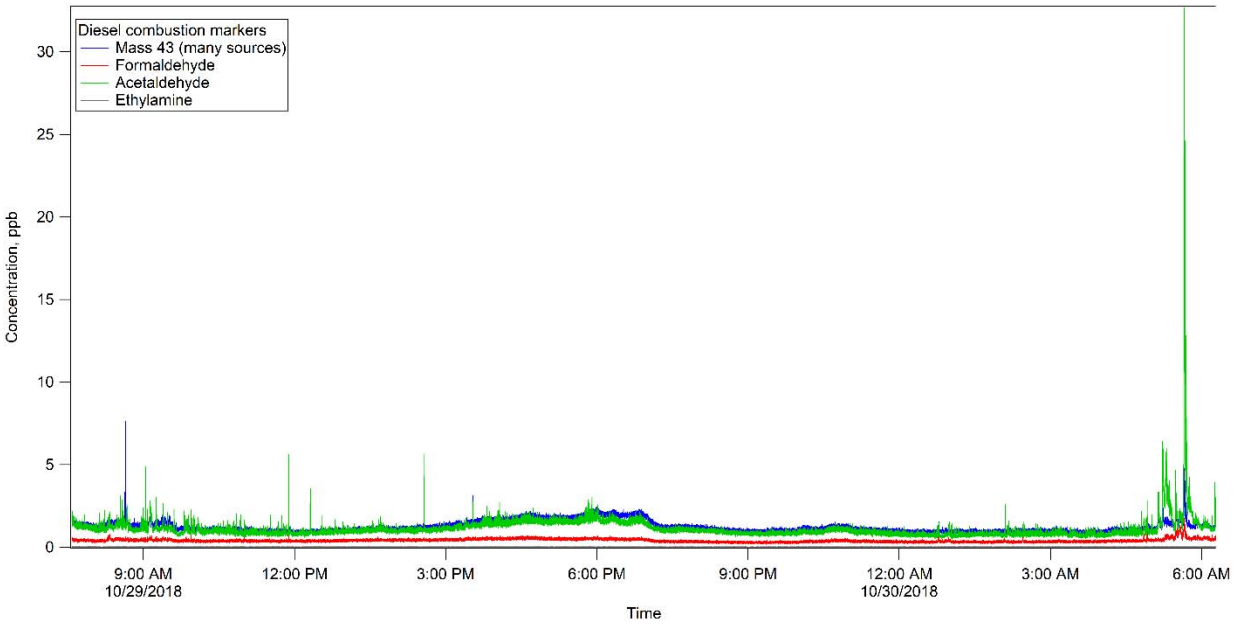

Figure 2-20. Diesel Combustion Markers.

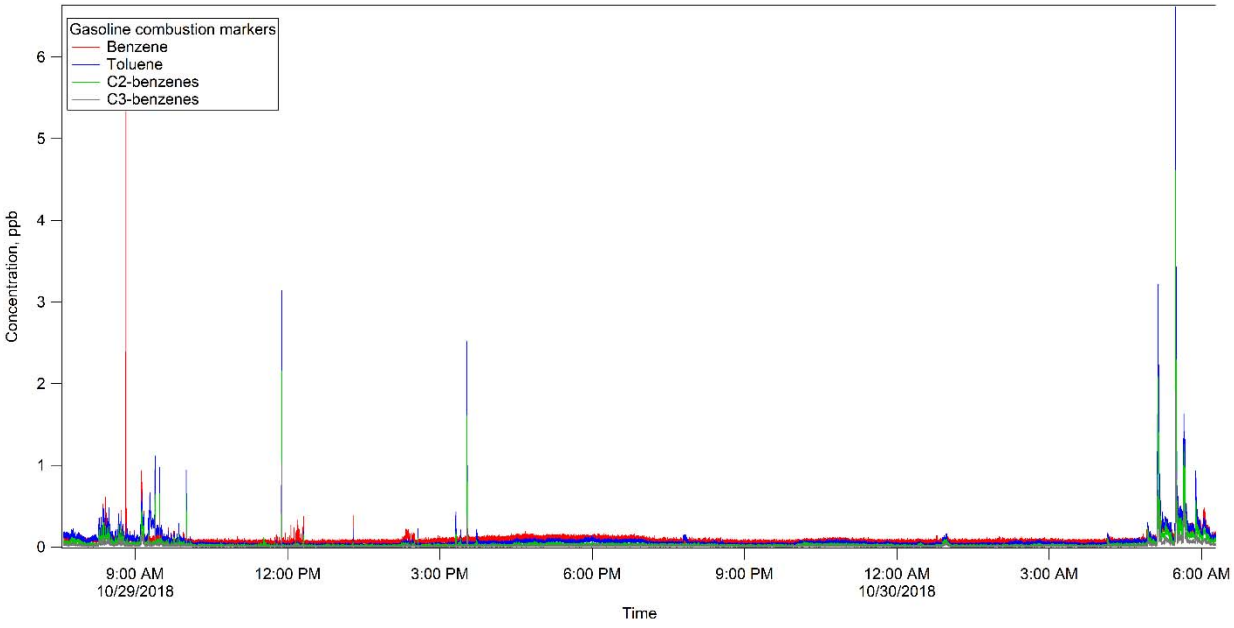

Figure 2-21. Gasoline Combustion Markers.

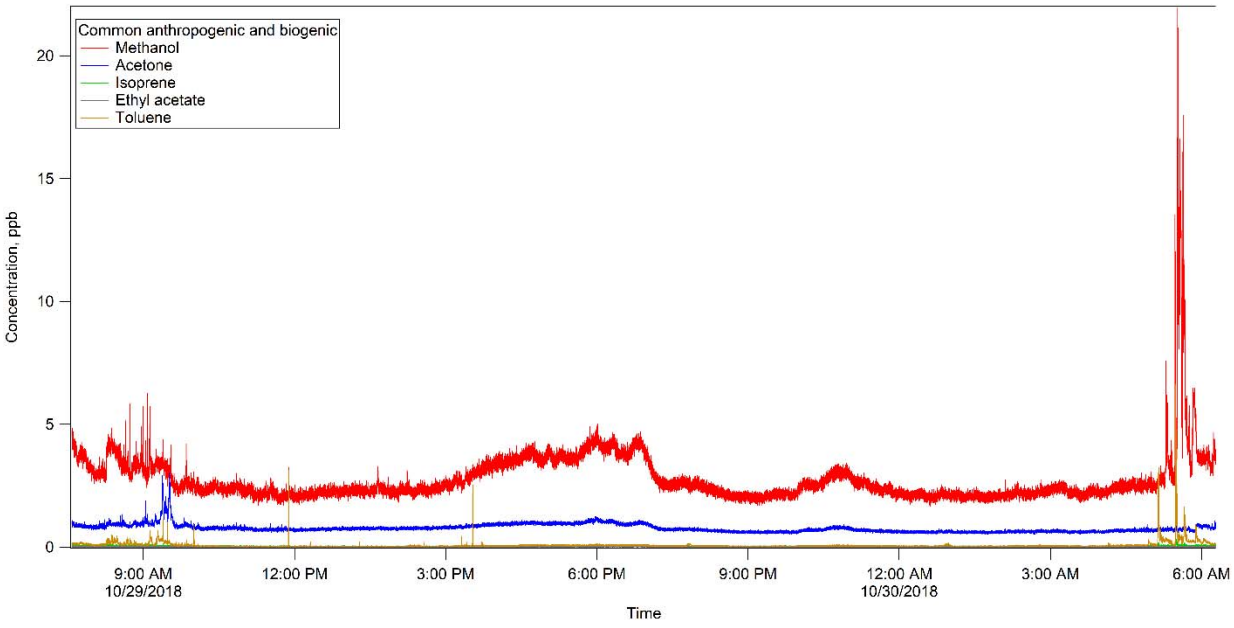

Figure 2-22. Plant and Human Markers.

3.0 OCTOBER 30, 2018 – OCTOBER 31, 2018 – STUDY SITE #4

3.1 Quality Assessment

Data from October 30, 2018, were assessed using Procedure 17124-DOE-HS-102. A Data Exchange Checklist was completed. The data were accepted by TerraGraphics with the following comments. Report No. 66409-RPT-004 was adequately documented and all checks passed the acceptance limits.

3.2 Summary

The ML personnel performed background sampling using the ML from October 30, 2018, to October 31, 2018, at Study Site 4. Site 4 is located downwind of the AN Tank Farm. The ML arrived at Site 4 at 06:57 on October 30, 2018. The QA/QC zero-air/sensitivity checks were performed on the LI-COR CO_2 monitor, Picarro NH_3 analyzer, and the PTR-MS beginning at 06:34. The collection of the confirmatory Thermosorb and Carbotrap samples began at 07:26. 2,4-dinitrophenylhydrazine (DNPH) samples were initiated at 08:08. The ML staff departed the monitoring site at 11:15 and checked out with the CSO.

The ML staff returned to Site 4 at 05:53 on October 31, 2018. The confirmatory sorbent samples were disconnected from the sampling station at 05:58. The ML moved to Site 5 by 06:48.

Figure 3-1. Mobile Laboratory Site #4 for the Duration of the Monitoring Period.

Figure 3-2. The Location of the Mobile Laboratory for the Duration of the Monitoring Period.

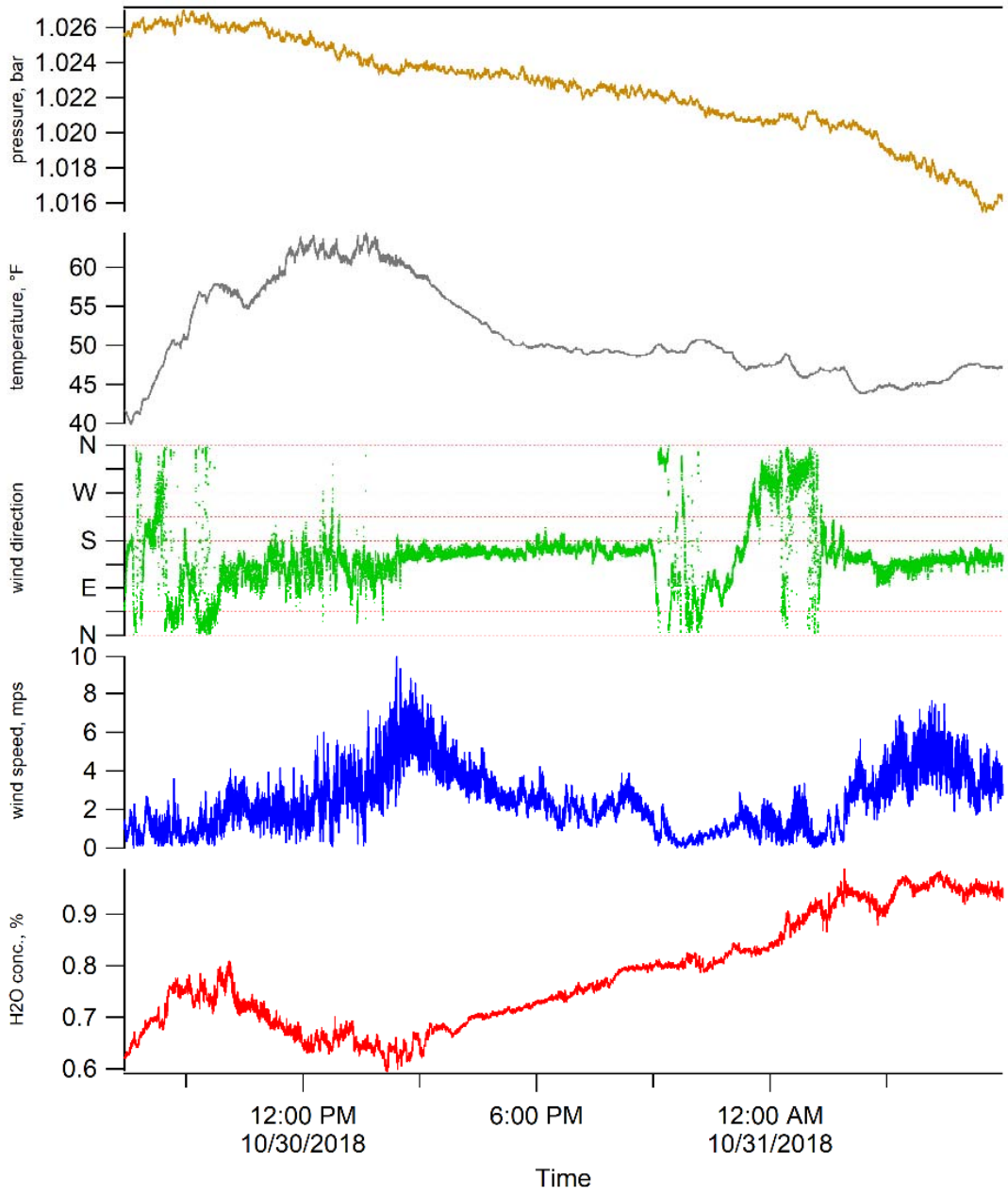

Figure 3-3. Weather Data.

3.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-MS,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were collected as follows.

Table 3-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
4	10/30/18	Thermosorb/N	EL33342	07:26	10:26	180
4	10/30/18	Carbotrap-300	A060184	07:26	13:26	360
4	10/30/18	LpDNPH	181030-A	08:08	11:08	180

Table 3-2 displays the statistical information for the monitoring period of October 30, 2018, to October 31, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 3-2. Statistical Information for the Monitoring Period of October 30, 2018 – October 31, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	Ammonia	25000	5.015	1.978	39.435	31.460	4.839
2	formaldehyde	300	0.553	0.295	53.338	4.196	0.502
3	Methanol	200000	5.546	10.797	194.690	170.061	4.049
4	acetonitrile	20000	0.167	0.049	29.188	1.160	0.180
5	acetaldehyde	25000	2.321	0.932	40.149	49.246	2.477
6	ethylamine	5000	0.012	0.007	60.909	0.079	0.011
7	1,3-butadiene	1000	0.097	0.069	70.407	1.147	0.088
8	propanenitrile	6000	0.031	0.014	45.015	0.165	0.028
9	2-propenal	100	0.120	0.114	95.588	2.826	0.105
10	1-butanol + butenes	20000	0.077	0.043	55.917	0.769	0.071
11	methyl isocyanate	20	0.055	0.027	49.092	0.257	0.054
12	methyl nitrite	100	0.061	0.051	84.457	1.281	0.053
13	furan	1	0.027	0.014	49.687	0.269	0.025
14	butanenitrile	8000	0.011	0.008	70.476	0.114	0.009
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.040	0.031	78.459	N/A*	N/A*
16	butanal	25000	0.104	0.118	113.082	2.306	0.089
17	NDMA**	0.3	0.018	0.015	86.842	0.196	0.015
18	benzene	500	0.107	0.042	39.462	0.964	0.101
19	2,4-pentadienenitrile + pyridine	300, 1000	0.024	0.012	50.551	0.122	0.021
20	2-methylene butanenitrile	300	0.013	0.009	74.411	0.108	0.010
21	2-methylfuran	1	0.028	0.019	67.571	0.398	0.025
22	pentanenitrile	6000	0.009	0.006	70.266	0.075	0.007
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.025	0.016	62.770	0.279	0.022
24	NEMA**	0.3	0.009	0.011	113.820	0.088	0.006
25	2,5-dimethylfuran	1	0.019	0.014	72.715	0.233	0.017
26	hexanenitrile	6000	0.004	0.004	117.745	0.055	0.002
27	2-hexanone (MBK)	5000	0.011	0.007	68.230	0.127	0.009
28	NDEA**	0.1	0.003	0.005	153.094	0.064	0.000
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.014	0.011	75.390	0.133	0.011
30	2,4-dimethylpyridine	500	0.009	0.008	90.039	0.182	0.006
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.011	0.009	77.297	0.126	0.009

Table 3-2. Statistical Information for the Monitoring Period of October 30, 2018 – October 31, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
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34	NMOR**	0.6	0.003	0.004	141.652	0.053	0.000
35	butyl nitrate	2500	0.002	0.003	117.893	0.032	0.001
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.006	0.005	84.960	0.079	0.004
37	6-methyl-2-heptanone	8000	0.006	0.005	77.945	0.049	0.005
38	2-pentylfuran	1	0.016	0.008	51.076	0.075	0.014
39	Biphenyl	200	0.004	0.005	110.077	0.049	0.003
40	2-heptylfuran	1	0.016	0.014	87.358	0.159	0.011
41	1,4-butanediol dinitrate	50	0.005	0.005	104.285	0.062	0.003
42	2-octylfuran	1	0.001	0.002	216.550	0.040	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.001	0.002	341.239	0.037	0.000
44	PCB	1000	0.007	0.006	82.556	0.071	0.005
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.002	0.003	155.321	0.042	0.001
46	furfural acetophenone	1	0.011	0.014	122.970	0.184	0.007

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.629 ppb and the median value was 0.036 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

** Nitrosamine results are suspect due to isobaric interferants causing positive bias that have been encountered during previous background studies [53005-81-RPT-007, *PTR-MS Mobile Laboratory Vapor Monitoring Background Study, (3/18/2018 – 4/20/2018)*, and *Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study*, RJ Lee Group, Inc., 2017].

The following figures display a selection of 16 COPC signals, overlaid with the same signal smoothed using a 1-minute moving average (in cases where a moving average assists with data visualization), and CO_2, for the monitoring period October 30, 2018, to October 31, 2018. If within range of the plot's left axis, a green horizontal line representing 50% of the COPC's OEL and a blue horizontal line representing the COPC's OEL are shown.

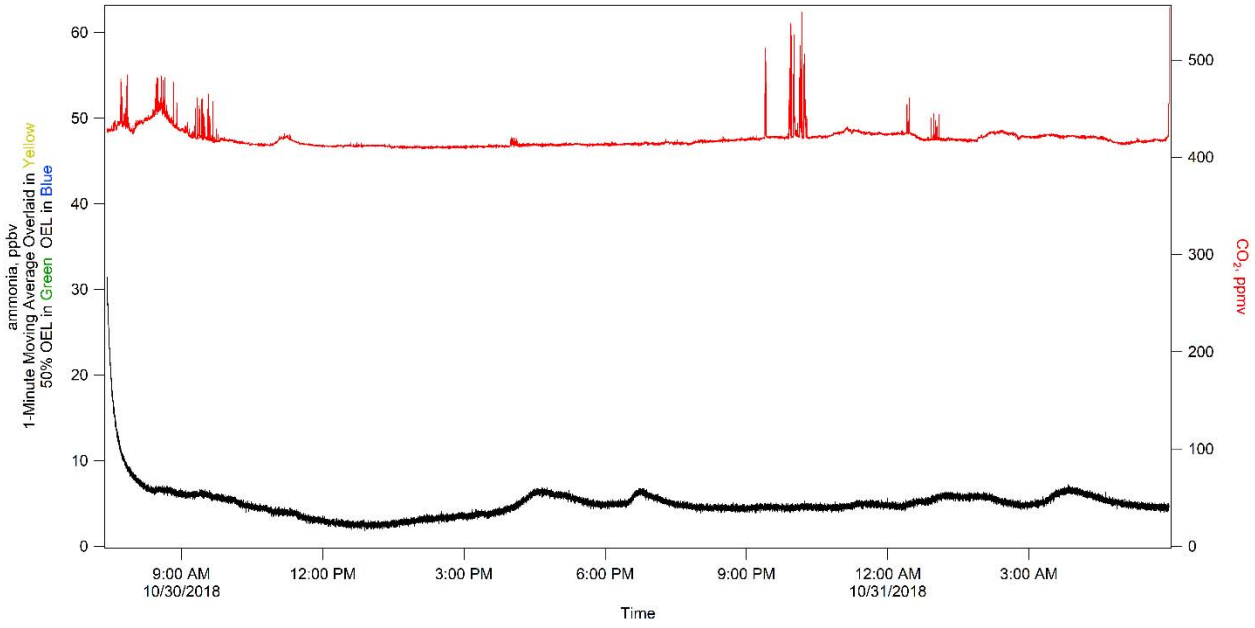

Figure 3-4. Ammonia.

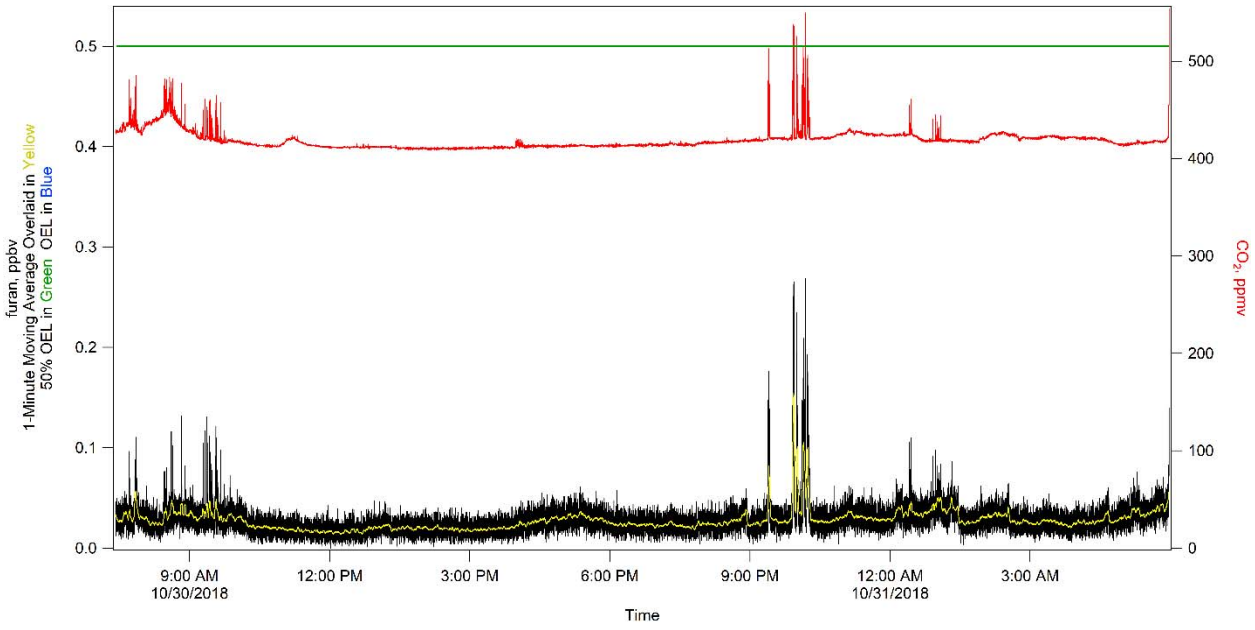

Figure 3-5. Furan.

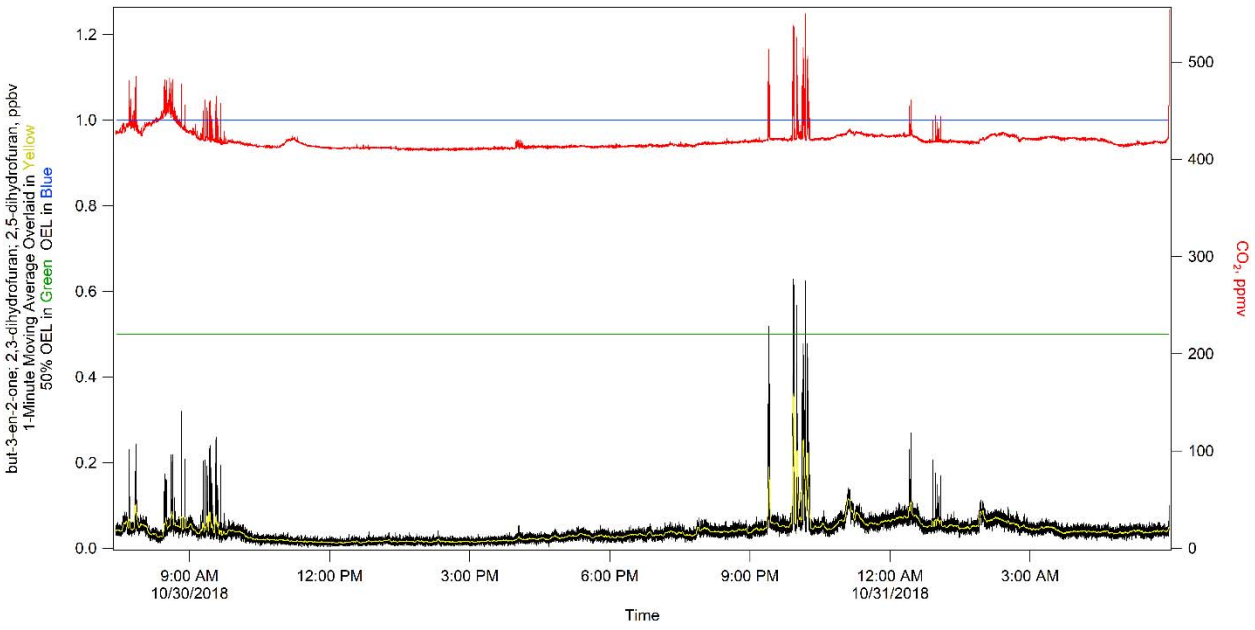

Figure 3-6. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

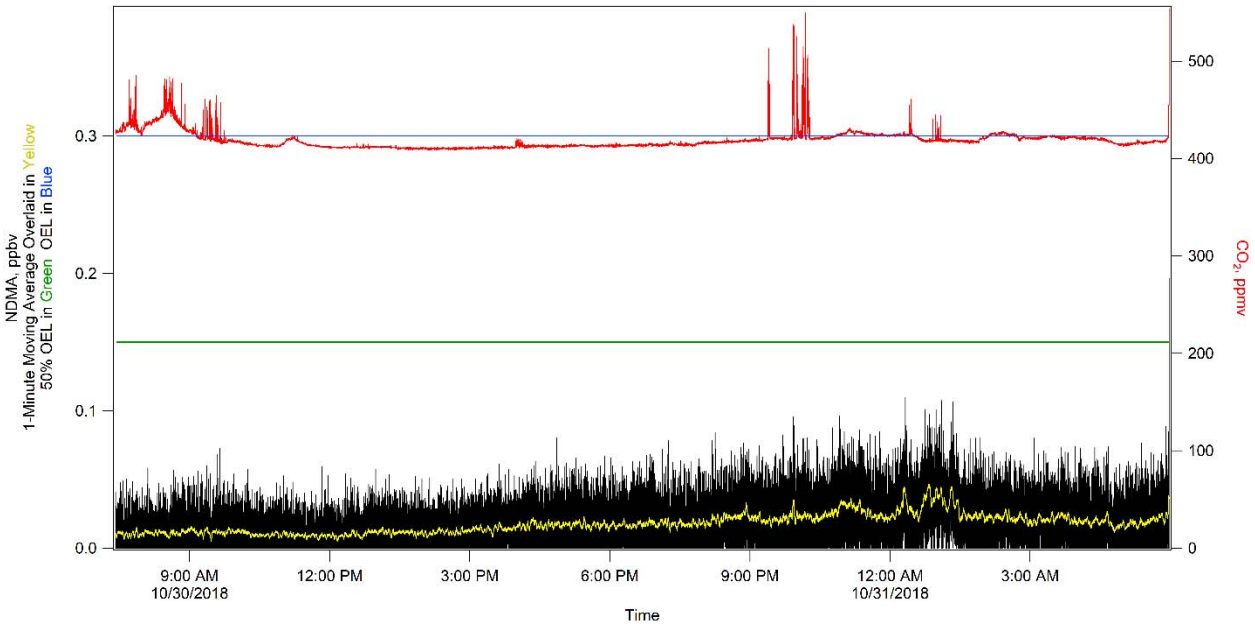

Figure 3-7. N-nitrosodimethylamine (NDMA).

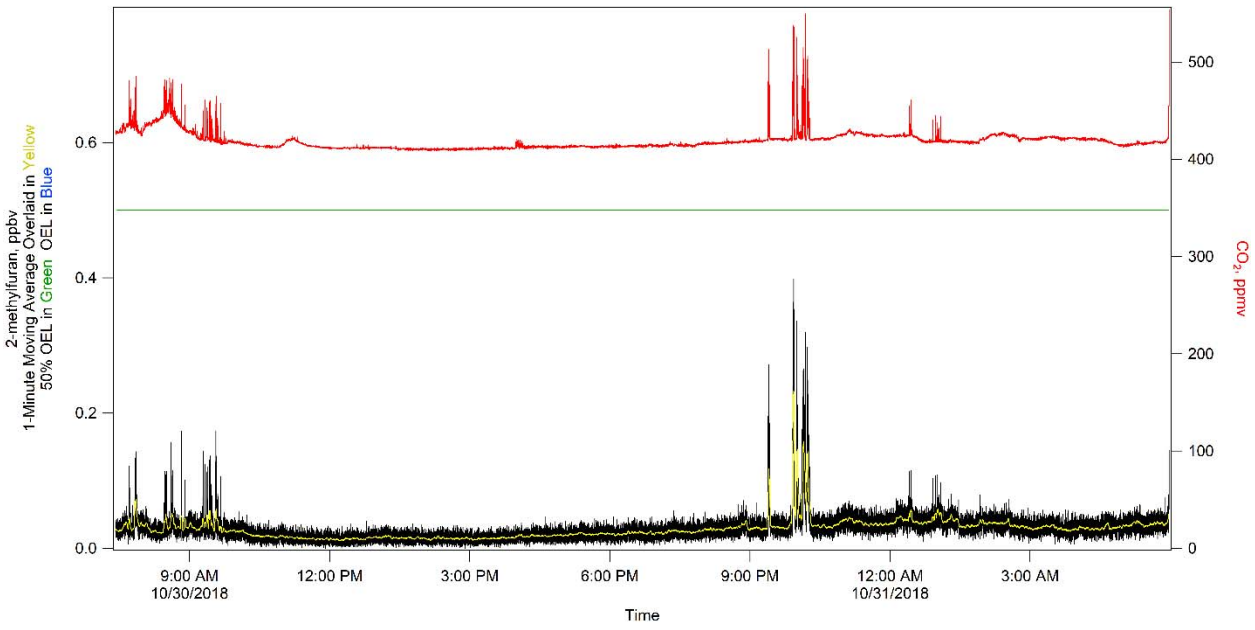

Figure 3-8. 2-methylfuran.

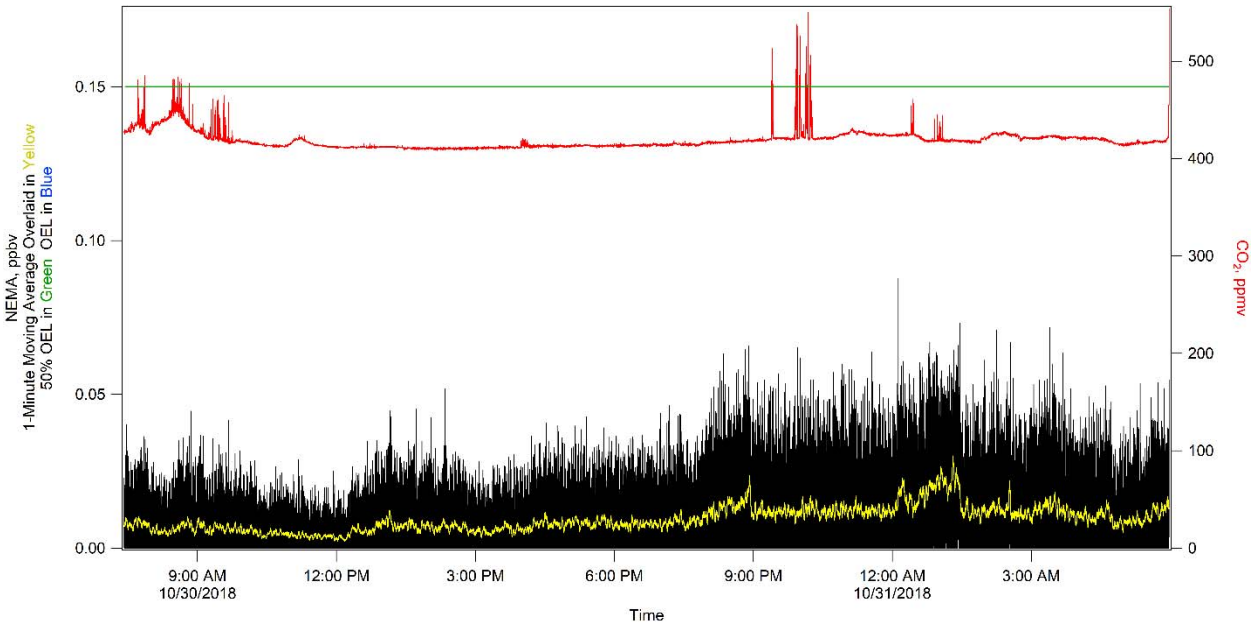

Figure 3-9. N-nitrosomethylethylamine (NEMA).

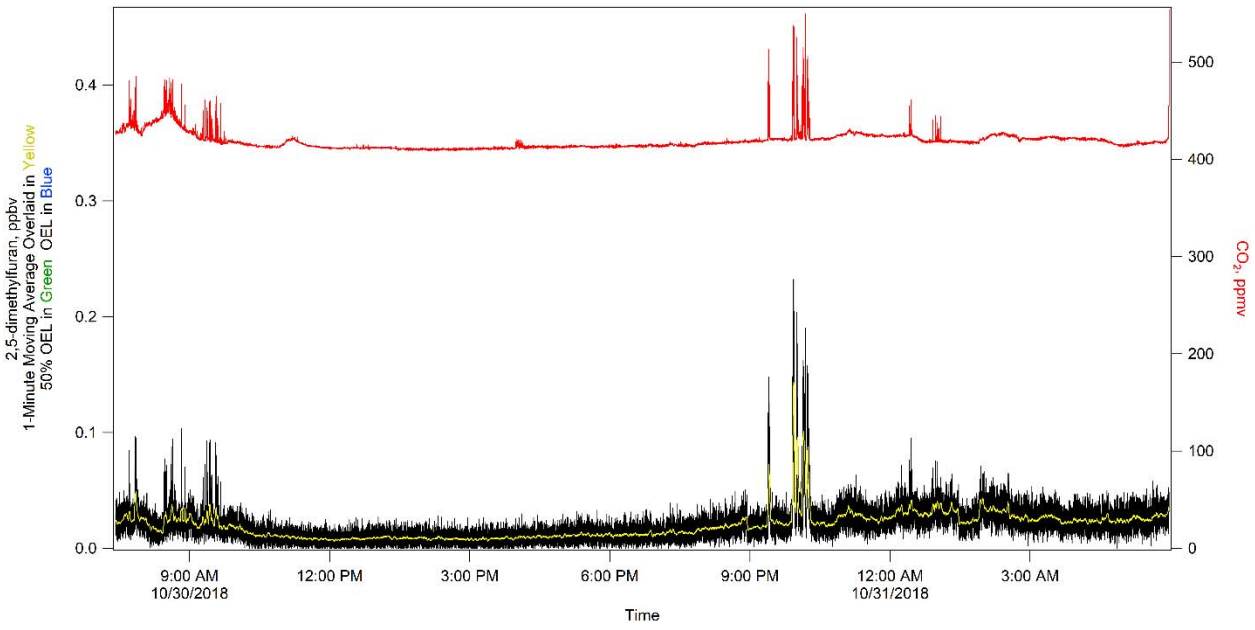

Figure 3-10. 2,5-dimethylfuran.

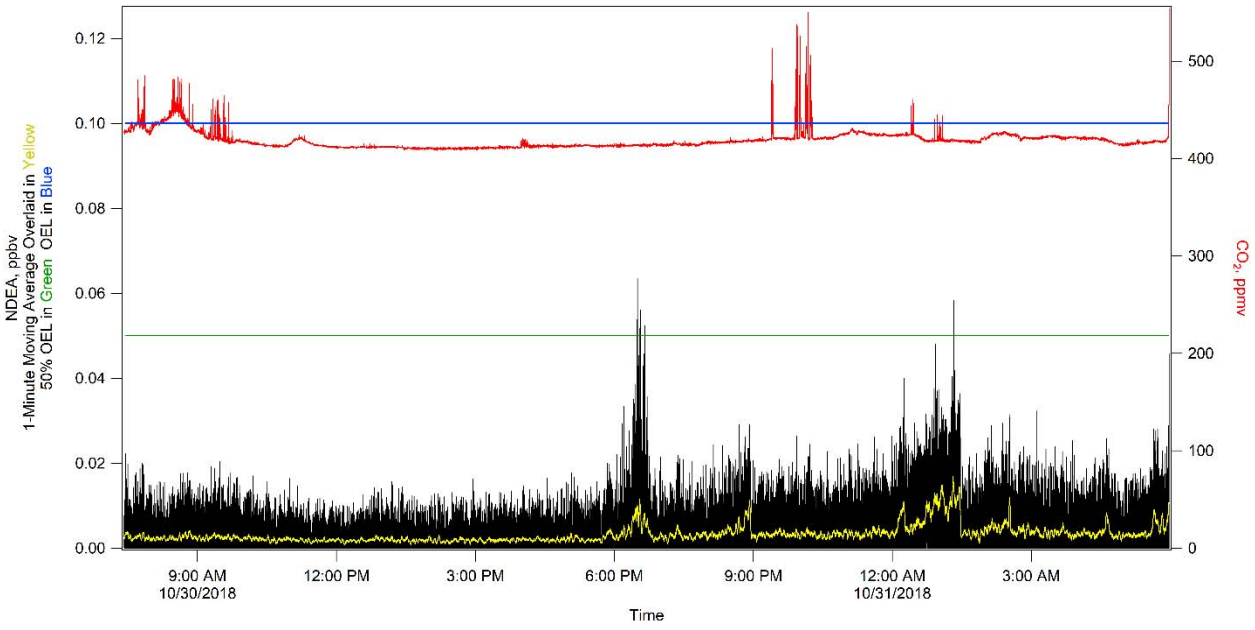

Figure 3-11. N-nitrosodiethylamine (NDEA).

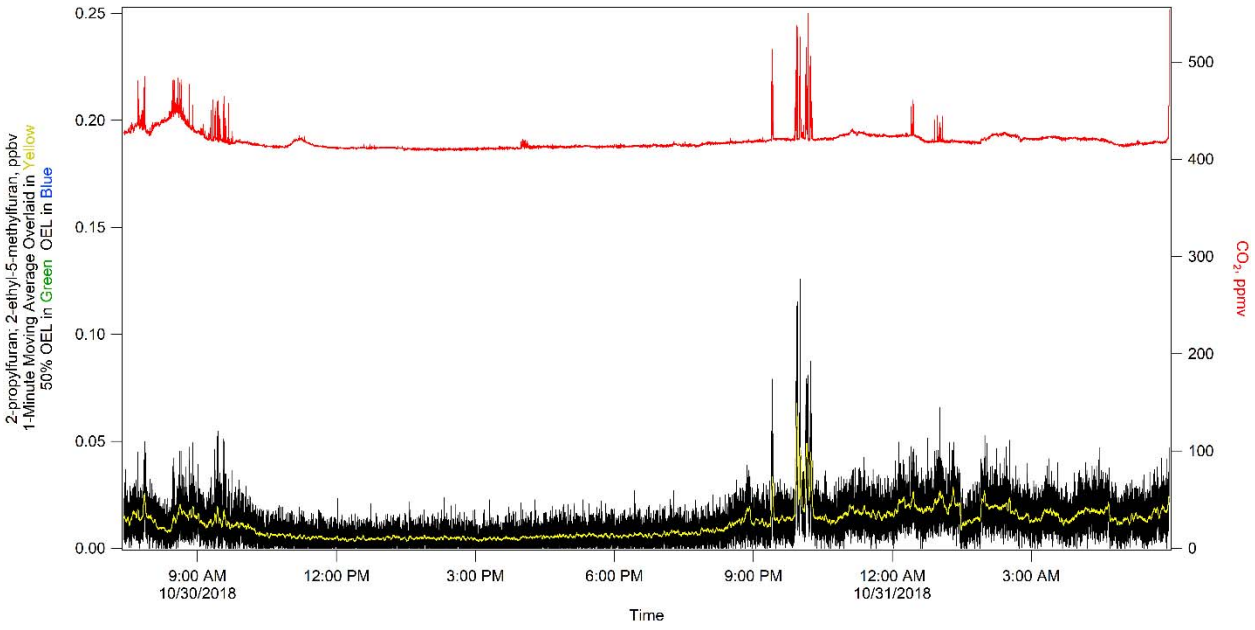

Figure 3-12. 2-propylfuran + 2-ethyl-5-methylfuran.

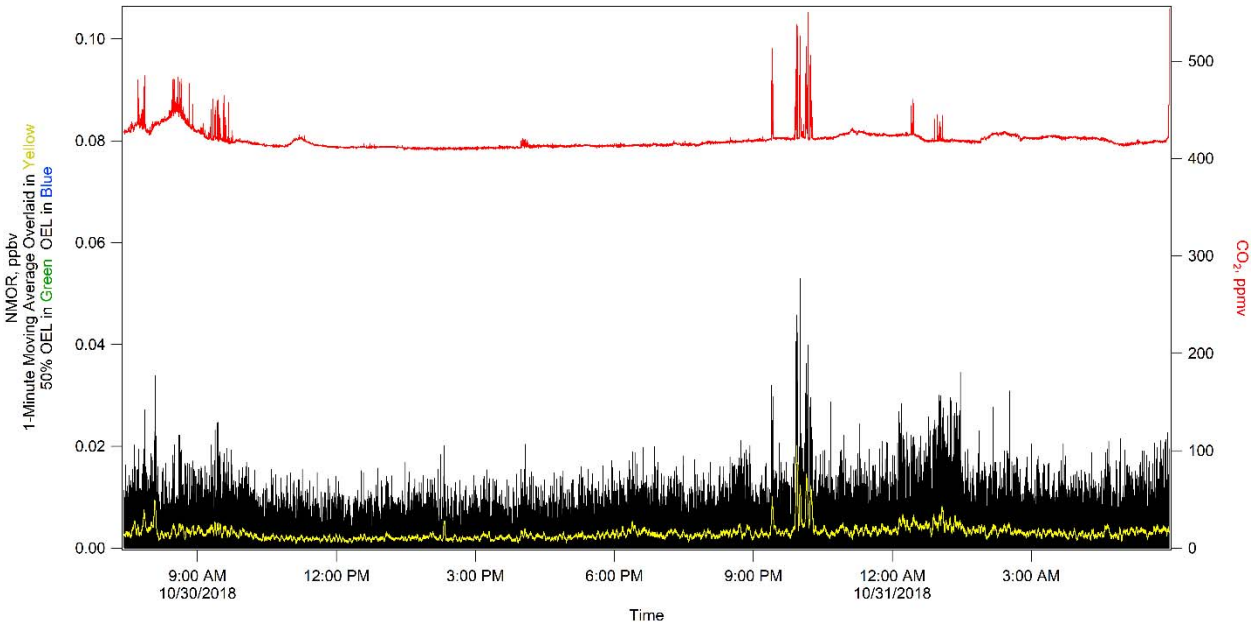

Figure 3-13. N-nitrosomorpholine (NMOR).

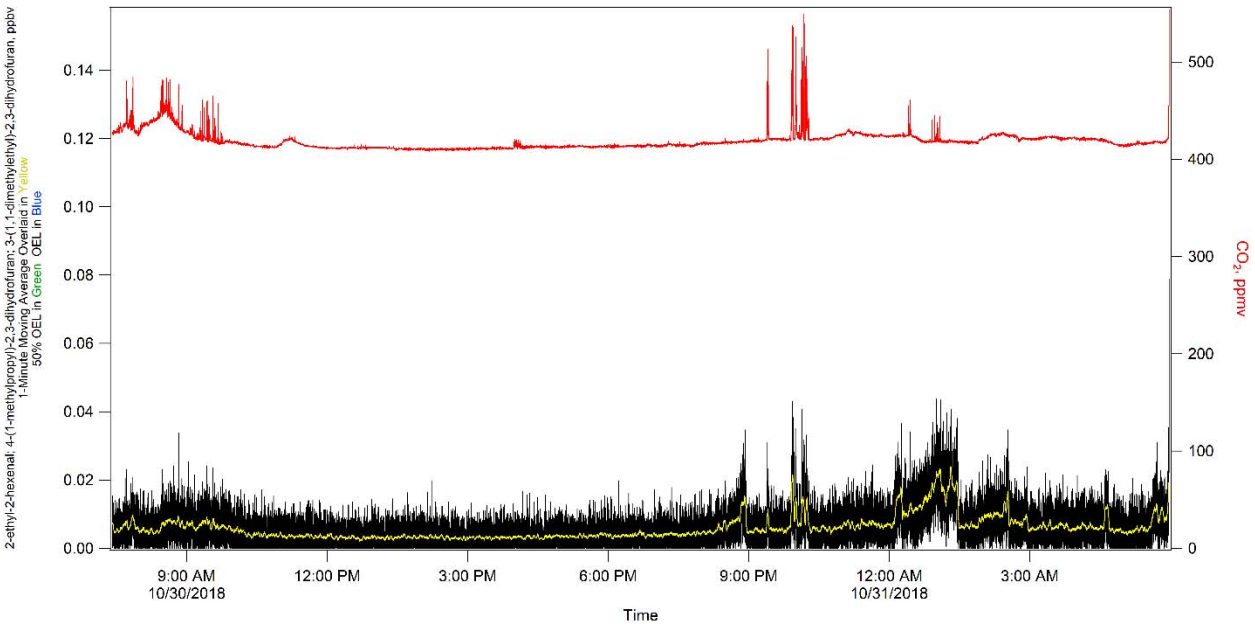

Figure 3-14. 2-ethyl-2-hexenal;4-(1-methylpropyl);2,3-dihydrofuran; 3-1(1,-1-dimethylethyl)-2,3-dihydrofuran.

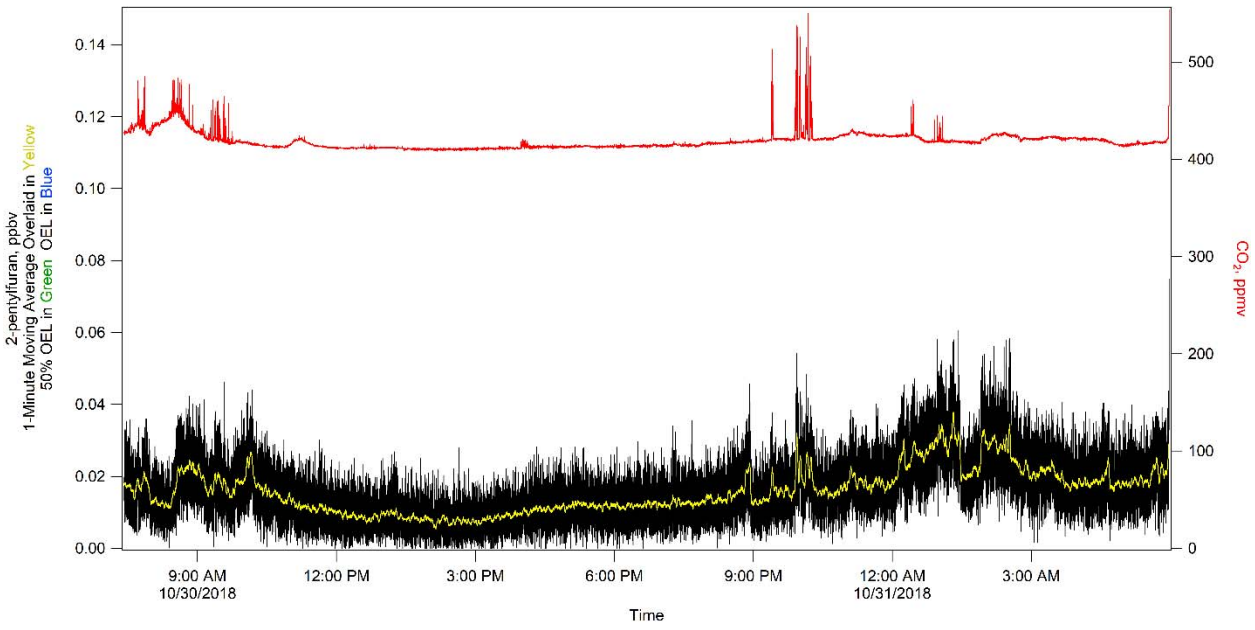

Figure 3-15. 2-pentylfuran.

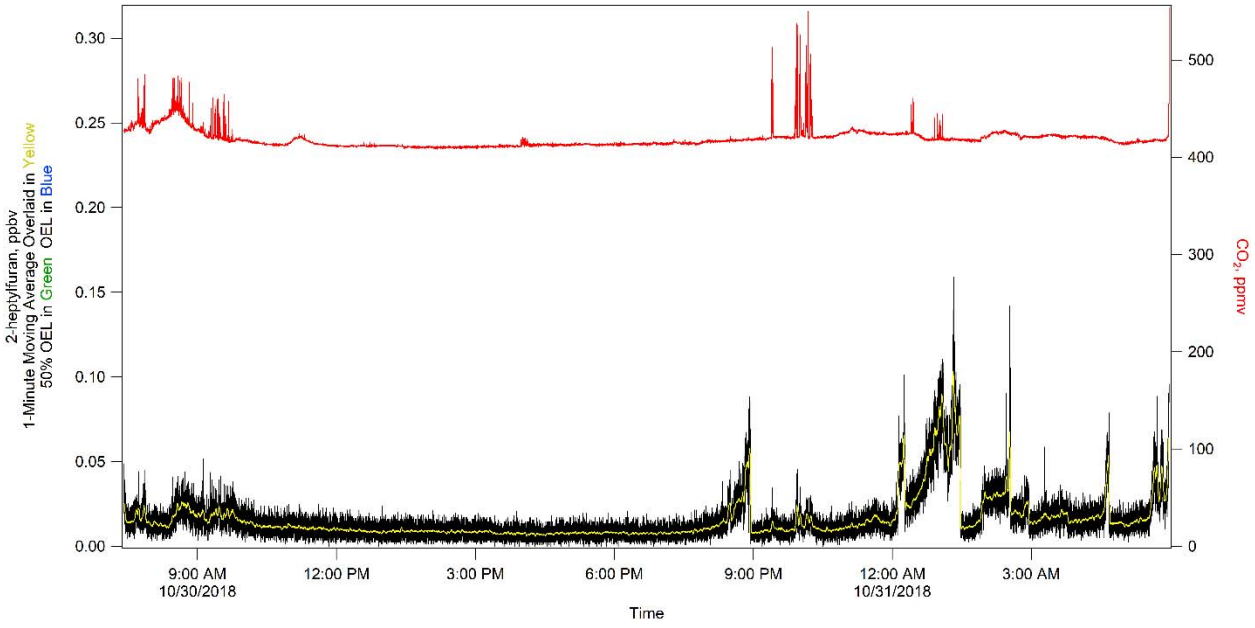

Figure 3-16. 2-heptylfuran.

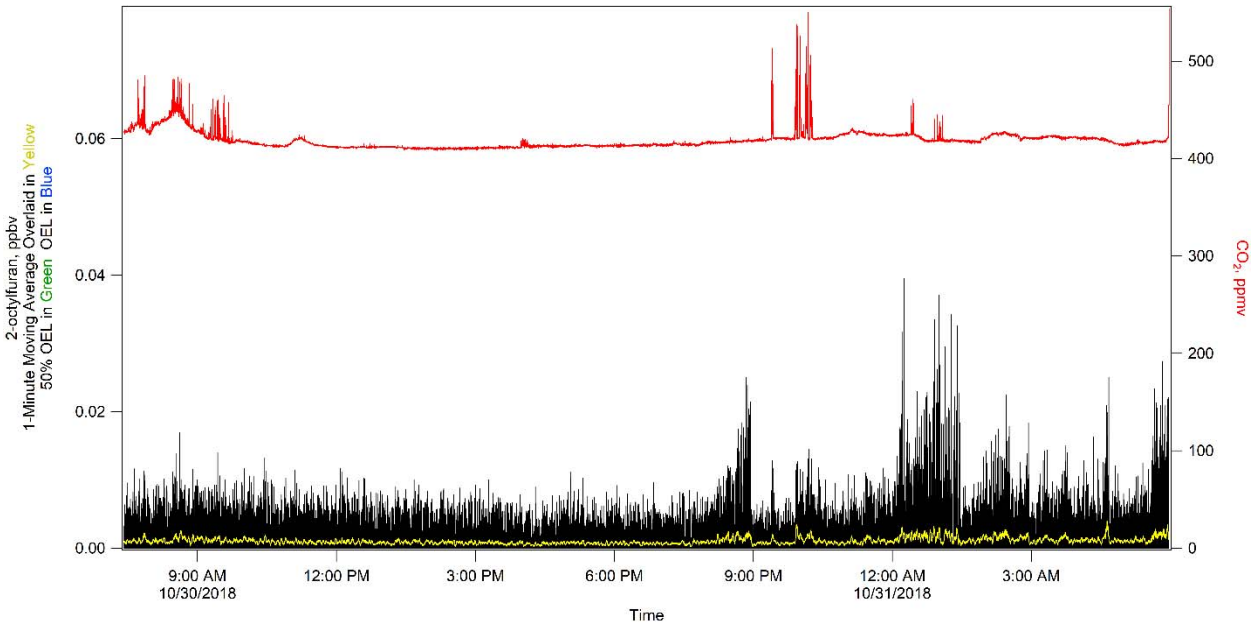

Figure 3-17. 2-octylfuran.

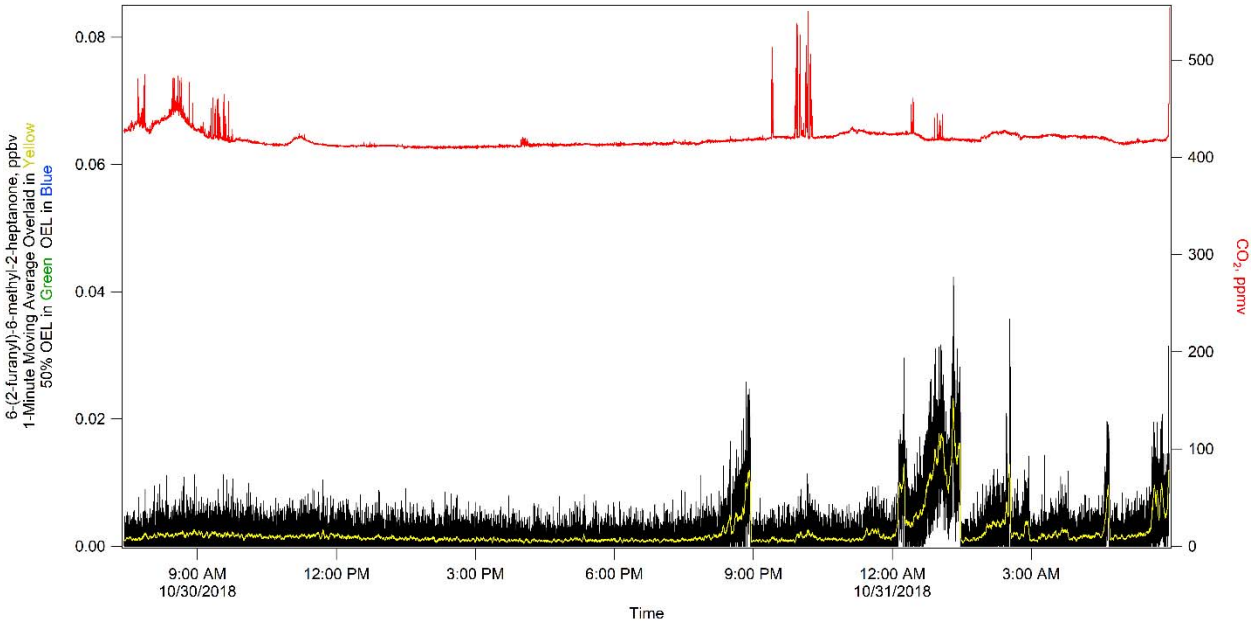

Figure 3-18. 6-(2-furanyl)-6-methyl-2-heptanone.

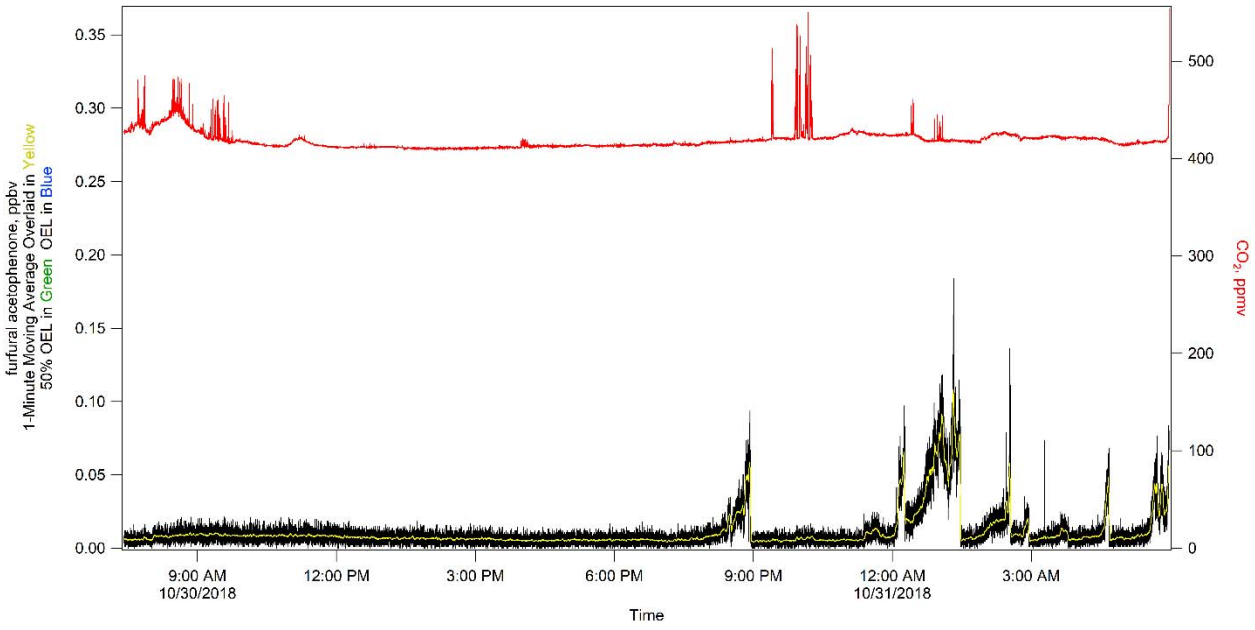

Figure 3-19. Furfural Acetophenone.

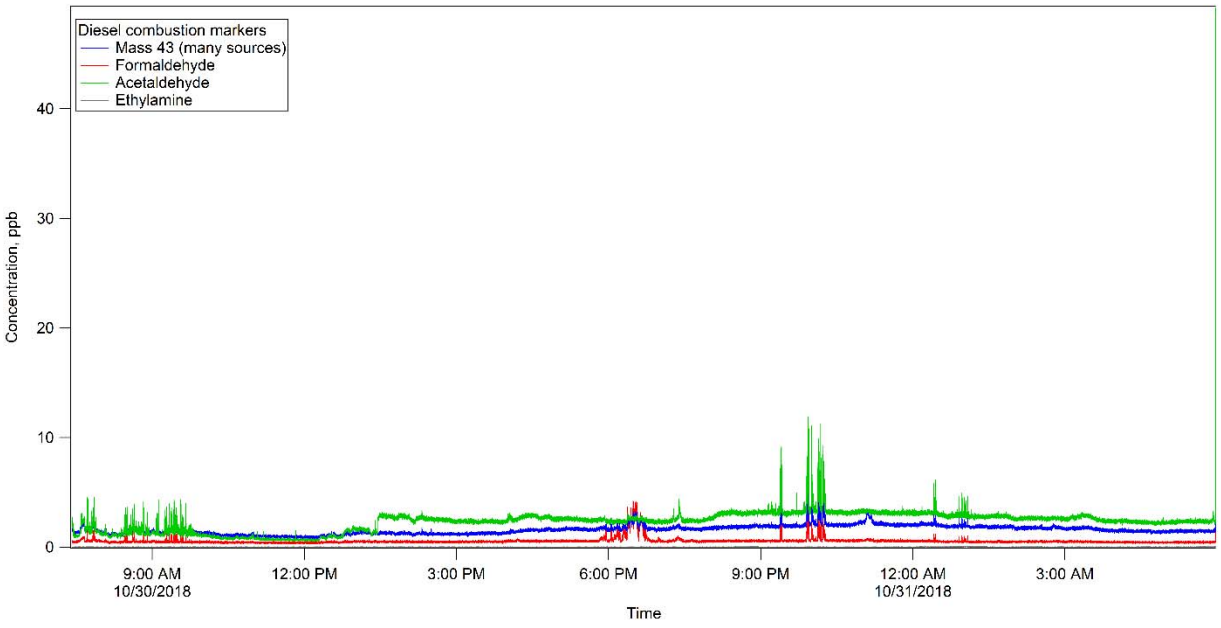

Figure 3-20. Diesel Combustion Markers.

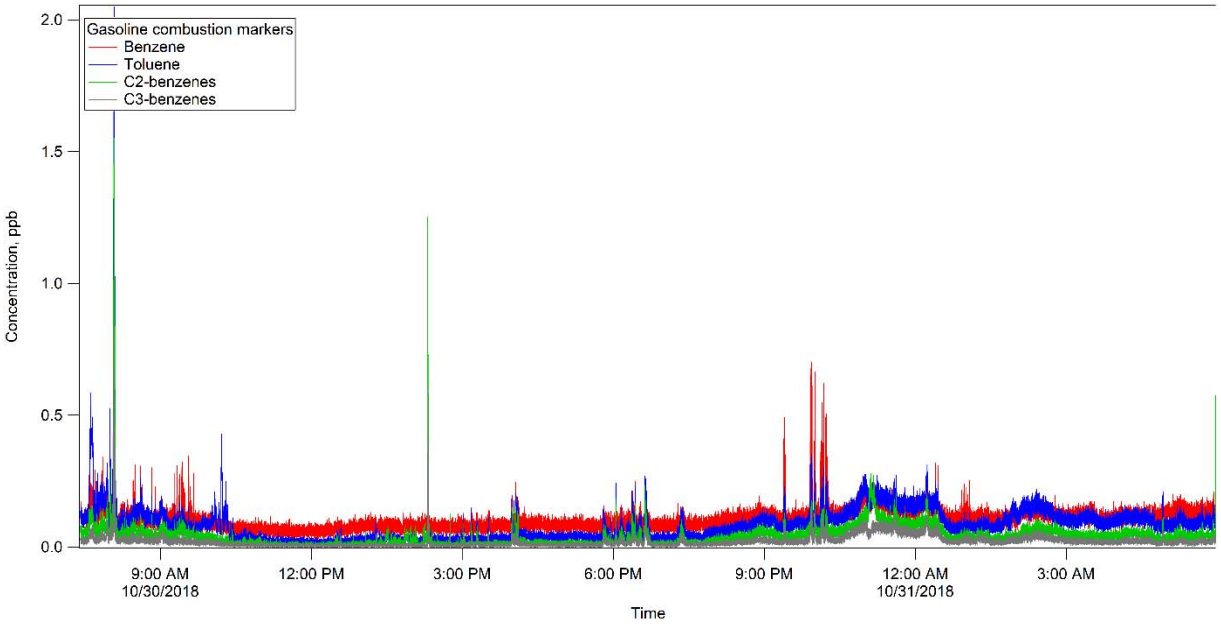

Figure 3-21. Gasoline Combustion Markers.

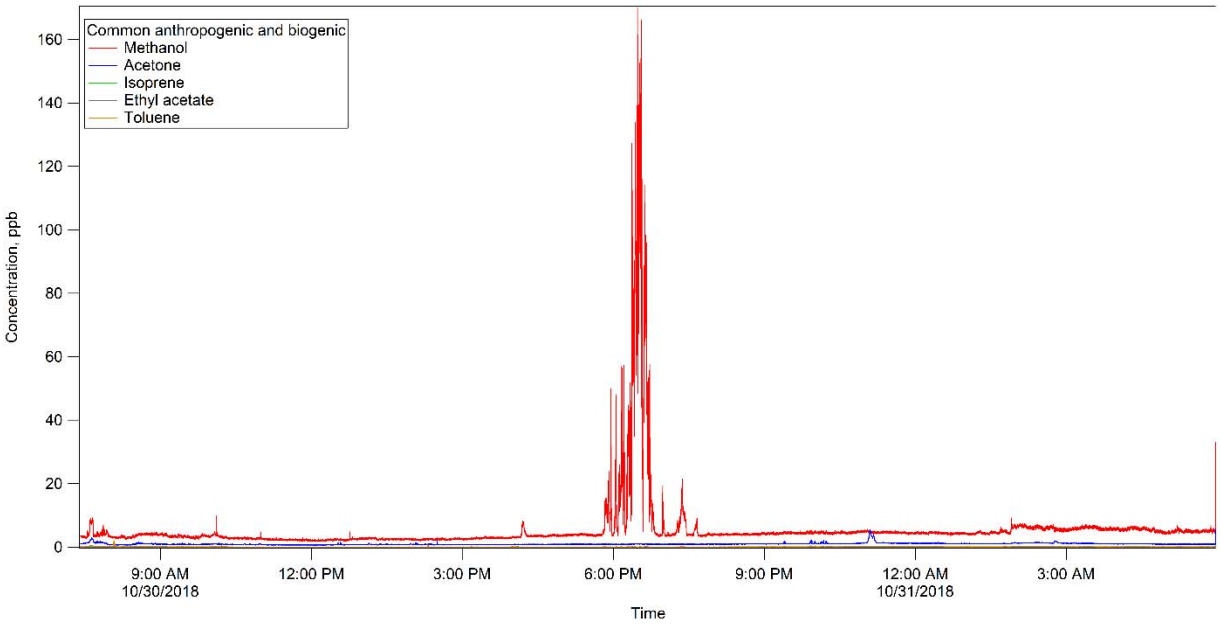

Figure 3-22. Plant and Human Markers.

4.0 OCTOBER 31, 2018 – NOVEMBER 1, 2018 – STUDY SITE #5

4.1 Quality Assessment

Data from October 31, 2018, were assessed using Procedure 17124-DOE-HS-102. A Data Exchange Checklist was completed. The data were accepted by TerraGraphics with the following comments. Report No. 66409-RPT-004 was adequately documented and all checks passed the acceptance limits.

4.2 Summary

The ML personnel performed background sampling using the ML from October 31, 2018, to November 1, 2018, at Study Site 5. Site 5 is located southeast of the Waste Treatment Facility. This site was chosen as it may provide data related to stack emission dispersion downwind of the tank farm ventilation and as a baseline point for future reference once the Waste Treatment Facility begins operation. The ML arrived at Site 5 at 06:48 on October 31, 2018. The QA/QC zero-air/sensitivity checks were initiated on the LI-COR CO_2 monitor, Picarro NH_3 analyzer, and the PTR-MS beginning at 06:13, prior to Site 5 arrival. Collection of confirmatory samples began at 07:10. The ML staff departed the monitoring site at 10:31 and checked out with the CSO.

The ML staff returned to Site 5 at 06:11 on November 1, 2018, and disconnected confirmatory sorbent samples from the sampling system. The ML moved to Site 6 by 07:20.

Figure 4-1. Mobile Laboratory Site #5 for the Duration of the Monitoring Period.

Figure 4-2. The Location of the Mobile Laboratory for the Duration of the Monitoring Period.

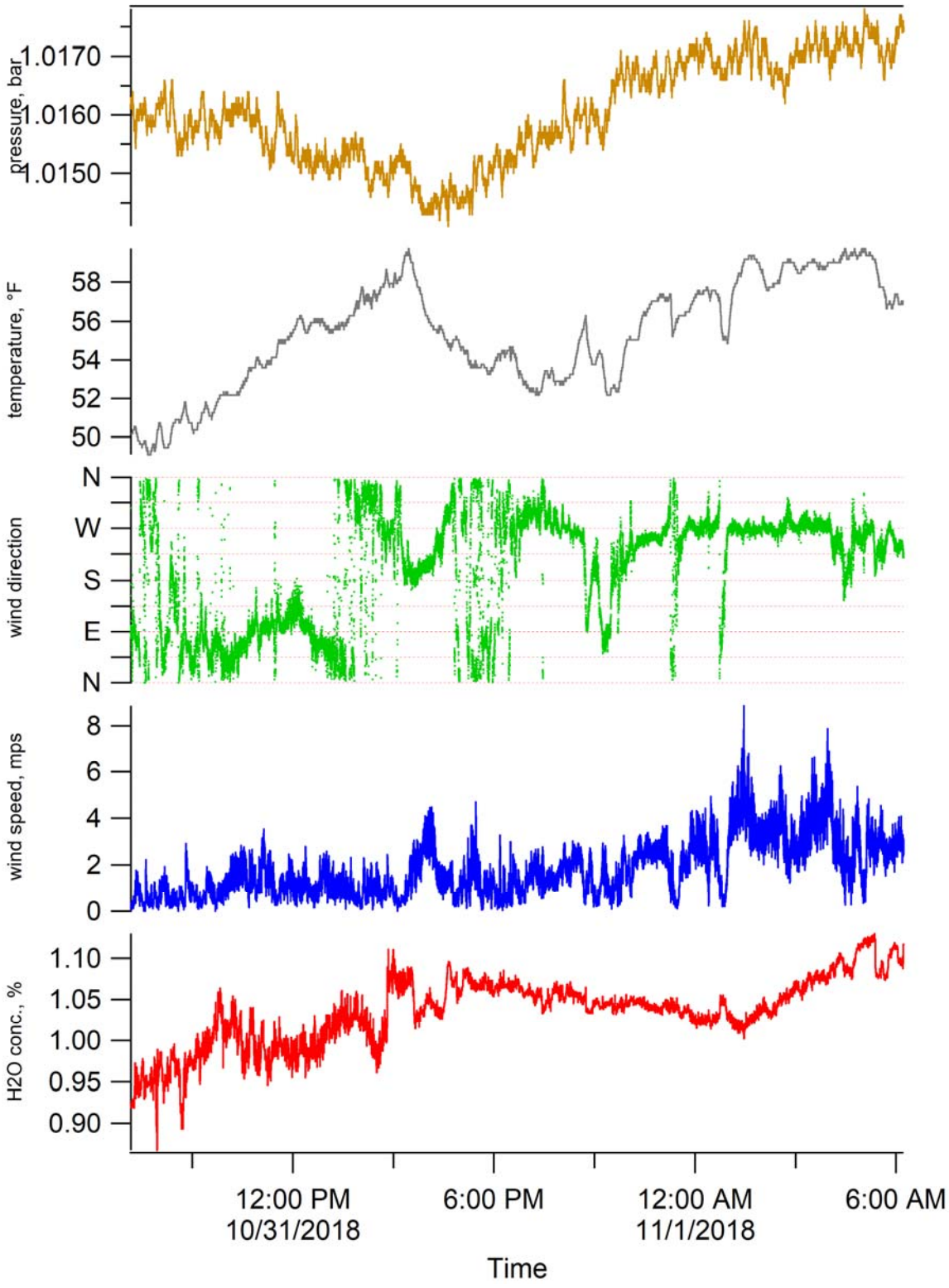

Figure 4-3. Weather Data.

4.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-MS,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were collected as follows.

Table 4-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
5	10/31/18	Thermosorb/N	EL33343	07:10	10:10	180
5	10/31/18	Carbotrap-300	A060143	07:10	13:10	360
5	10/31/18	LpDNPH	181031-A	07:10	10:10	180

Table 4-2 displays the statistical information for the monitoring period of October 31, 2018, to November 1, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 4-2. Statistical Information for the Monitoring Period of October 31, 2018 – November 1, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	Ammonia	25000	8.940	2.781	31.109	23.276	7.881
2	formaldehyde	300	0.410	0.161	39.342	4.991	0.387
3	Methanol	200000	3.916	1.234	31.507	61.640	3.860
4	acetonitrile	20000	0.179	0.054	29.999	3.456	0.186
5	acetaldehyde	25000	2.433	0.942	38.726	27.946	2.484
6	ethylamine	5000	0.011	0.006	56.879	0.083	0.010
7	1,3-butadiene	1000	0.124	0.109	87.477	2.002	0.105
8	propanenitrile	6000	0.035	0.018	51.280	0.645	0.032
9	2-propenal	100	0.137	0.157	114.586	5.334	0.112
10	1-butanol + butenes	20000	0.098	0.088	89.610	3.326	0.079
11	methyl isocyanate	20	0.044	0.020	44.750	0.323	0.041
12	methyl nitrite	100	0.066	0.063	96.888	2.127	0.055
13	furan	1	0.035	0.018	51.796	0.456	0.032
14	butanenitrile	8000	0.011	0.008	69.712	0.192	0.010
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.054	0.040	75.455	N/A*	N/A*
16	butanal	25000	0.179	0.316	176.389	4.994	0.101
17	NDMA**	0.3	0.018	0.015	81.018	0.196	0.016
18	benzene	500	0.142	0.106	74.297	5.134	0.122
19	2,4-pentadienenitrile + pyridine	300, 1000	0.027	0.012	44.380	0.322	0.024
20	2-methylene butanenitrile	300	0.014	0.008	58.485	0.133	0.012
21	2-methylfuran	1	0.035	0.023	65.463	0.669	0.031
22	pentanenitrile	6000	0.008	0.005	67.317	0.080	0.007
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.029	0.017	59.532	0.436	0.026
24	NEMA**	0.3	0.009	0.010	108.133	0.086	0.006
25	2,5-dimethylfuran	1	0.025	0.016	63.351	0.378	0.022
26	hexanenitrile	6000	0.003	0.003	107.580	0.067	0.002
27	2-hexanone (MBK)	5000	0.014	0.030	210.121	1.171	0.010
28	NDEA**	0.1	0.003	0.004	147.546	0.043	0.000
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.014	0.009	68.473	0.567	0.012
30	2,4-dimethylpyridine	500	0.013	0.017	127.957	0.751	0.009
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.014	0.009	65.271	0.169	0.012

Table 4-2. Statistical Information for the Monitoring Period of October 31, 2018 – November 1, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
32	heptanenitrile	6000	0.003	0.003	98.793	0.057	0.002
33	4-methyl-2-hexanone	500	0.009	0.012	133.498	0.229	0.006
34	NMOR**	0.6	0.004	0.005	144.112	0.102	0.001
35	butyl nitrate	2500	0.003	0.003	106.543	0.040	0.001
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.006	0.005	82.933	0.131	0.005
37	6-methyl-2-heptanone	8000	0.007	0.004	65.949	0.054	0.006
38	2-pentylfuran	1	0.023	0.009	40.092	0.086	0.022
39	Biphenyl	200	0.005	0.005	90.603	0.048	0.004
40	2-heptylfuran	1	0.017	0.009	52.361	0.197	0.015
41	1,4-butanediol dinitrate	50	0.005	0.004	82.479	0.071	0.003
42	2-octylfuran	1	0.001	0.002	202.341	0.041	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.001	0.002	301.625	0.032	0.000
44	PCB	1000	0.008	0.005	56.035	0.082	0.007
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.002	0.002	129.756	0.042	0.001
46	furfural acetophenone	1	0.010	0.008	81.621	0.230	0.008

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 1.199 ppb and the median value was 0.046 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

** Nitrosamine results are suspect due to isobaric interferants causing positive bias that have been encountered during previous background studies [53005-81-RPT-007, *PTR-MS Mobile Laboratory Vapor Monitoring Background Study, (3/18/2018 – 4/20/2018)*, and *Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study*, RJ Lee Group, Inc., 2017].

The following figures display a selection of 16 COPC signals, overlaid with the same signal smoothed using a 1-minute moving average (in cases where a moving average assists with data visualization), and CO_2, for the monitoring period October 31, 2018, to November 1, 2018. If within range of the plot's left axis, a green horizontal line representing 50% of the COPC's OEL and a blue horizontal line representing the COPC's OEL are shown.

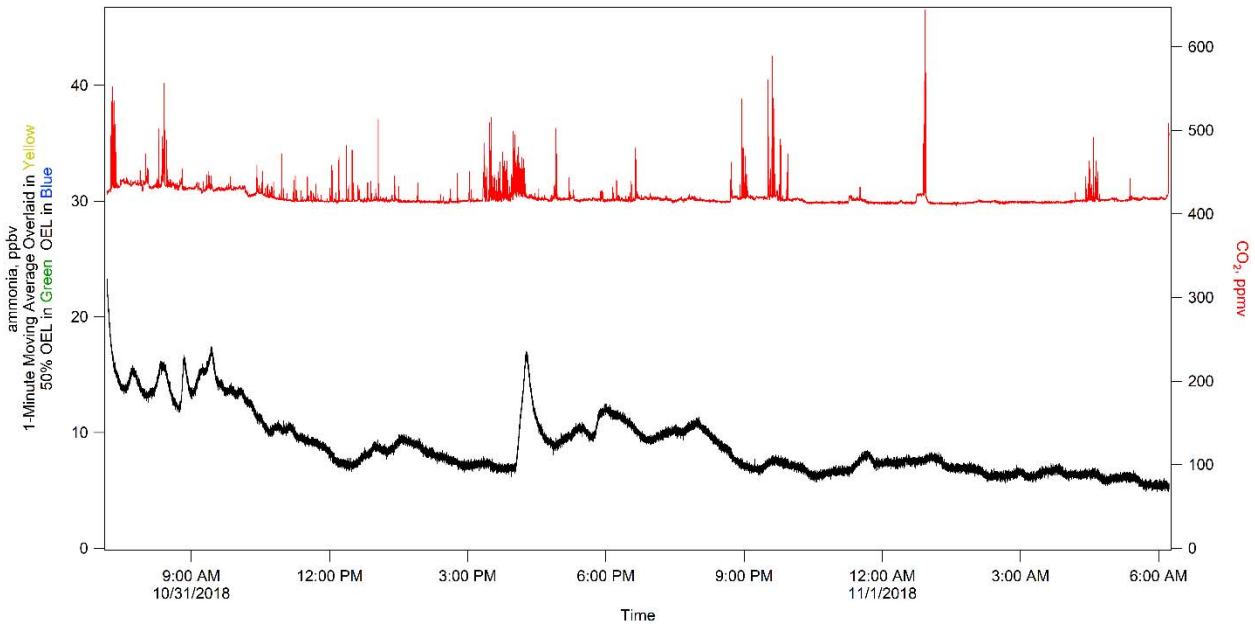

Figure 4-4. Ammonia.

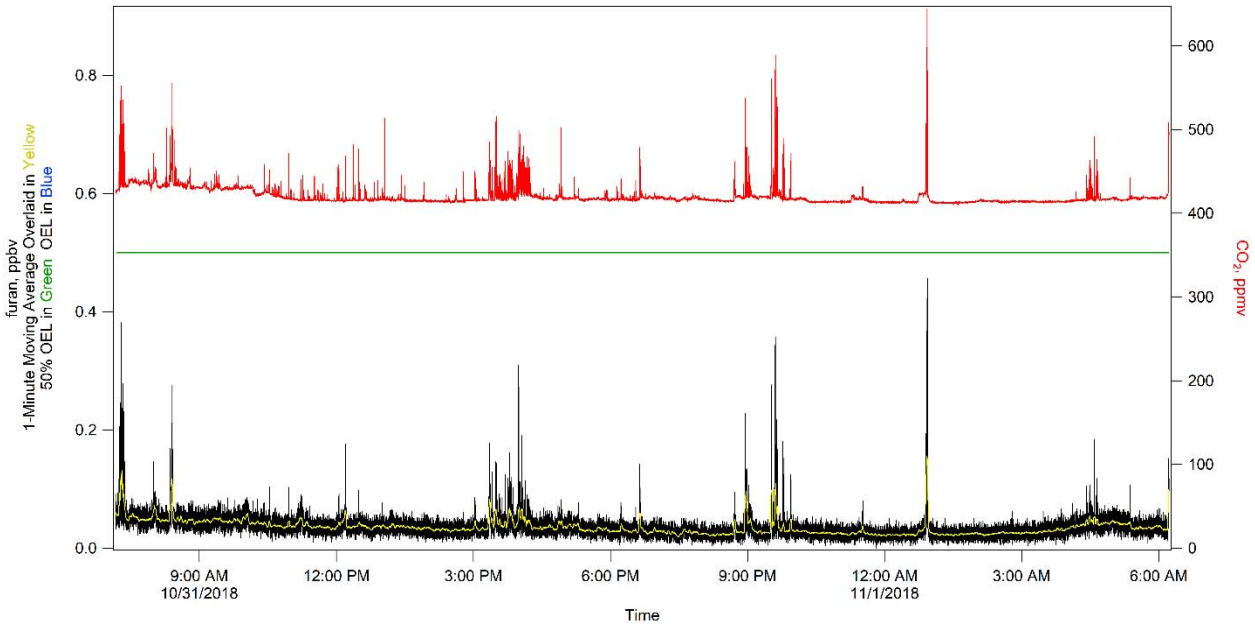

Figure 4-5. Furan.

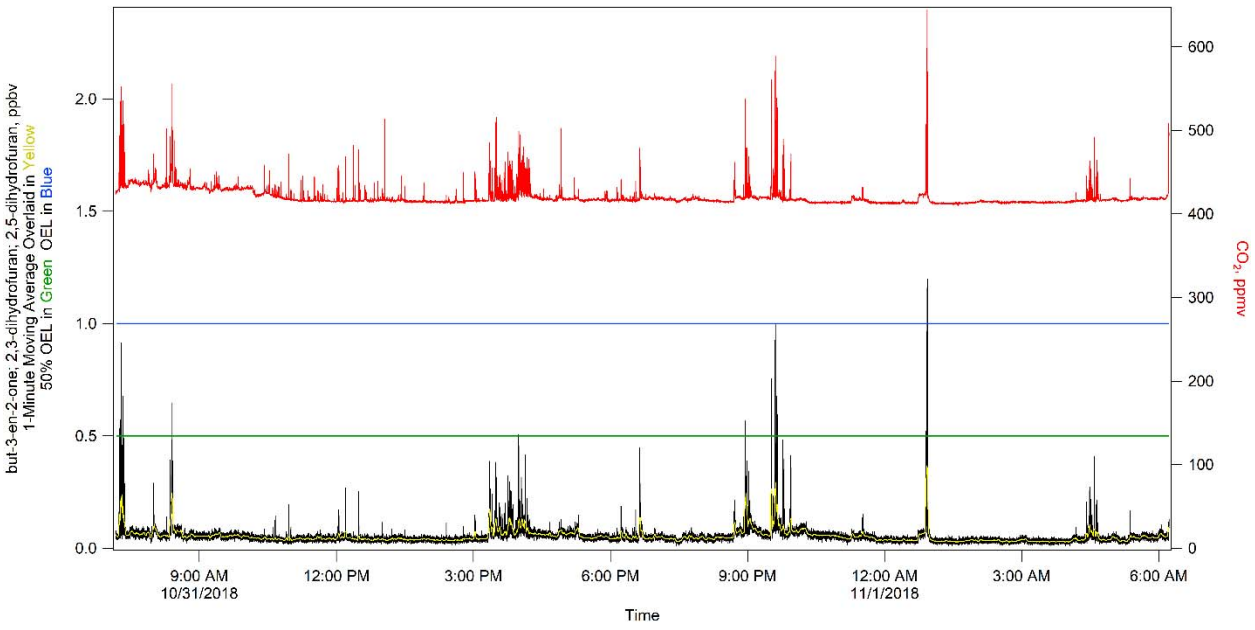

Figure 4-6. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

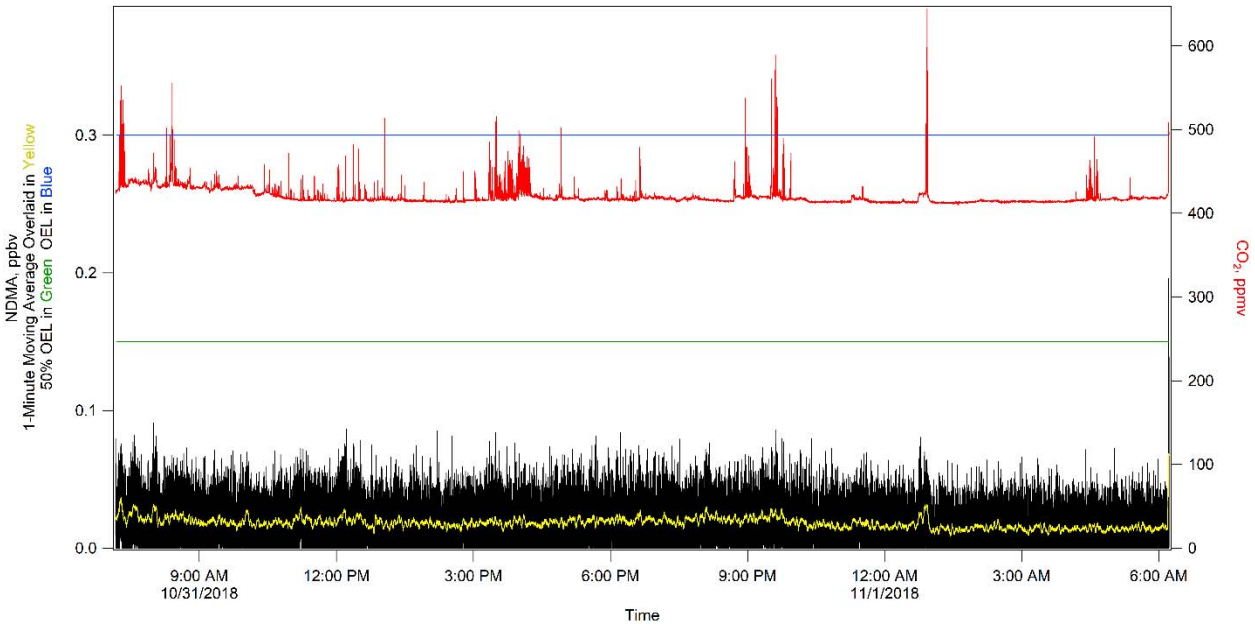

Figure 4-7. N-nitrosodimethylamine (NDMA).

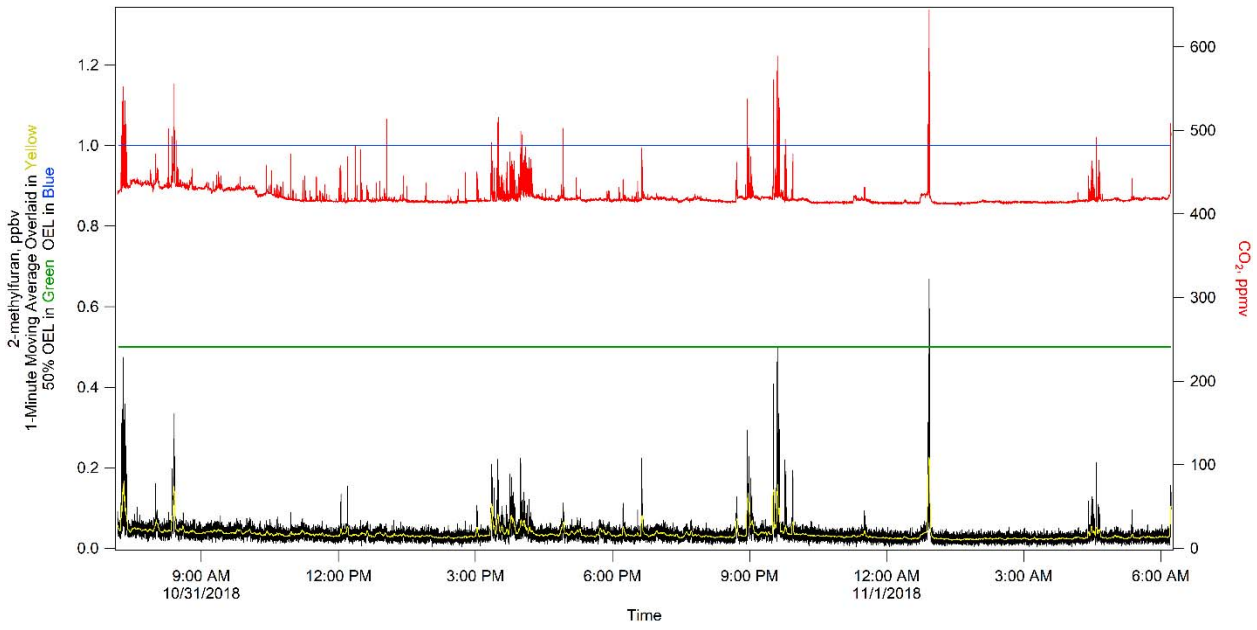

Figure 4-8. 2-methylfuran.

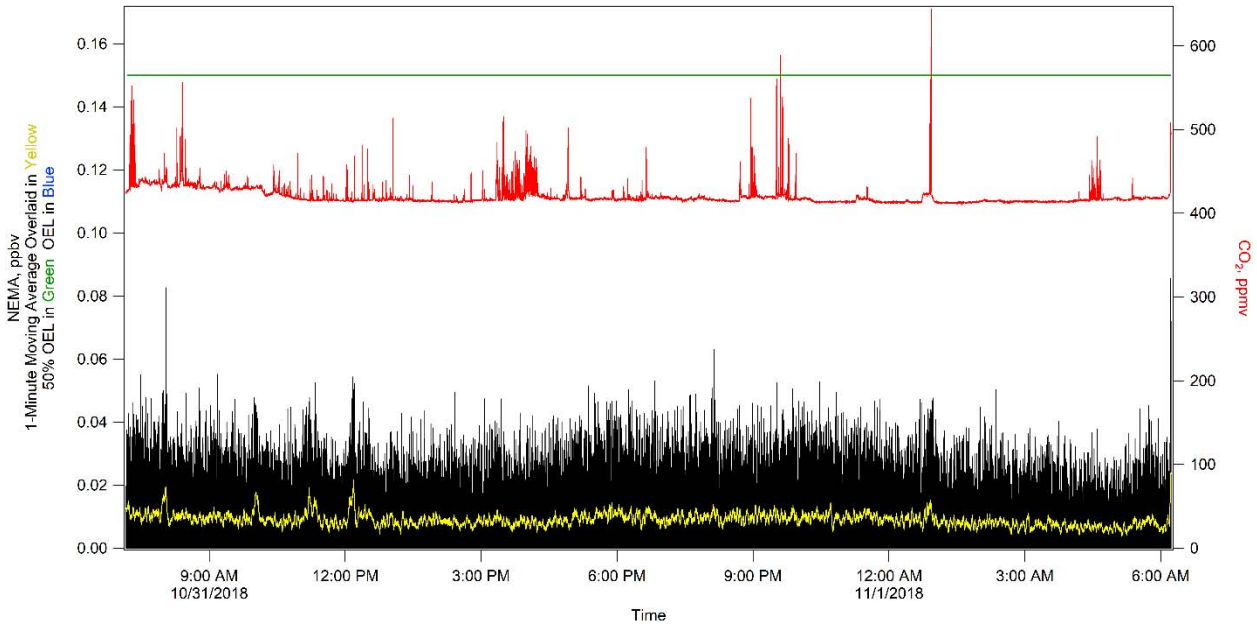

Figure 4-9. N-nitrosomethylethylamine (NEMA).

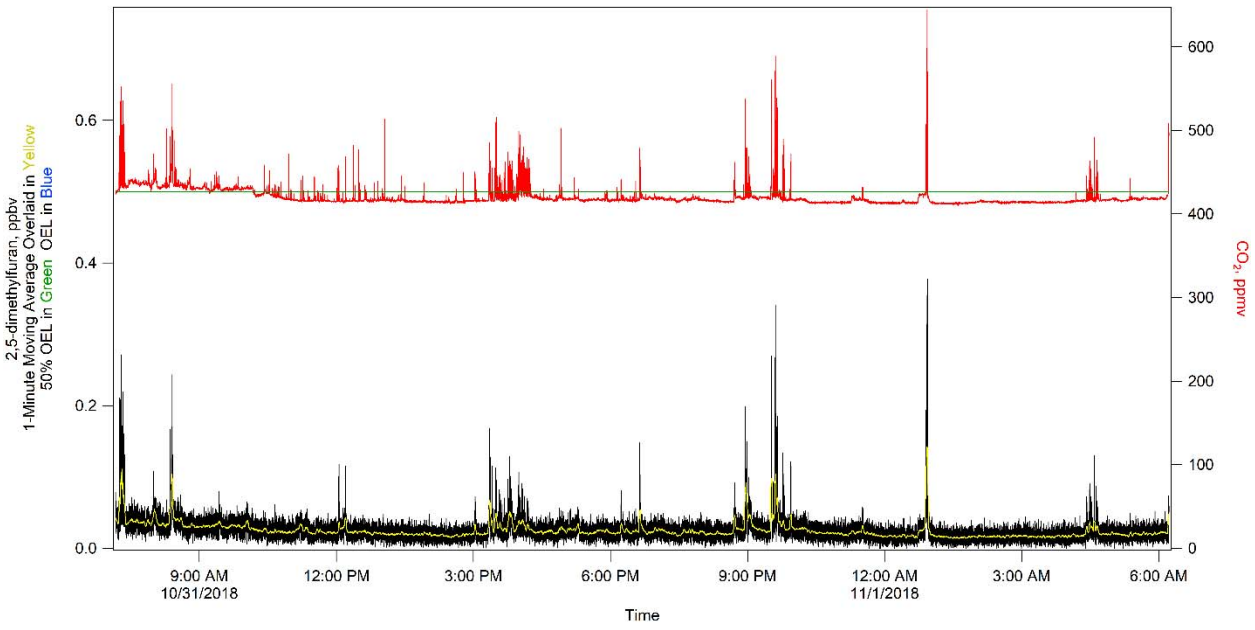

Figure 4-10. 2,5-dimethylfuran.

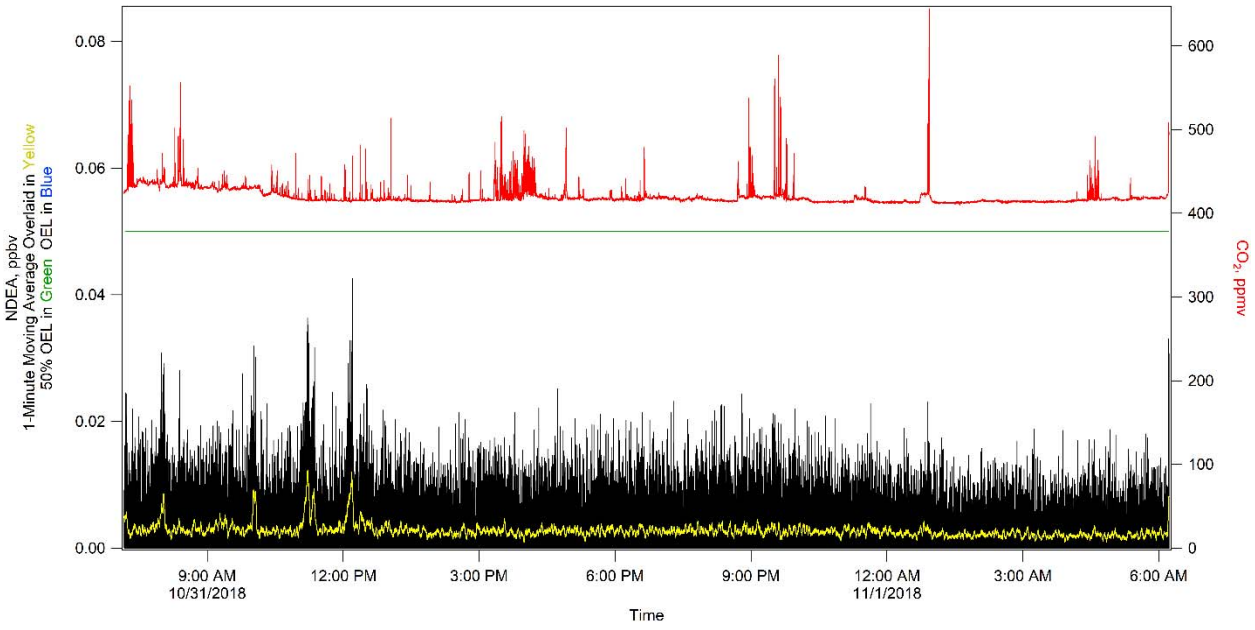

Figure 4-11. N-nitrosodiethylamine (NDEA).

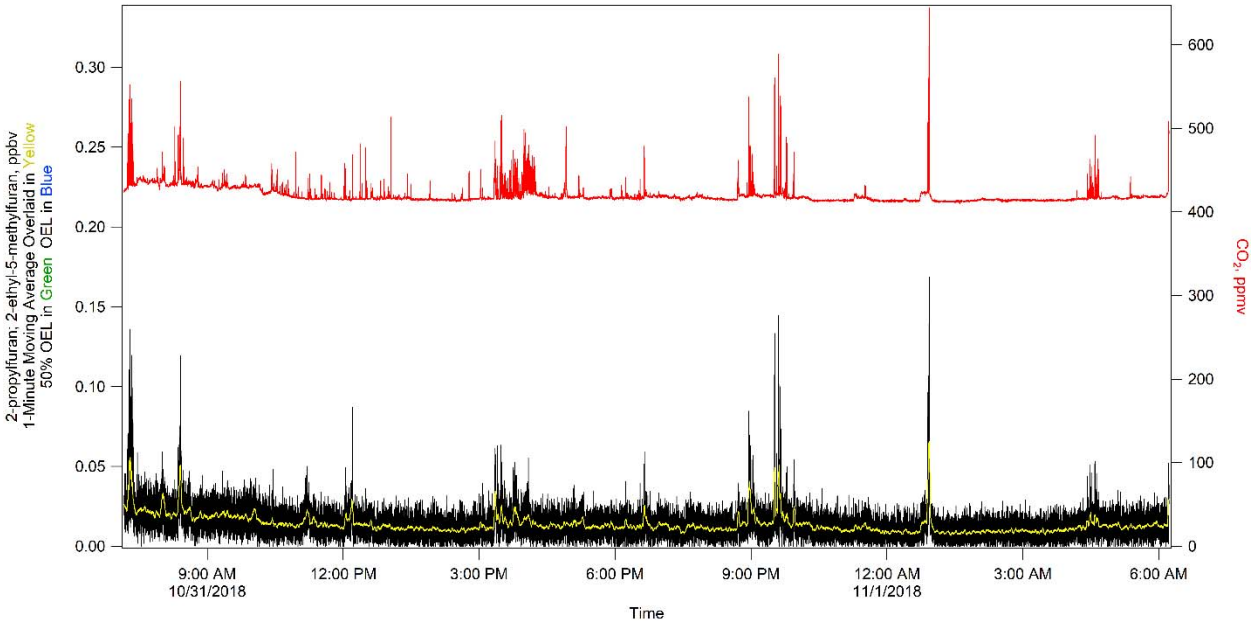

Figure 4-12. 2-propylfuran + 2-ethyl-5-methylfuran.

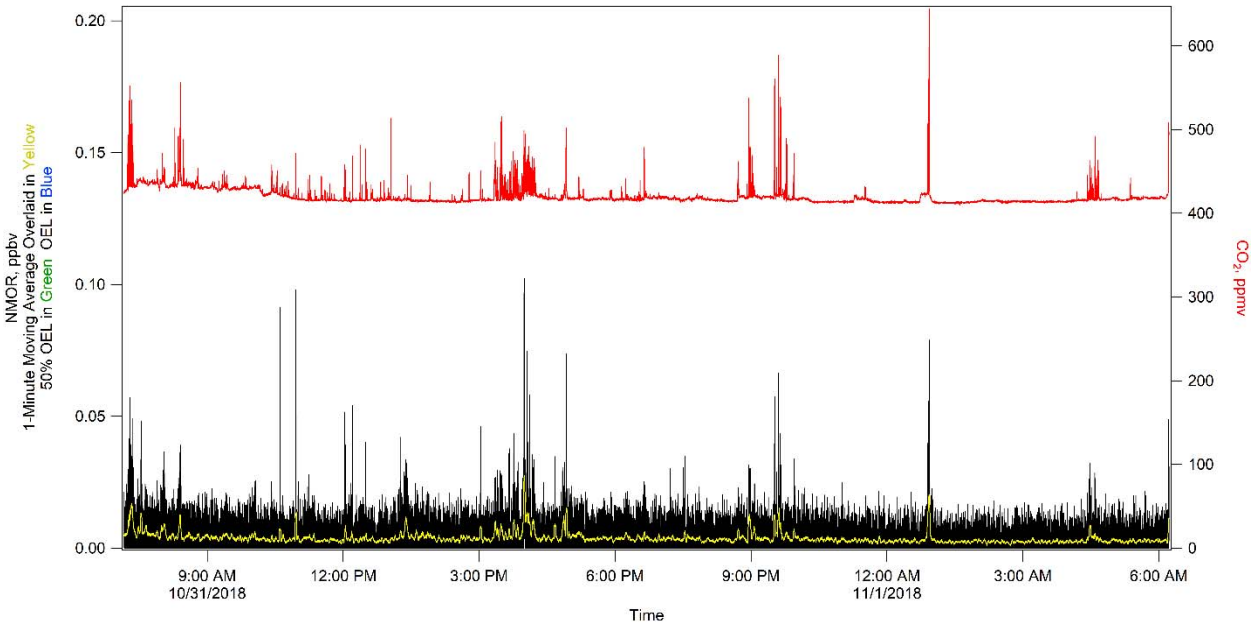

Figure 4-13. N-nitrosomorpholine (NMOR).

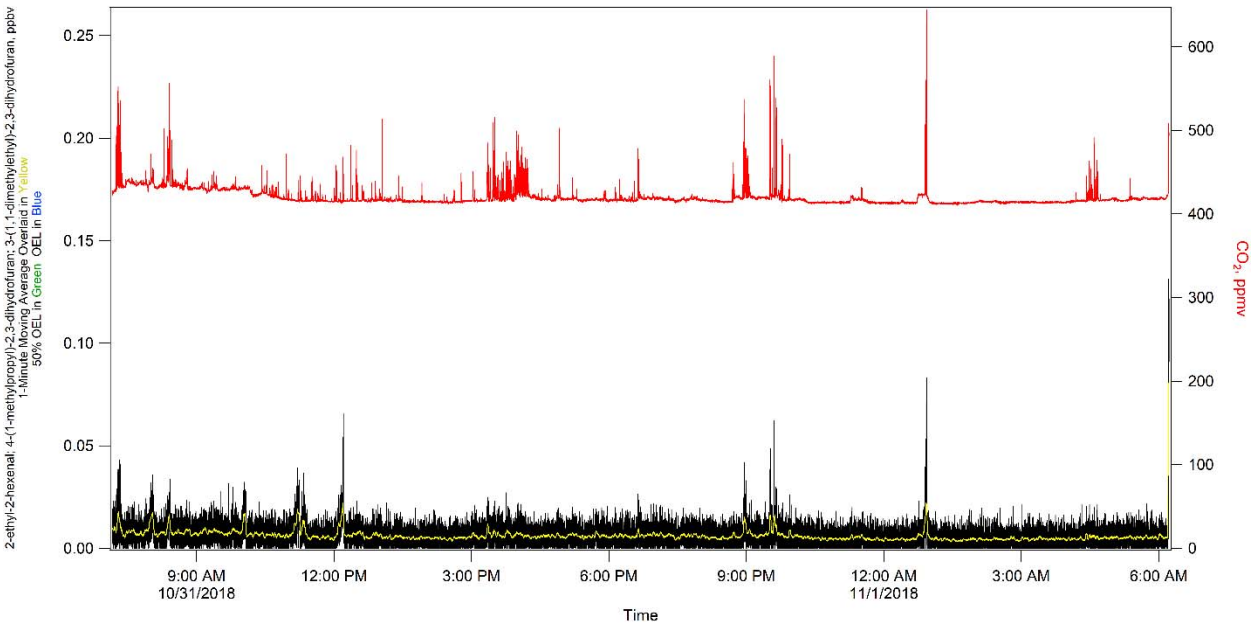

Figure 4-14. 2-ethyl-2-hexenal;4-(1-methylpropyl);2,3-dihydrofuran; 3-1(1,-1-dimethylethyl)-2,3-dihydrofuran.

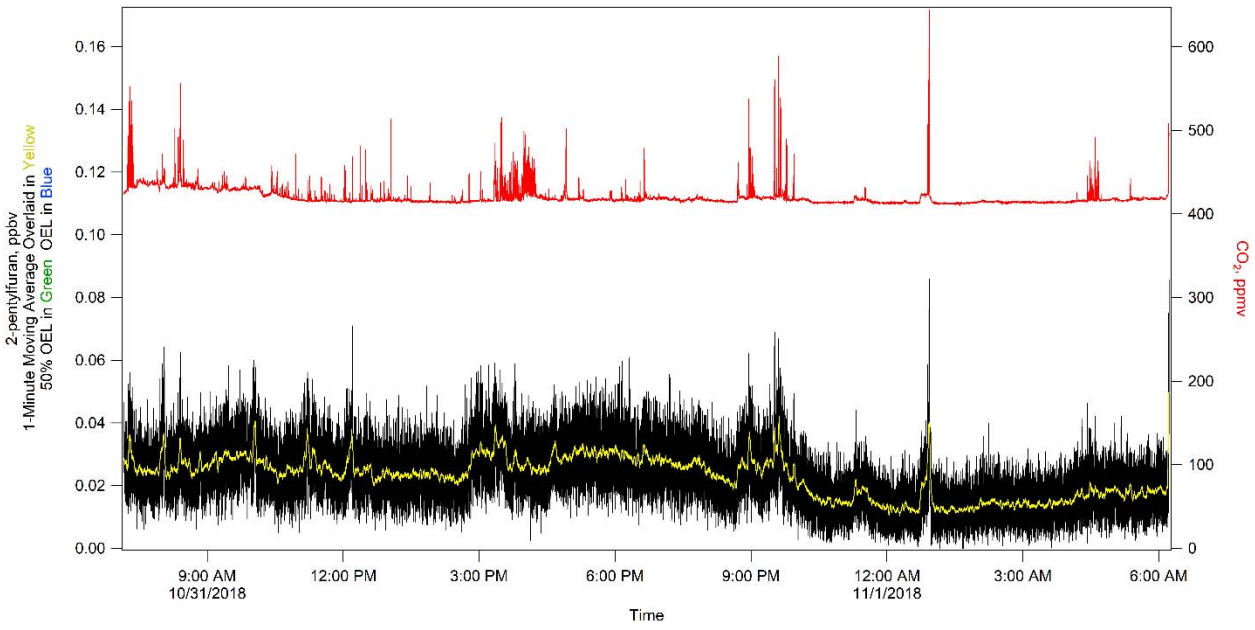

Figure 4-15. 2-pentylfuran.

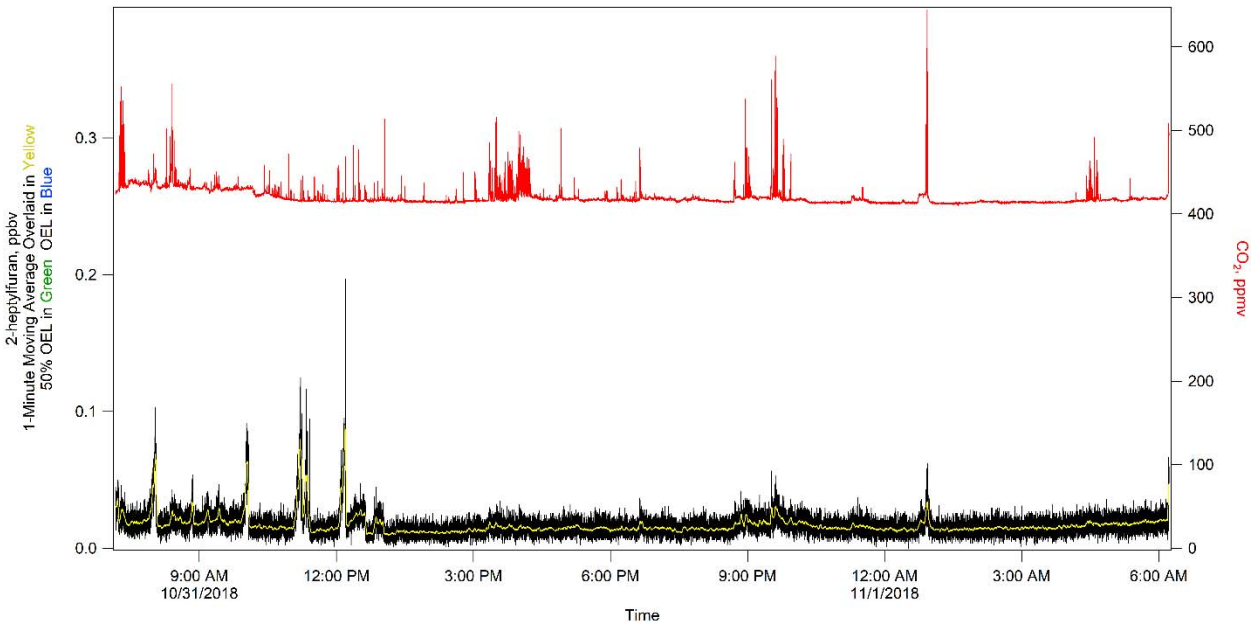

Figure 4-16. 2-heptylfuran.

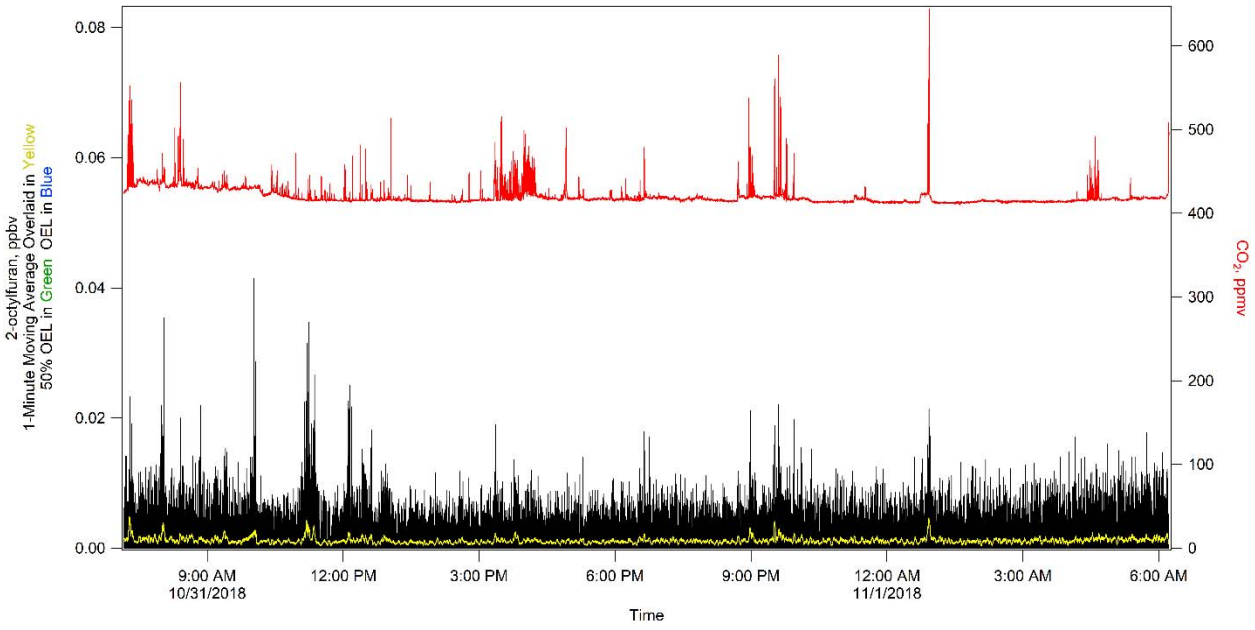

Figure 4-17. 2-octylfuran.

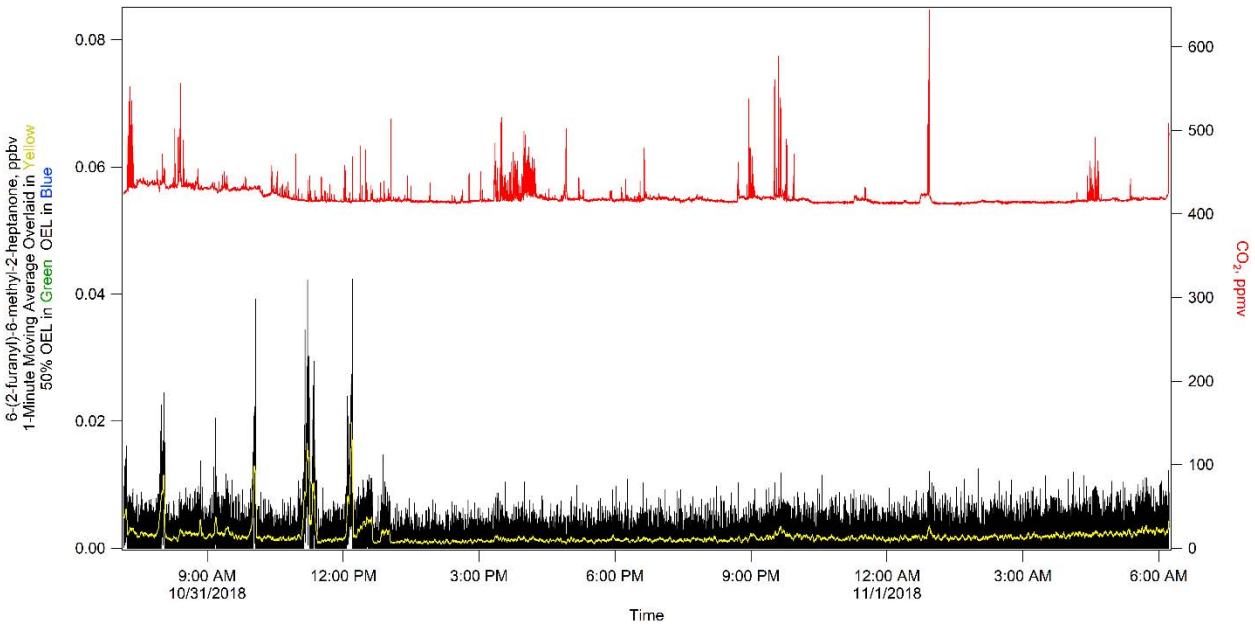

Figure 4-18. 6-(2-furanyl)-6-methyl-2-heptanone.

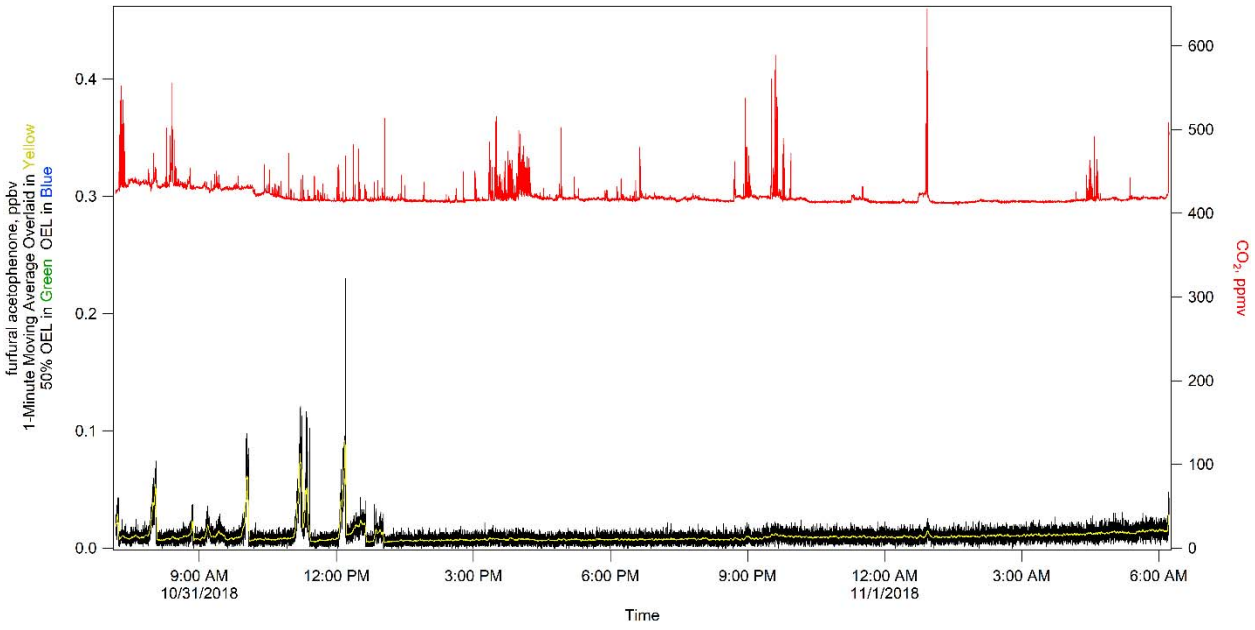

Figure 4-19. Furfural Acetophenone.

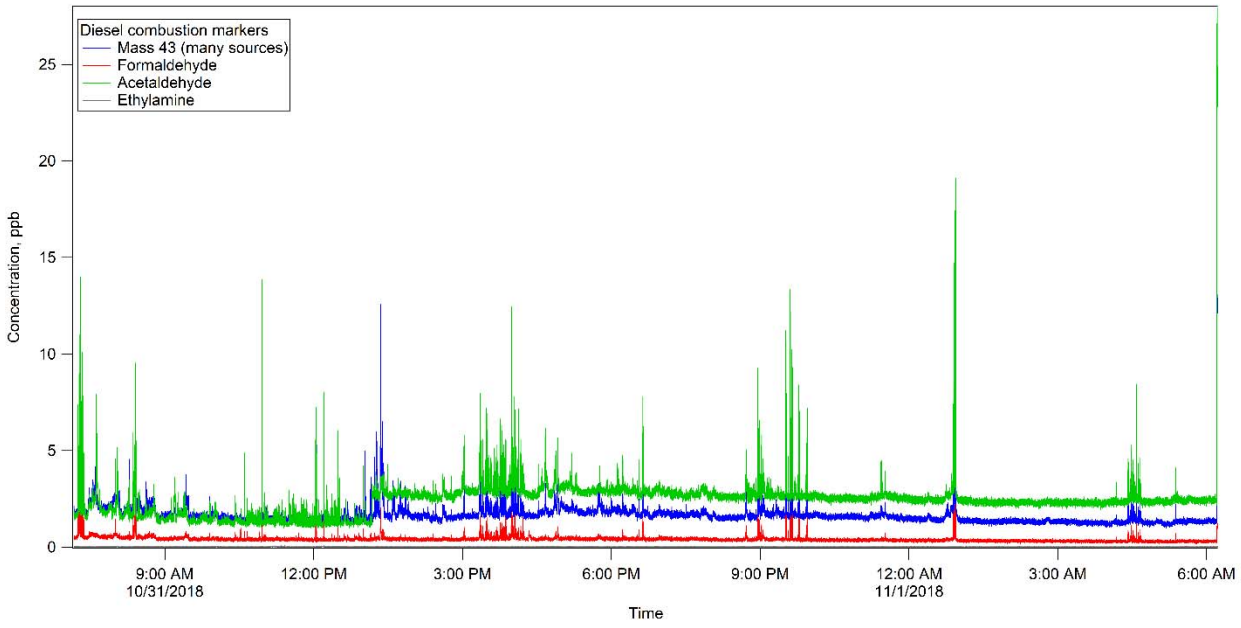

Figure 4-20. Diesel Combustion Markers.

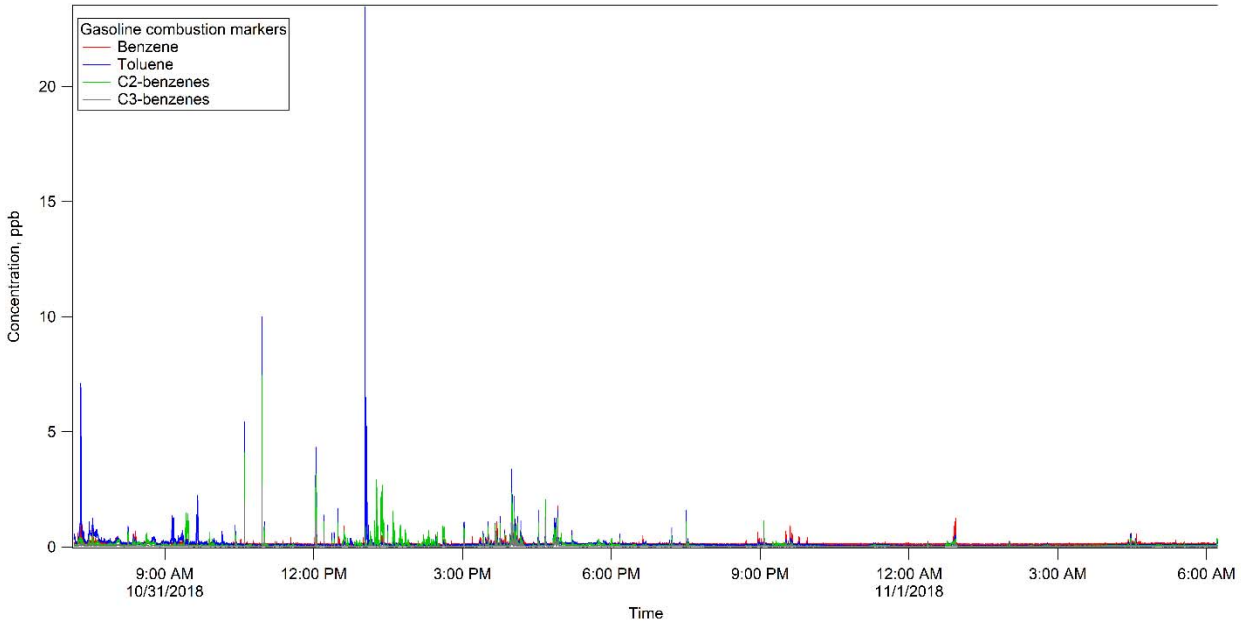

Figure 4-21. Gasoline Combustion Markers.

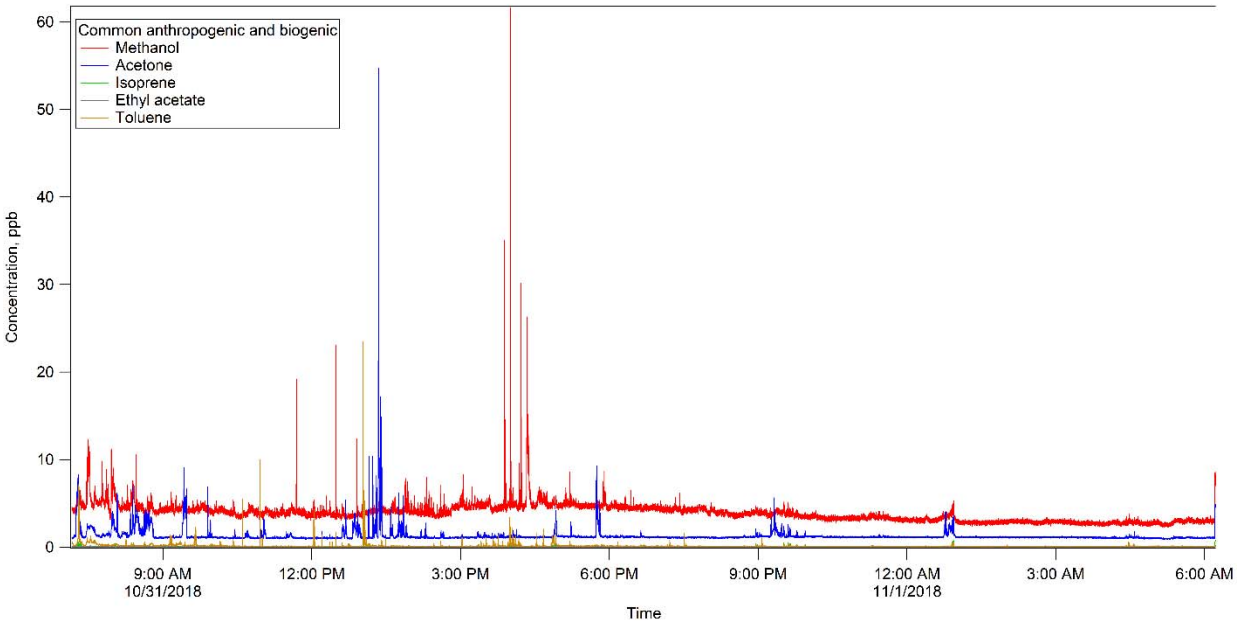

Figure 4-22. Plant and Human Markers.

5.0 NOVEMBER 1, 2018 – NOVEMBER 2, 2018 – STUDY SITE #6

5.1 Quality Assessment

Data from November 1, 2018, were assessed using Procedure 17124-DOE-HS-102. A Data Exchange Checklist was completed. The data were accepted by TerraGraphics with the following comments. Report No. 66409-RPT-004 was adequately documented and all checks passed the acceptance limits.

5.2 Summary

The ML personnel performed background sampling using the ML from November 1, 2018, to November 2, 2018, at Study Site 6. Site 6 is located near the intersection of US Highway 395 and Clearwater Avenue in Kennewick, WA. This site was chosen as a representative of commercial and heavy-traffic emissions as it includes heavy traffic patterns of mixed vehicle types and light commercial activity including a variety of eating establishments. The ML arrived at Site 6 at 07:20 on November 1, 2018. The initial QA/QC zero-air/sensitivity checks were performed on the CO_2 monitor, NH_3 monitor, and the PTR-MS beginning at 06:30. The collection of confirmatory samples began at 07:39. The ML staff departed the monitoring site at 11:16 and checked out with the CSO.

The ML staff returned to Site 6 at 04:45 on November 2, 2018. The ML moved to Site 1 by 07:15.

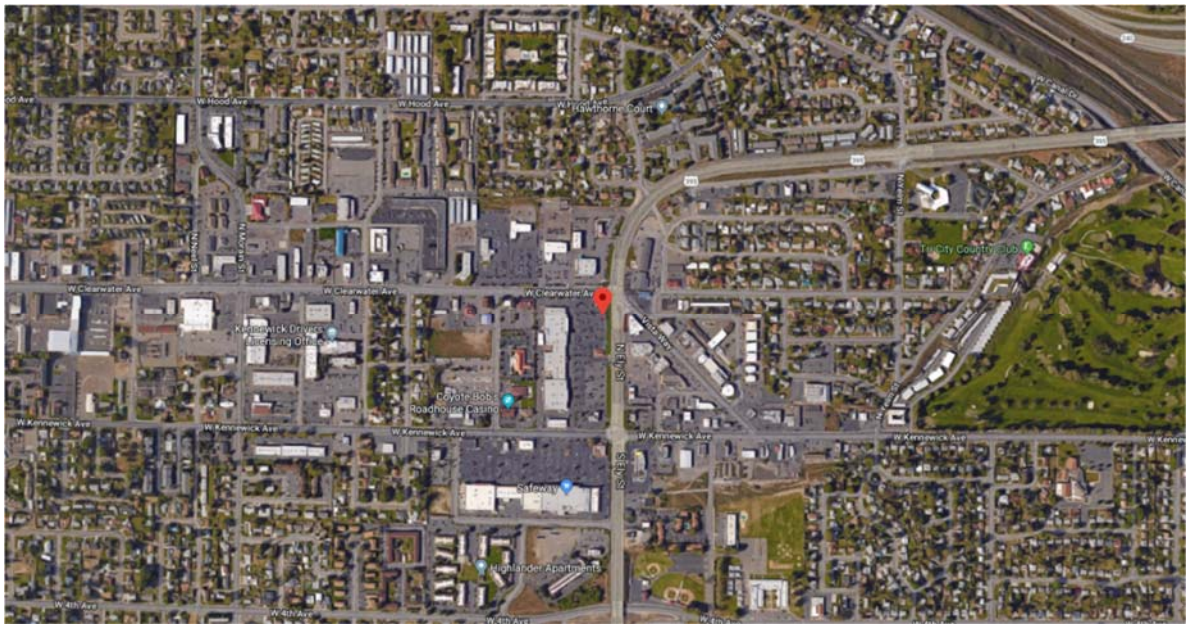

Figure 5-1. Mobile Laboratory Site #6 for the Duration of the Monitoring Period.

Figure 5-2. The Location of the Mobile Laboratory for the Duration of the Monitoring Period.

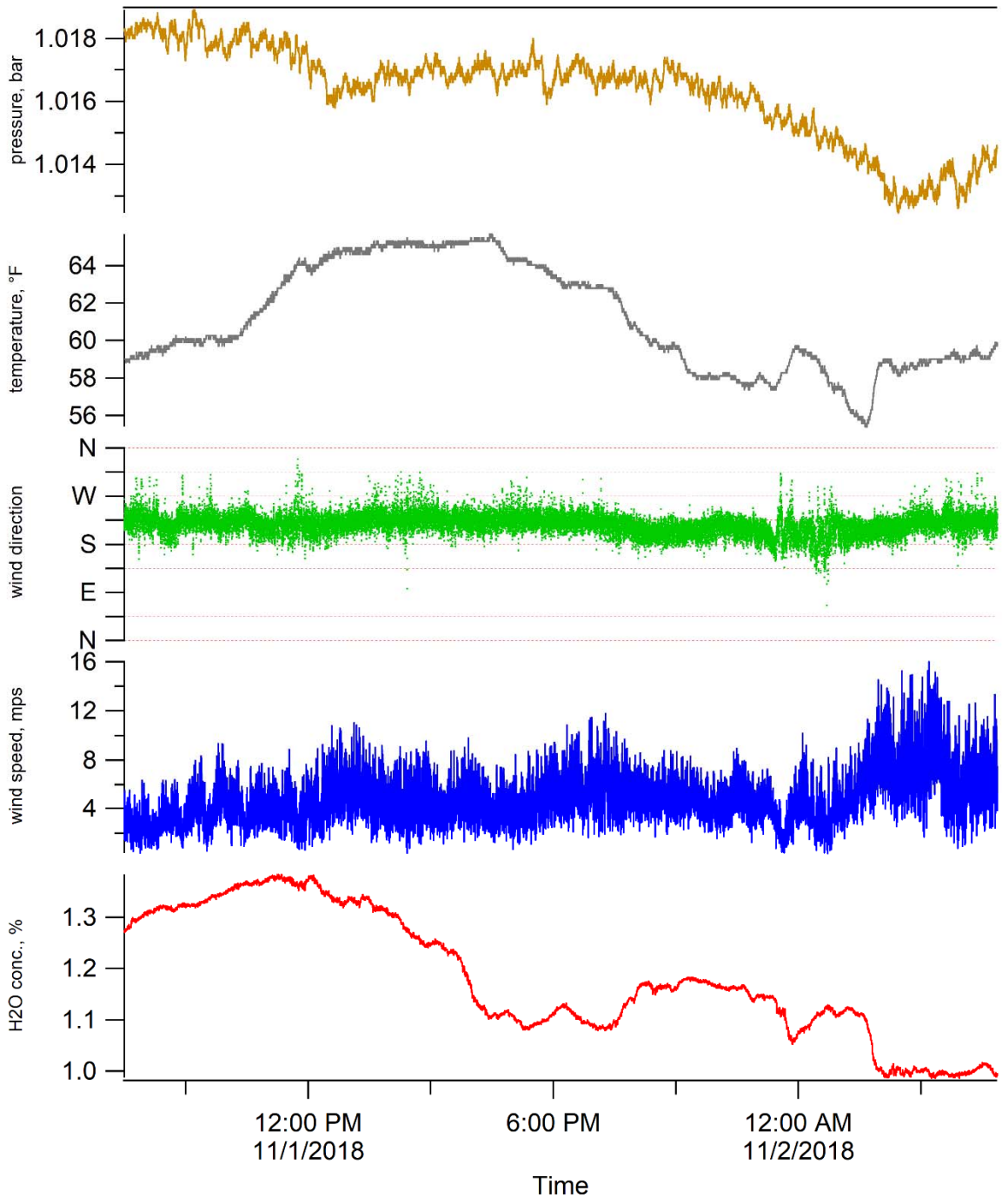

Figure 5-3. Weather Data.

5.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-MS,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Table 5-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
6	11/01/18	Thermosorb/N	EL33341	07:40	10:40	180
6	11/01/18	CarboTrap-300	A060136	07:40	13:40	360
6	11/01/18	LpDNPH	181101-A	07:39	10:39	180
6	11/01/18	LpDNPH	181101-B	07:39	07:39	180

Table 5-2 displays the statistical information for the monitoring period of November 1, 2018, to November 2, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 5-2. Statistical Information for the Monitoring Period of November 1, 2018 – November 2, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	Ammonia	25000	6.264	1.886	30.102	21.011	5.726
2	formaldehyde	300	0.353	0.087	24.674	3.181	0.335
3	Methanol	200000	2.992	0.992	33.146	63.508	2.936
4	acetonitrile	20000	0.188	0.047	24.744	0.815	0.198
5	acetaldehyde	25000	2.546	0.848	33.300	22.037	2.424
6	ethylamine	5000	0.010	0.006	54.633	0.043	0.009
7	1,3-butadiene	1000	0.093	0.079	85.174	5.814	0.085
8	propanenitrile	6000	0.039	0.026	67.416	2.158	0.035
9	2-propenal	100	0.134	0.065	48.187	2.804	0.121
10	1-butanol + butenes	20000	0.114	0.147	129.107	13.504	0.087
11	methyl isocyanate	20	0.033	0.012	36.801	0.173	0.032
12	methyl nitrite	100	0.054	0.016	29.772	0.421	0.053
13	furan	1	0.051	0.026	50.634	0.307	0.044
14	butanenitrile	8000	0.011	0.012	105.060	1.003	0.009
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.033	0.014	40.939	N/A*	N/A*
16	butanal	25000	0.078	0.018	23.327	0.338	0.077
17	NDMA**	0.3	0.019	0.016	83.881	0.106	0.016
18	benzene	500	0.171	0.176	103.082	13.388	0.140
19	2,4-pentadienenitrile + pyridine	300, 1000	0.025	0.014	55.286	0.888	0.022
20	2-methylene butanenitrile	300	0.011	0.005	46.983	0.152	0.010
21	2-methylfuran	1	0.035	0.019	53.170	0.185	0.031
22	pentanenitrile	6000	0.007	0.005	73.546	0.295	0.006
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.025	0.011	45.687	0.206	0.023
24	NEMA**	0.3	0.008	0.009	113.788	0.066	0.005
25	2,5-dimethylfuran	1	0.020	0.011	52.928	0.125	0.018
26	hexanenitrile	6000	0.003	0.003	105.569	0.151	0.002
27	2-hexanone (MBK)	5000	0.008	0.005	60.852	0.046	0.007
28	NDEA**	0.1	0.002	0.003	150.604	0.027	0.000
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.013	0.005	39.064	0.090	0.012
30	2,4-dimethylpyridine	500	0.013	0.024	175.713	1.899	0.009
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.012	0.007	58.318	0.053	0.011

Table 5-2. Statistical Information for the Monitoring Period of November 1, 2018 – November 2, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
32	heptanenitrile	6000	0.004	0.004	95.267	0.072	0.002
33	4-methyl-2-hexanone	500	0.006	0.004	69.578	0.038	0.005
34	NMOR**	0.6	0.004	0.006	147.770	0.266	0.001
35	butyl nitrate	2500	0.003	0.003	105.330	0.029	0.002
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.006	0.005	77.203	0.036	0.005
37	6-methyl-2-heptanone	8000	0.006	0.004	70.930	0.031	0.005
38	2-pentylfuran	1	0.014	0.007	48.645	0.056	0.013
39	Biphenyl	200	0.006	0.005	85.468	0.034	0.004
40	2-heptylfuran	1	0.018	0.011	59.271	0.067	0.015
41	1,4-butanediol dinitrate	50	0.006	0.005	71.606	0.035	0.005
42	2-octylfuran	1	0.001	0.003	224.584	0.031	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.001	0.002	293.398	0.028	0.000
44	PCB	1000	0.010	0.005	47.299	0.036	0.009
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.003	0.003	111.547	0.025	0.001
46	furfural acetophenone	1	0.015	0.010	69.201	0.061	0.011

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.366 ppb and the median value was 0.031 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

** Nitrosamine results are suspect due to isobaric interferants causing positive bias that have been encountered during previous background studies [53005-81-RPT-007, *PTR-MS Mobile Laboratory Vapor Monitoring Background Study, (3/18/2018 – 4/20/2018)*, and *Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study*, RJ Lee Group, Inc., 2017].

The following figures display a selection of 16 COPC signals, overlaid with the same signal smoothed using a 1-minute moving average (in cases where a moving average assists with data visualization), and CO_2, for the monitoring period November 1, 2018, to November 2, 2018. If within range of the plot's left axis, a green horizontal line representing 50% of the COPC's OEL and a blue horizontal line representing the COPC's OEL are shown.

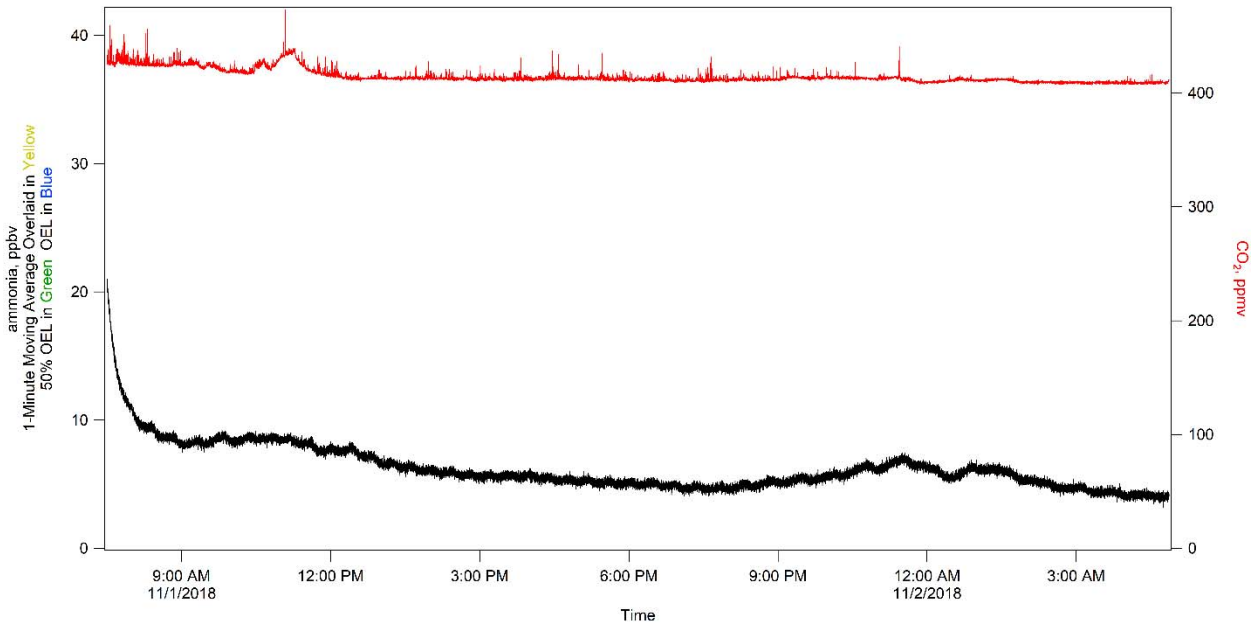

Figure 5-4. Ammonia.

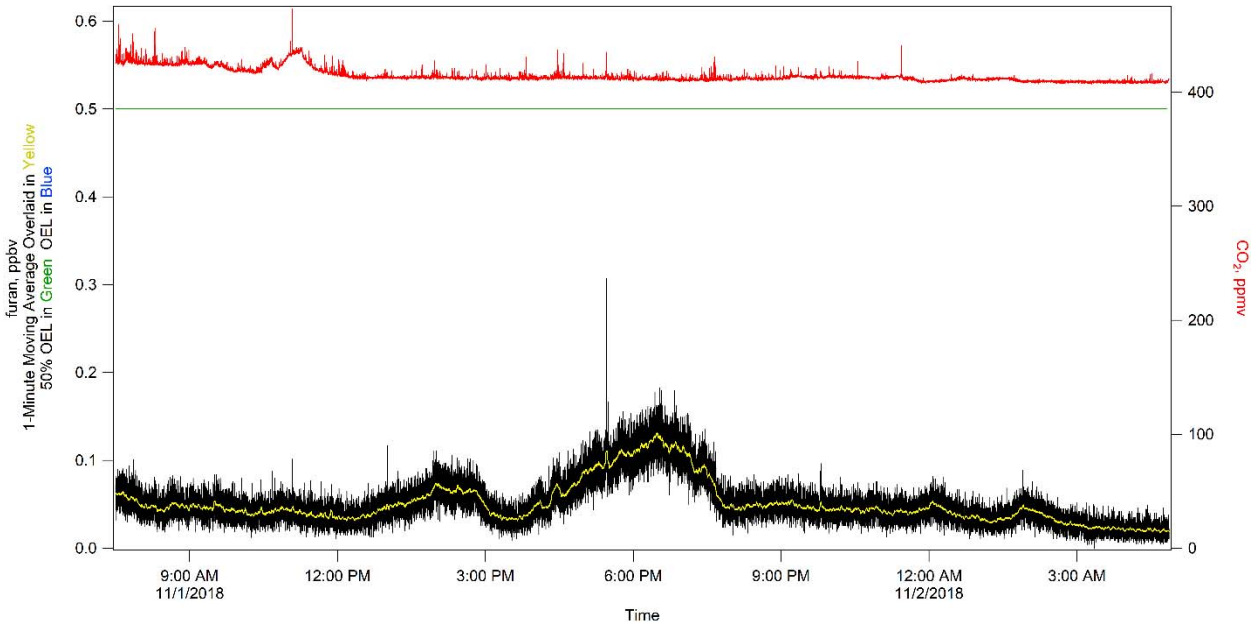

Figure 5-5. Furan.

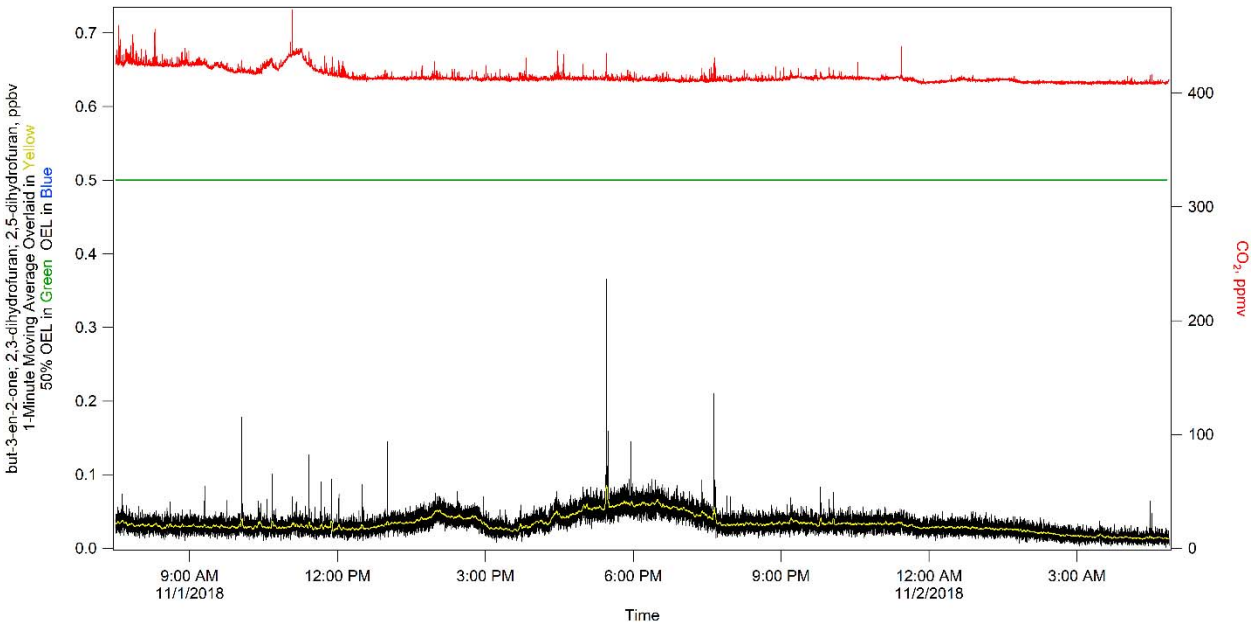

Figure 5-6. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

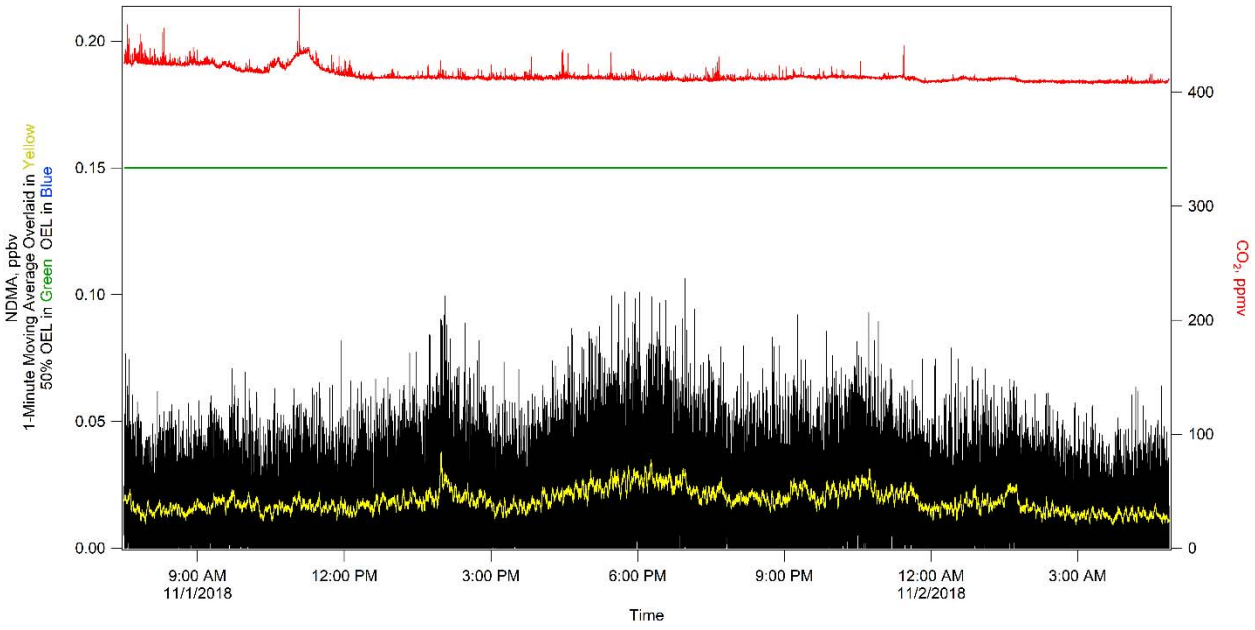

Figure 5-7. N-nitrosodimethylamine (NDMA).

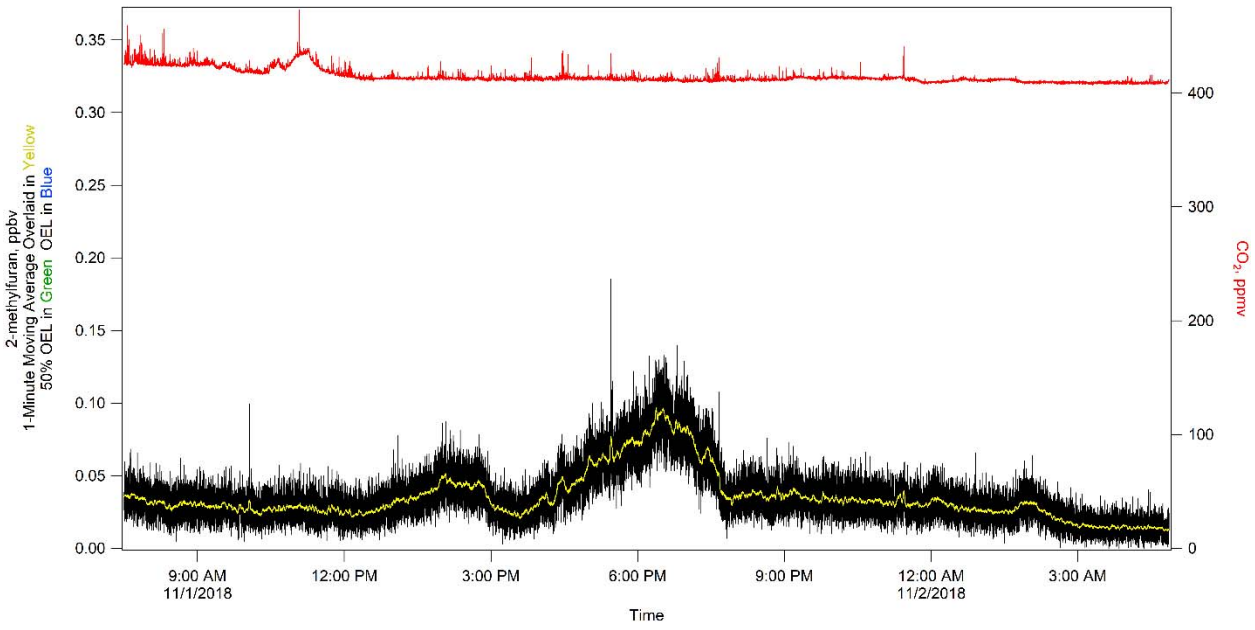

Figure 5-8. 2-methylfuran.

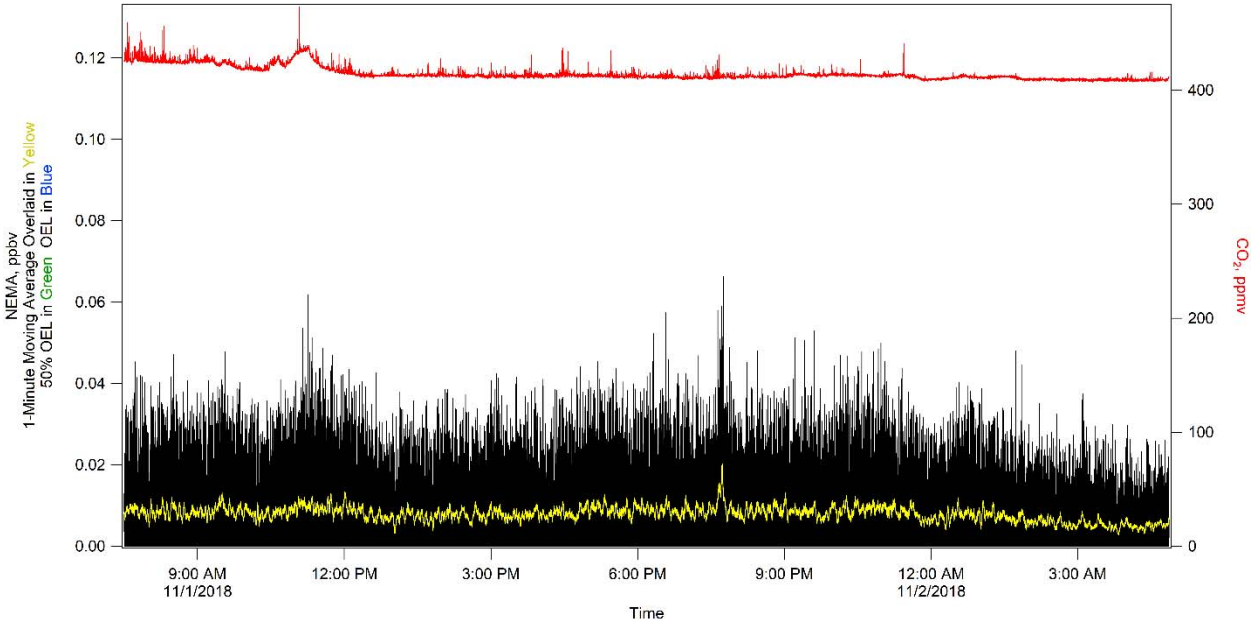

Figure 5-9. N-nitrosomethylethylamine (NEMA).

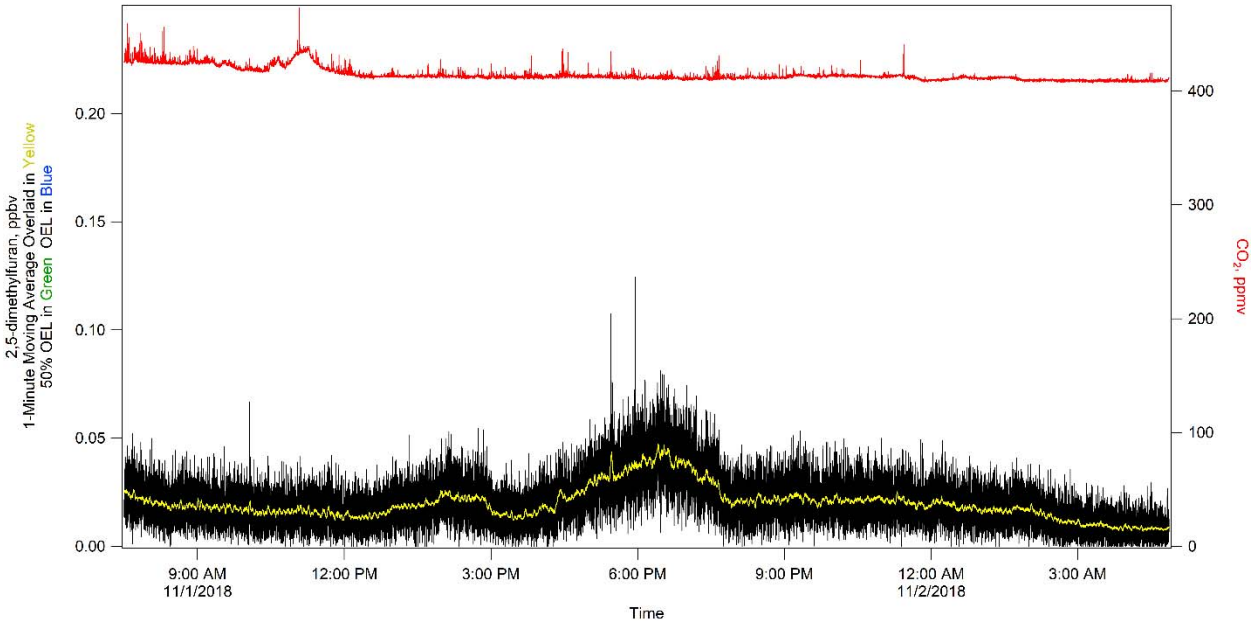

Figure 5-10. 2,5-dimethylfuran.

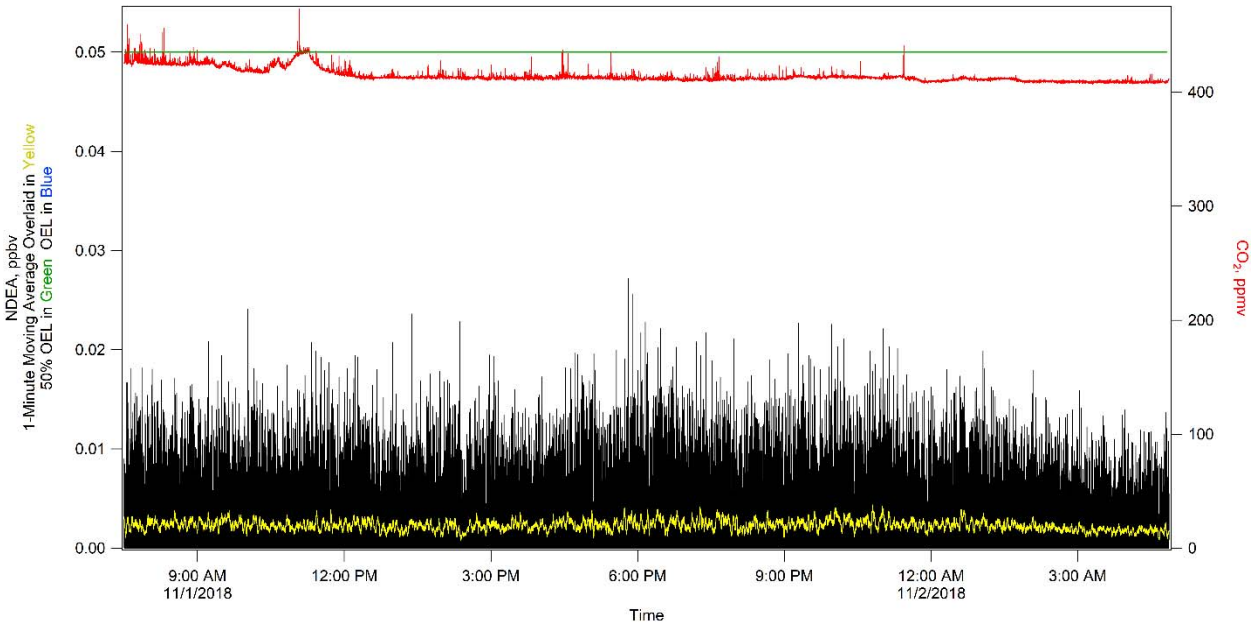

Figure 5-11. N-nitrosodiethylamine (NDEA).

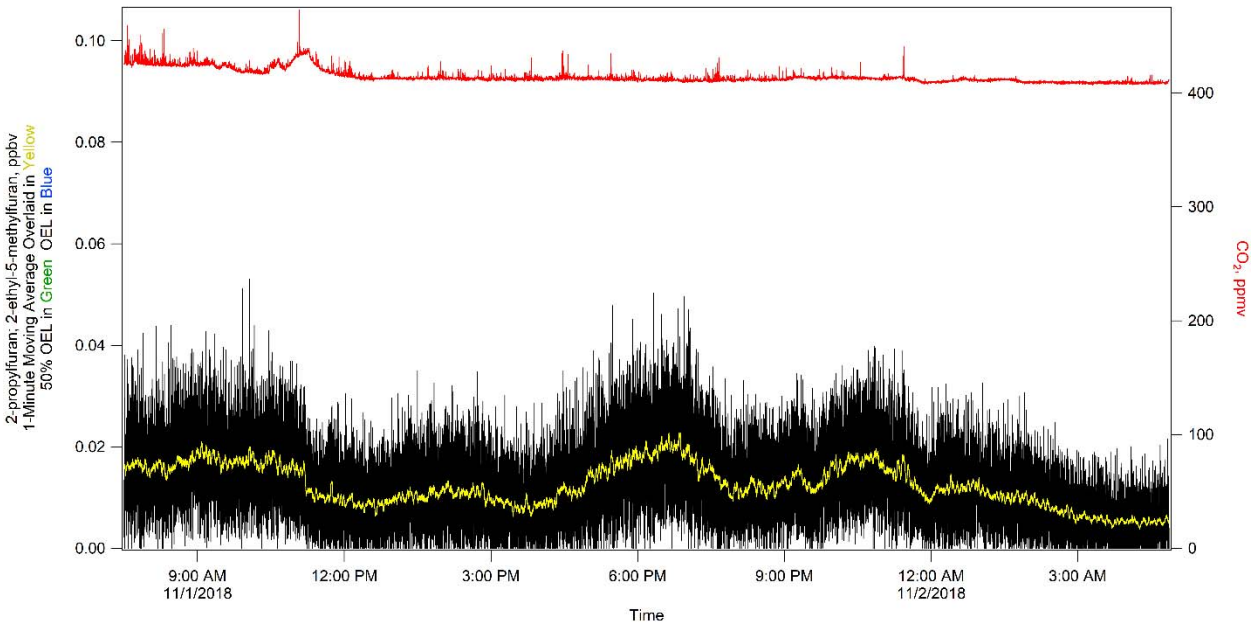

Figure 5-12. 2-propylfuran + 2-ethyl-5-methylfuran.

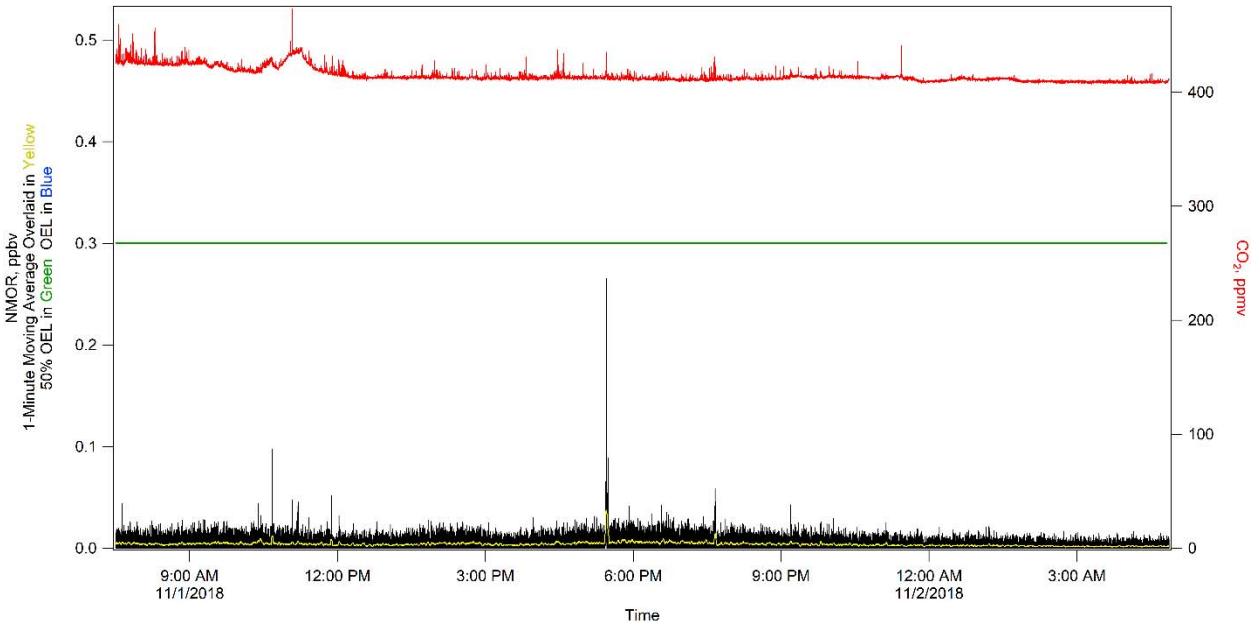

Figure 5-13. N-nitrosomorpholine (NMOR).

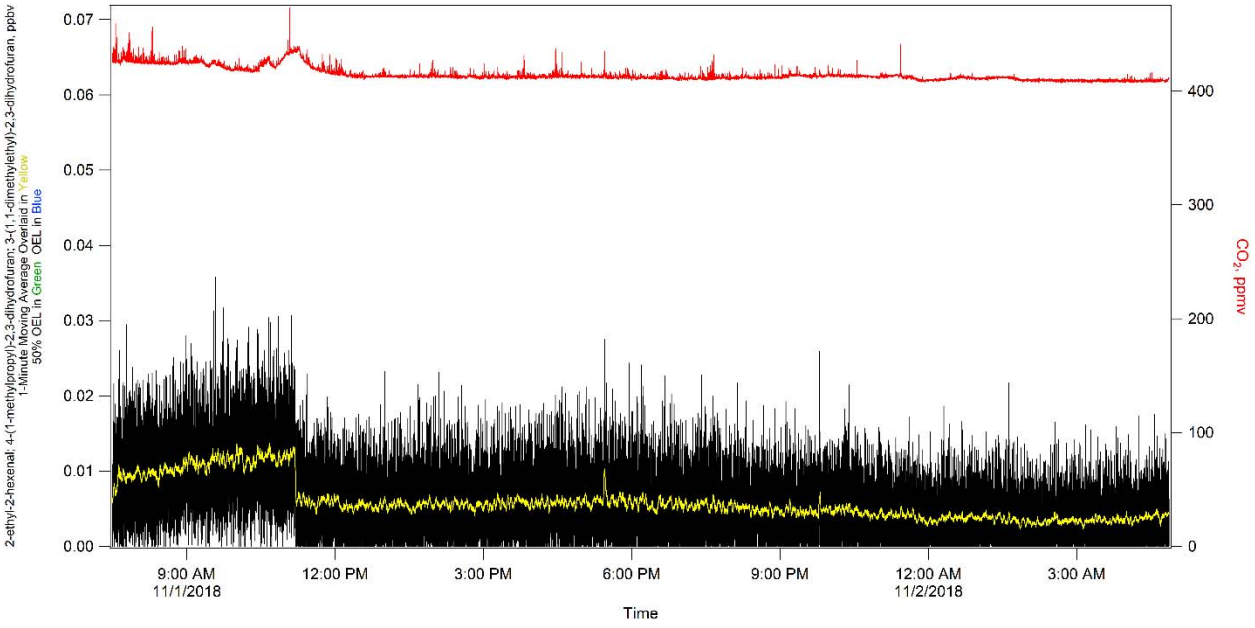

Figure 5-14. 2-ethyl-2-hexenal;4-(1-methylpropyl);2,3-dihydrofuran; 3-1(1,-1-dimethylethyl)-2,3-dihydrofuran.

The observed abrupt changes in average concentration are due to unoptomized tuning resulting in higher than normal instrument background. See DR18-009 in Appendix A for further explanation. This phenomenon will be described in detail in a future monthly summary report.

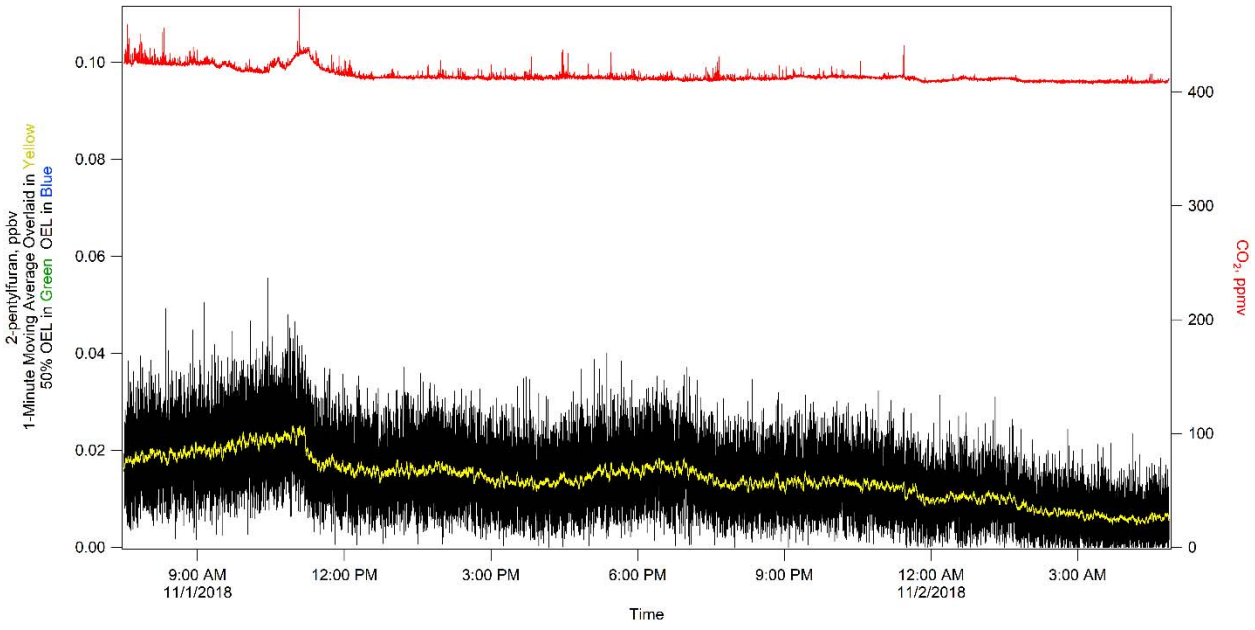

Figure 5-15. 2-pentylfuran.

The observed abrupt changes in average concentration are due to unoptomized tuning resulting in higher than normal instrument background. See DR18-009 in Appendix A for further explanation. This phenomenon will be described in detail in a future monthly summary report.

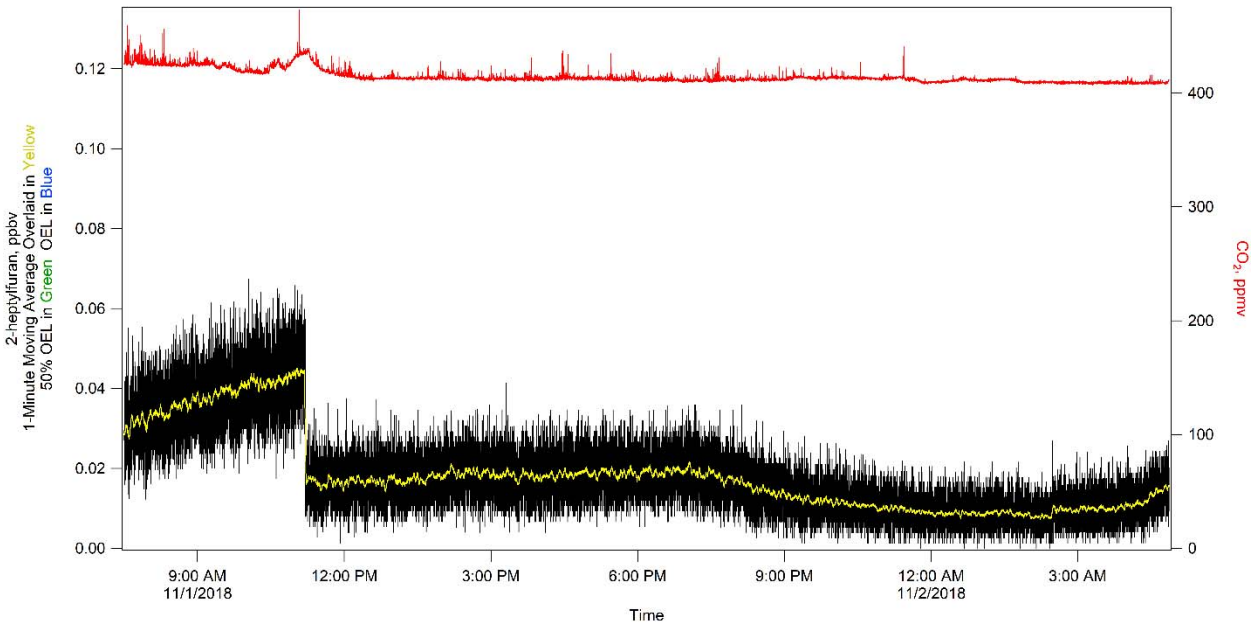

Figure 5-16. 2-heptylfuran.

The observed abrupt changes in average concentration are due to unoptomized tuning resulting in higher than normal instrument background. See DR18-009 in Appendix A for further explanation. This phenomenon will be described in detail in a future monthly summary report.

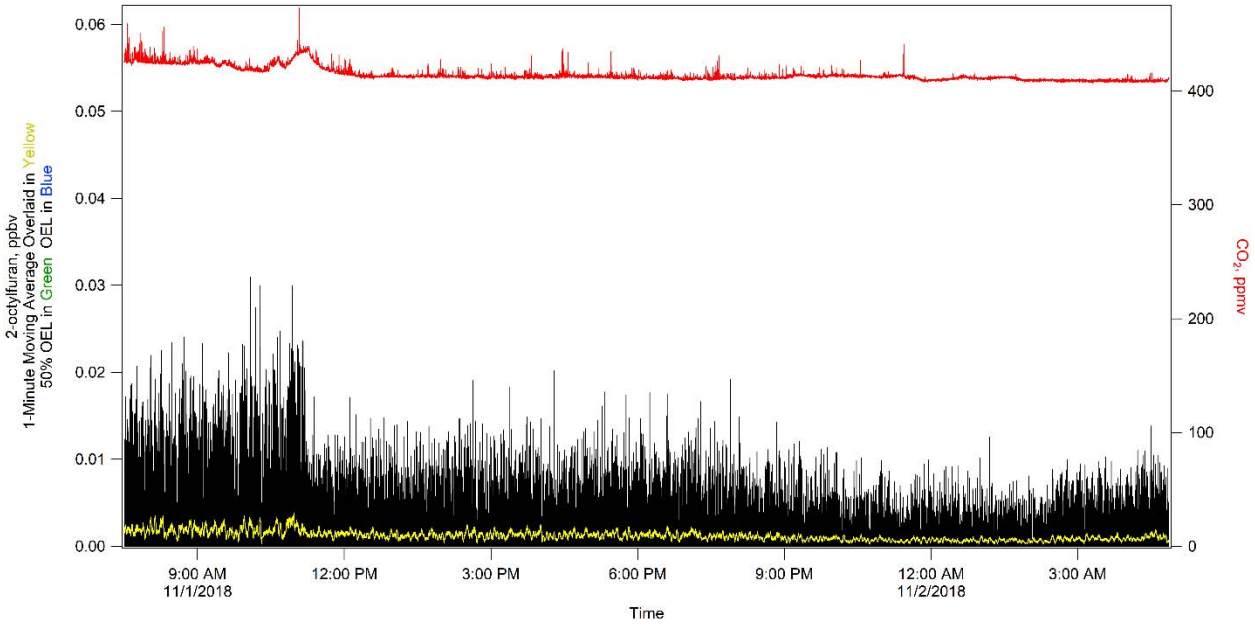

Figure 5-17. 2-octylfuran.

The observed abrupt changes in average concentration are due to unoptomized tuning resulting in higher than normal instrument background. See DR18-009 in Appendix A for further explanation. This phenomenon will be described in detail in a future monthly summary report.

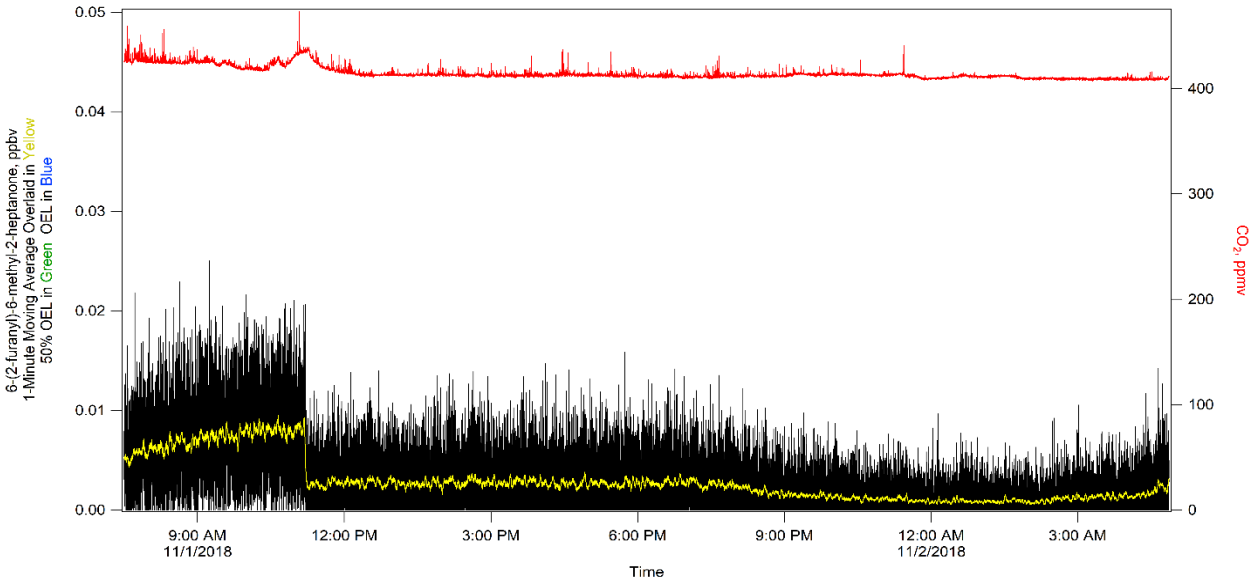

Figure 5-18. 6-(2-furanyl)-6-methyl-2-heptanone.

The observed abrupt changes in average concentration are due to unoptomized tuning resulting in higher than normal instrument background. See DR18-009 in Appendix A for further explanation. This phenomenon will be described in detail in a future monthly summary report.

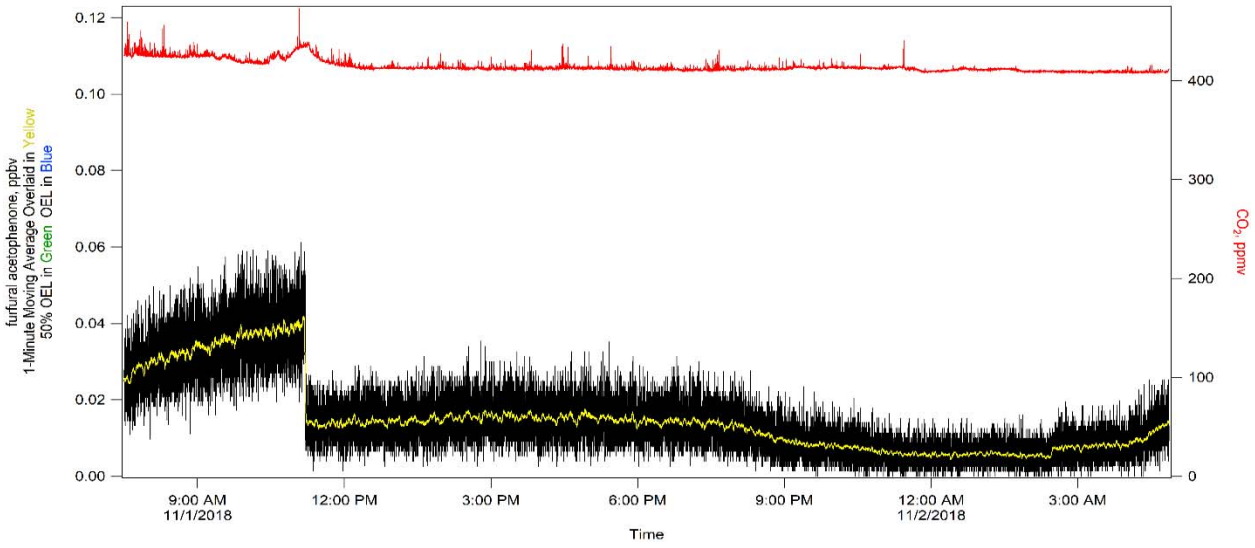

Figure 5-19. Furfural Acetophenone.

The observed abrupt changes in average concentration are due to unoptomized tuning resulting in higher than normal instrument background. See DR18-009 in Appendix A for further explanation. This phenomenon will be described in detail in a future monthly summary report.

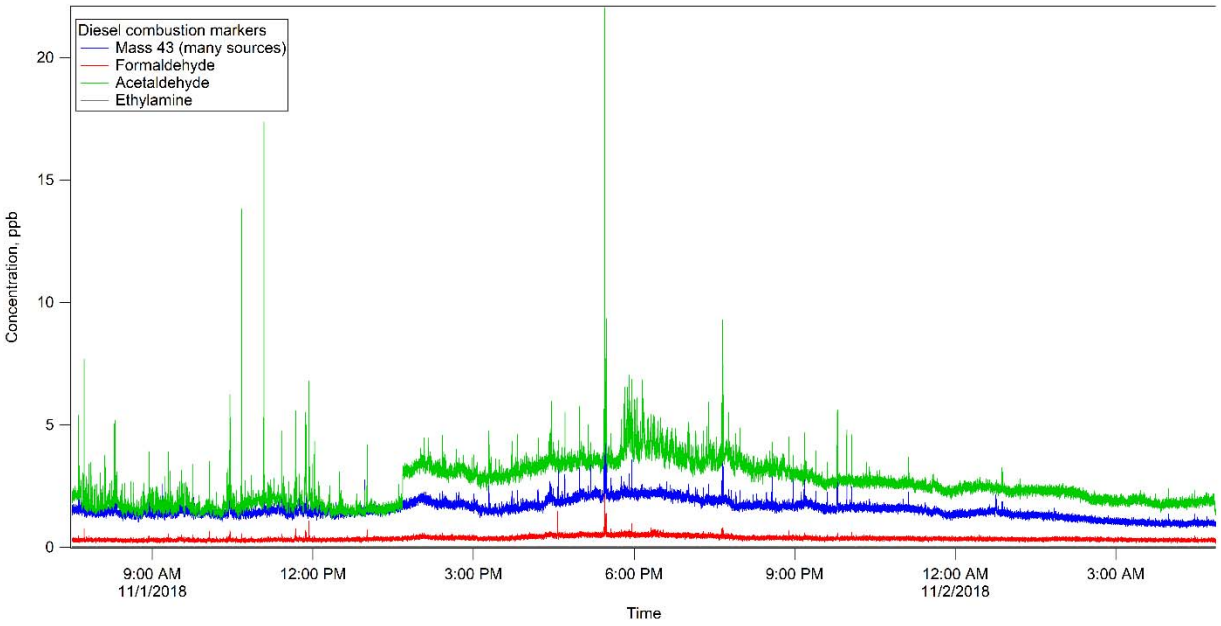

Figure 5-20. Diesel Combustion Markers.

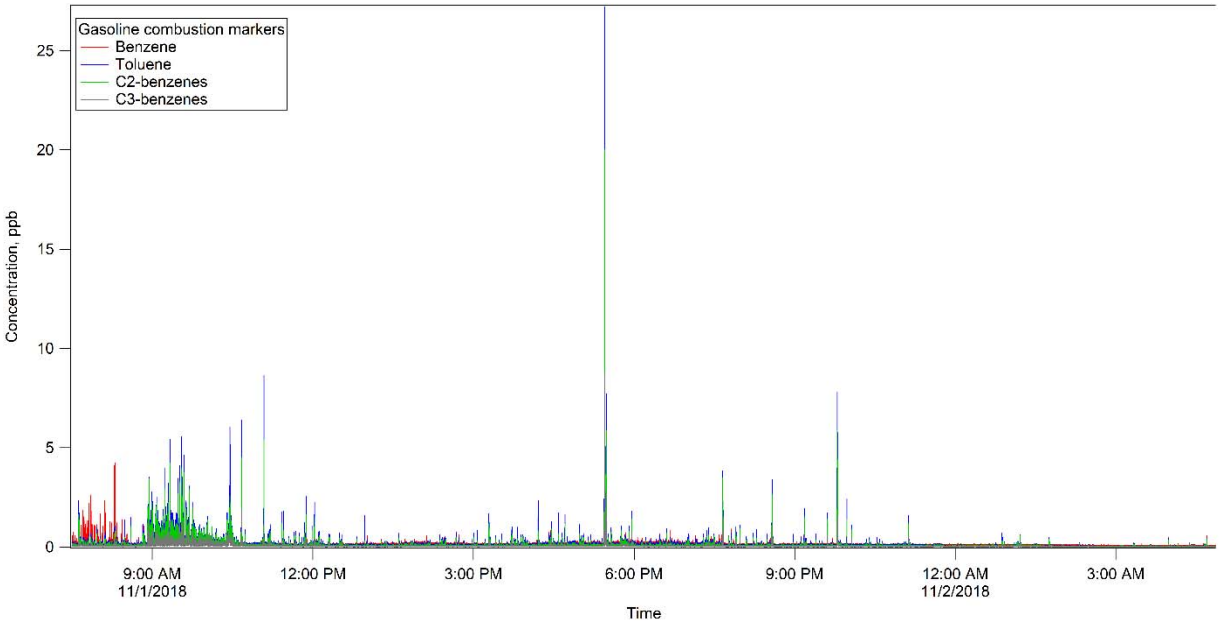

Figure 5-21. Gasoline Combustion Markers.

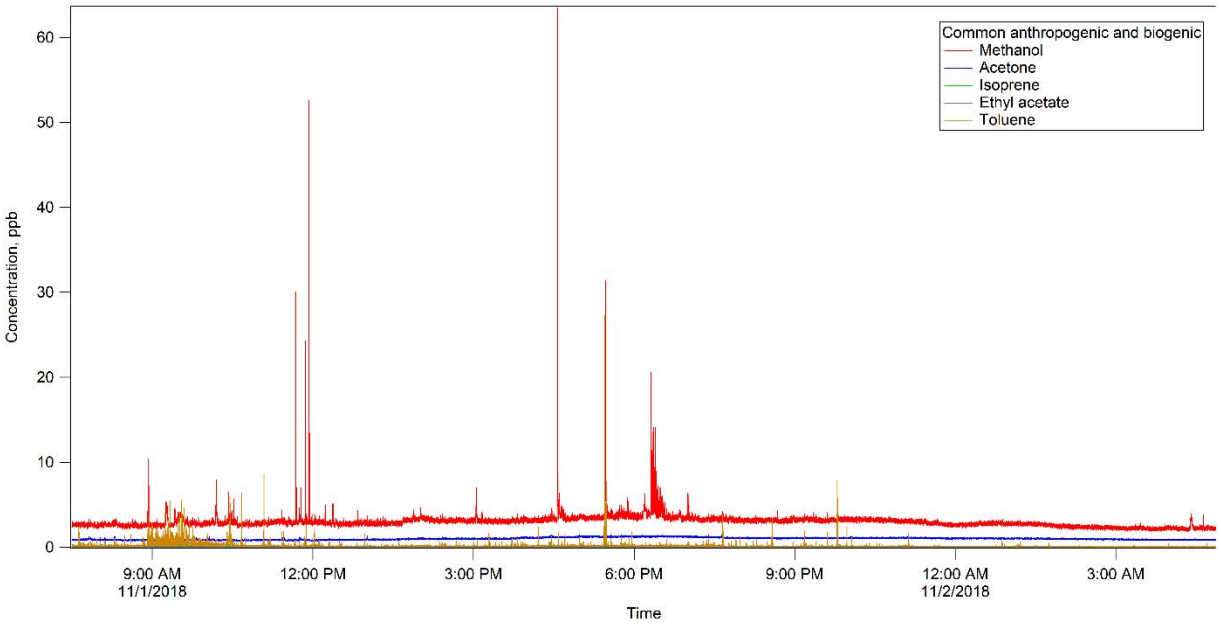

Figure 5-22. Plant and Human Markers.

6.0 NOVEMBER 2, 2018 – NOVEMBER 3, 2018 – STUDY SITE #1

6.1 Quality Assessment

Data from November 2, 2018, were assessed using Procedure 17124-DOE-HS-102. A Data Exchange Checklist was completed. The data were accepted by TerraGraphics with the following comments. Report No. 66409-RPT-004 was adequately documented and all checks passed the acceptance limits.

6.2 Summary

The ML personnel performed background sampling using the ML from November 2, 2018, to November 3, 2018, at Study Site 1. Site 1 is located on the plateau northwest of the 200W Tank Farm operations. The ML arrived at Site 1 at 07:15 on November 2, 2018. The initial QA/QC zero-air/sensitivity checks were performed on the LI-COR CO_2 monitor, Picarro NH_3 analyzer, and the PTR-MS beginning at 05:36, prior to Site 1 arrival. Collection of confirmatory samples began at 07:28. The ML staff departed the monitoring site at 10:40.

The ML staff returned to Site 1 at 06:09 on November 3, 2018. At 06:11, the confirmatory sorbent samples were disconnected from the sampling station. The ML moved to Site 2 by 07:05.

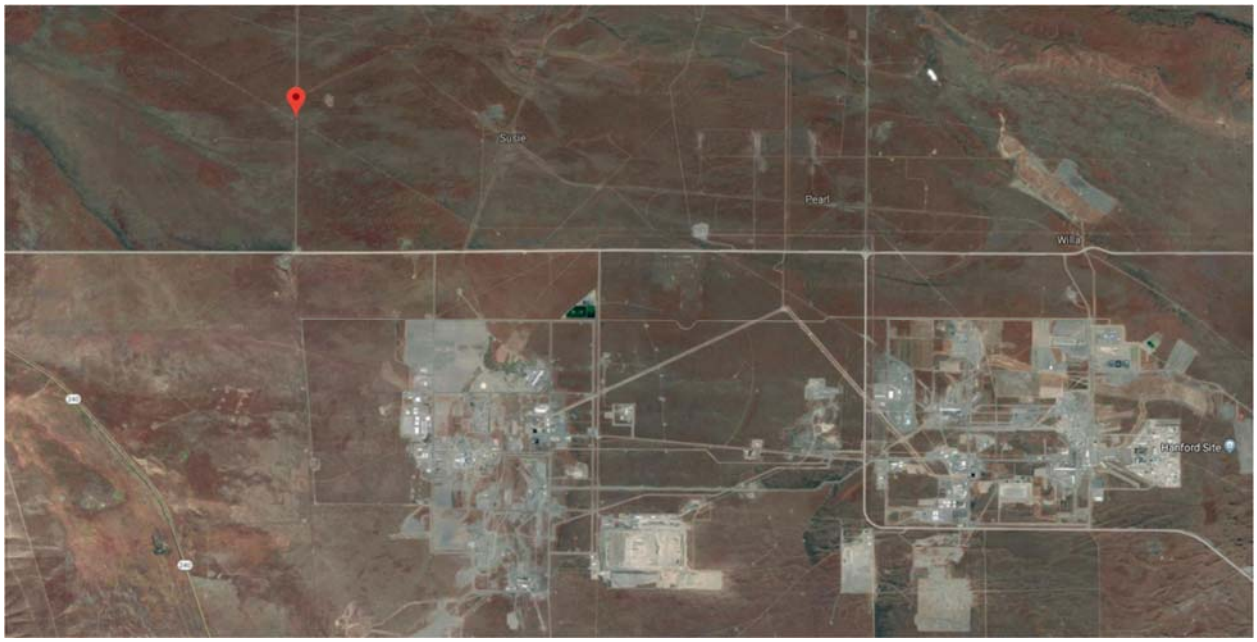

Figure 6-1. Mobile Laboratory Site #1 for the Duration of the Monitoring Period.

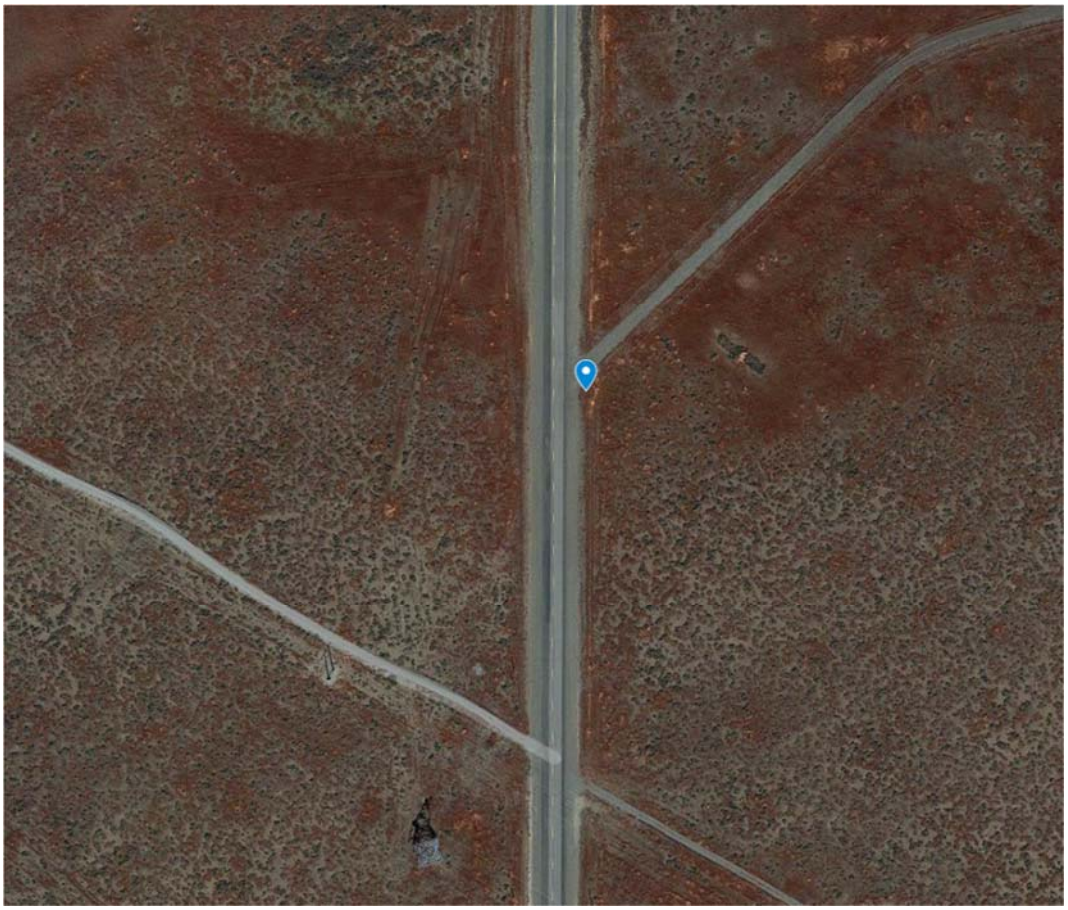

Figure 6-2. Location of the Mobile Laboratory for the Duration of the Monitoring Period.

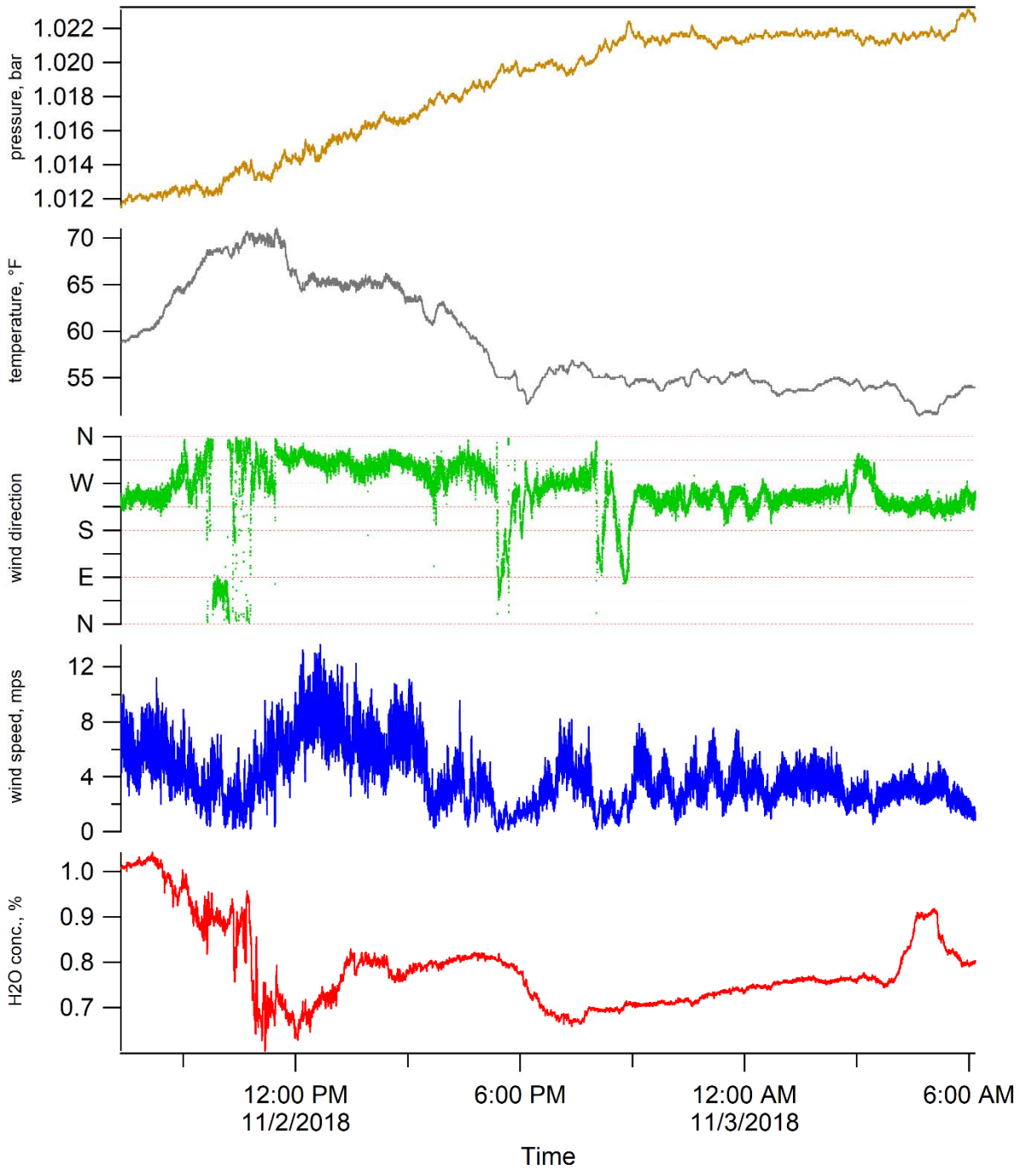

Figure 6-3. Weather Data.

6.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-MS,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were collected as follows.

Table 6-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
1	11/02/18	Thermosorb/N	EL33358	07:28	10:28	180
1	11/02/18	Carbotrap-300	A060215	07:28	13:28	360
1	11/02/18	LpDNPH	181102-A	07:28	10:28	180

Table 6-2 displays the statistical information for the monitoring period of November 2, 2018, to November 3, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 6-2. Statistical Information for the Monitoring Period of November 2, 2018 – November 3, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	Ammonia	25000	2.984	1.030	34.518	6.998	2.593
2	formaldehyde	300	0.338	0.059	17.473	3.848	0.335
3	Methanol	200000	2.367	0.385	16.287	4.552	2.276
4	acetonitrile	20000	0.132	0.021	16.045	0.231	0.133
5	acetaldehyde	25000	1.493	0.440	29.496	12.249	1.640
6	ethylamine	5000	0.010	0.005	56.216	0.038	0.009
7	1,3-butadiene	1000	0.058	0.037	64.038	1.214	0.056
8	propanenitrile	6000	0.022	0.008	34.724	0.118	0.021
9	2-propenal	100	0.063	0.033	52.238	3.396	0.060
10	1-butanol + butenes	20000	0.044	0.015	33.510	0.588	0.042
11	methyl isocyanate	20	0.023	0.009	40.230	0.252	0.022
12	methyl nitrite	100	0.038	0.016	41.909	1.426	0.036
13	furan	1	0.019	0.008	42.353	0.296	0.018
14	butanenitrile	8000	0.006	0.004	68.247	0.056	0.005
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.023	0.011	45.932	N/A*	N/A*
16	butanal	25000	0.060	0.015	24.550	0.282	0.057
17	NDMA**	0.3	0.011	0.011	97.717	0.080	0.008
18	benzene	500	0.073	0.017	22.961	0.829	0.072
19	2,4-pentadienenitrile + pyridine	300, 1000	0.015	0.005	36.178	0.093	0.014
20	2-methylene butanenitrile	300	0.007	0.004	53.452	0.052	0.007
21	2-methylfuran	1	0.017	0.008	47.657	0.358	0.015
22	pentanenitrile	6000	0.005	0.003	67.333	0.042	0.004
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.014	0.008	53.852	0.231	0.013
24	NEMA**	0.3	0.006	0.007	113.873	0.050	0.003
25	2,5-dimethylfuran	1	0.011	0.007	59.574	0.227	0.010
26	hexanenitrile	6000	0.002	0.002	108.692	0.018	0.001
27	2-hexanone (MBK)	5000	0.007	0.004	67.330	0.037	0.006
28	NDEA**	0.1	0.002	0.003	146.806	0.029	0.000
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.010	0.004	41.485	0.032	0.009
30	2,4-dimethylpyridine	500	0.003	0.003	98.154	0.024	0.002
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.007	0.005	70.875	0.085	0.006

Table 6-2. Statistical Information for the Monitoring Period of November 2, 2018 – November 3, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
32	heptanenitrile	6000	0.002	0.002	101.393	0.018	0.001
33	4-methyl-2-hexanone	500	0.004	0.003	76.511	0.026	0.003
34	NMOR**	0.6	0.002	0.003	154.511	0.045	0.000
35	butyl nitrate	2500	0.002	0.002	115.240	0.015	0.001
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.003	0.003	89.332	0.025	0.002
37	6-methyl-2-heptanone	8000	0.004	0.003	80.287	0.025	0.003
38	2-pentylfuran	1	0.009	0.005	53.301	0.039	0.008
39	Biphenyl	200	0.002	0.003	111.113	0.020	0.001
40	2-heptylfuran	1	0.009	0.004	48.047	0.034	0.008
41	1,4-butanediol dinitrate	50	0.004	0.003	74.415	0.022	0.003
42	2-octylfuran	1	0.001	0.002	212.183	0.018	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.001	0.002	288.934	0.019	0.000
44	PCB	1000	0.007	0.003	50.432	0.028	0.006
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.001	0.001	136.814	0.015	0.000
46	furfural acetophenone	1	0.006	0.004	57.337	0.034	0.005

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.720 ppb and the median value was 0.021 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

** Nitrosamine results are suspect due to isobaric interferants causing positive bias that have been encountered during previous background studies [53005-81-RPT-007, *PTR-MS Mobile Laboratory Vapor Monitoring Background Study, (3/18/2018 – 4/20/2018)*, and *Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study*, RJ Lee Group, Inc., 2017].

The following figures display a selection of 16 COPC signals, overlaid with the same signal smoothed using a 1-minute moving average (in cases where a moving average assists with data visualization), and CO_2, for the monitoring period November 2, 2018, to November 3, 2018. If within range of the plot's left axis, a green horizontal line representing 50% of the COPC's OEL and a blue horizontal line representing the COPC's OEL are shown.

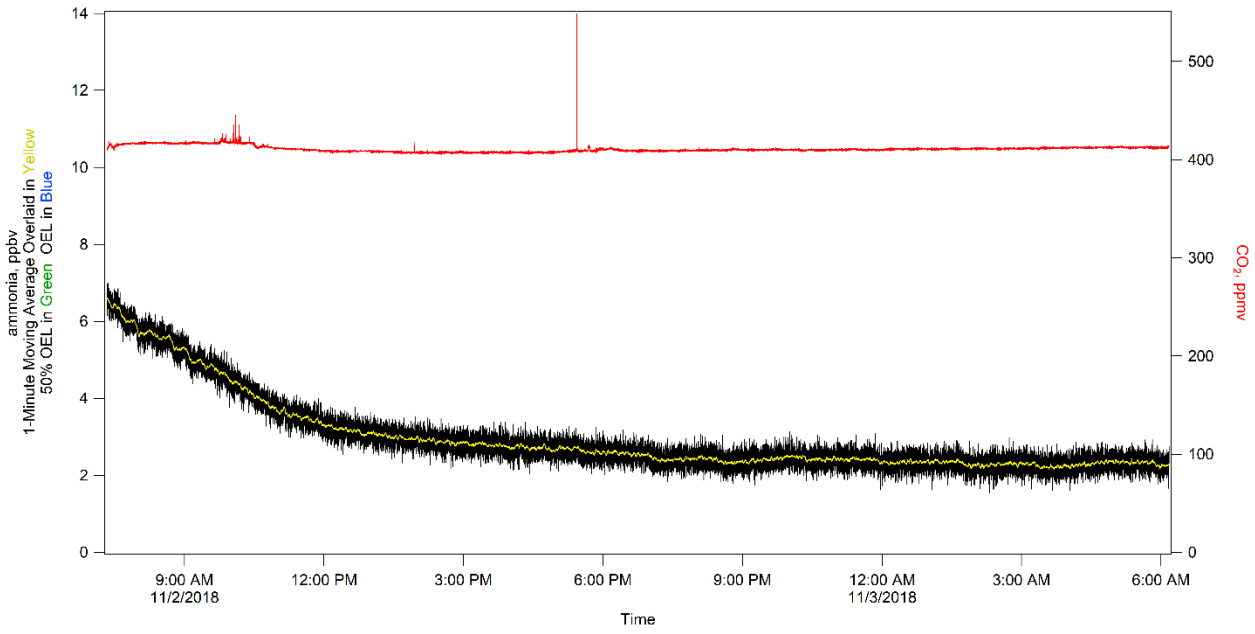

Figure 6-4. Ammonia.

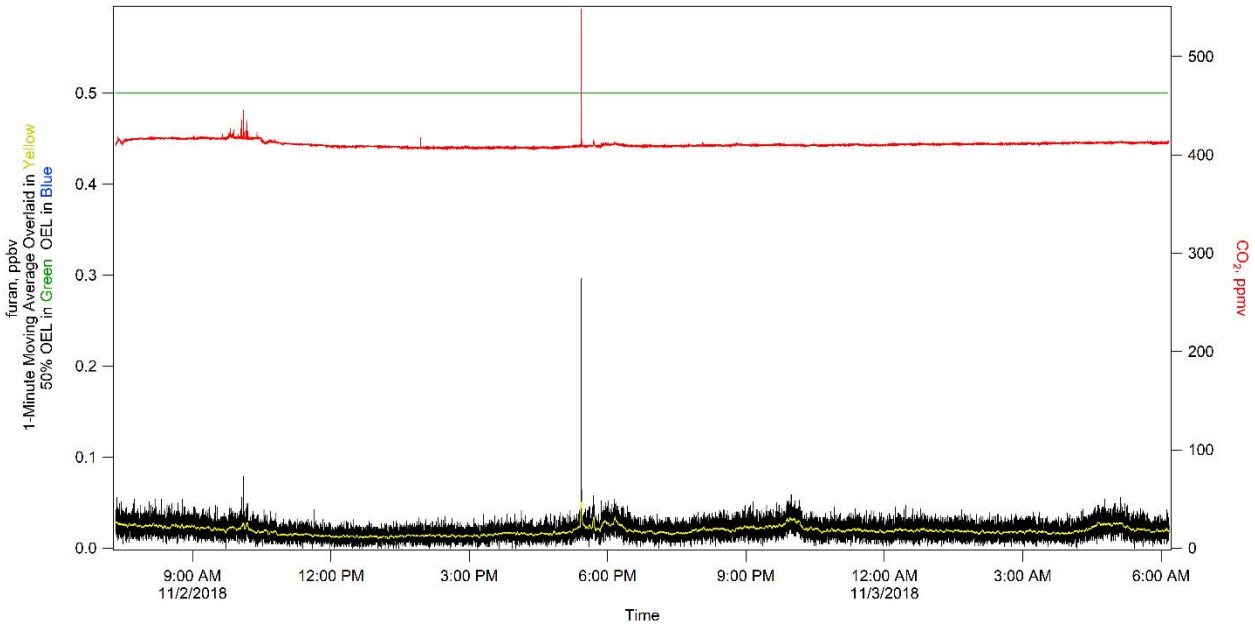

Figure 6-5. Furan.

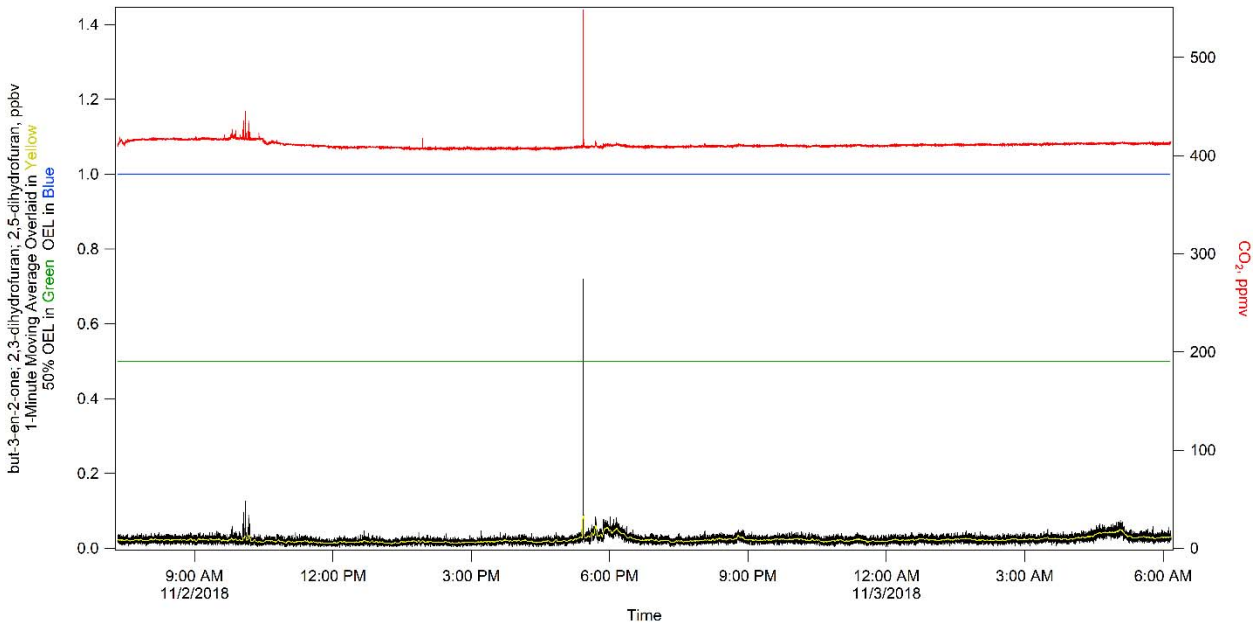

Figure 6-6. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

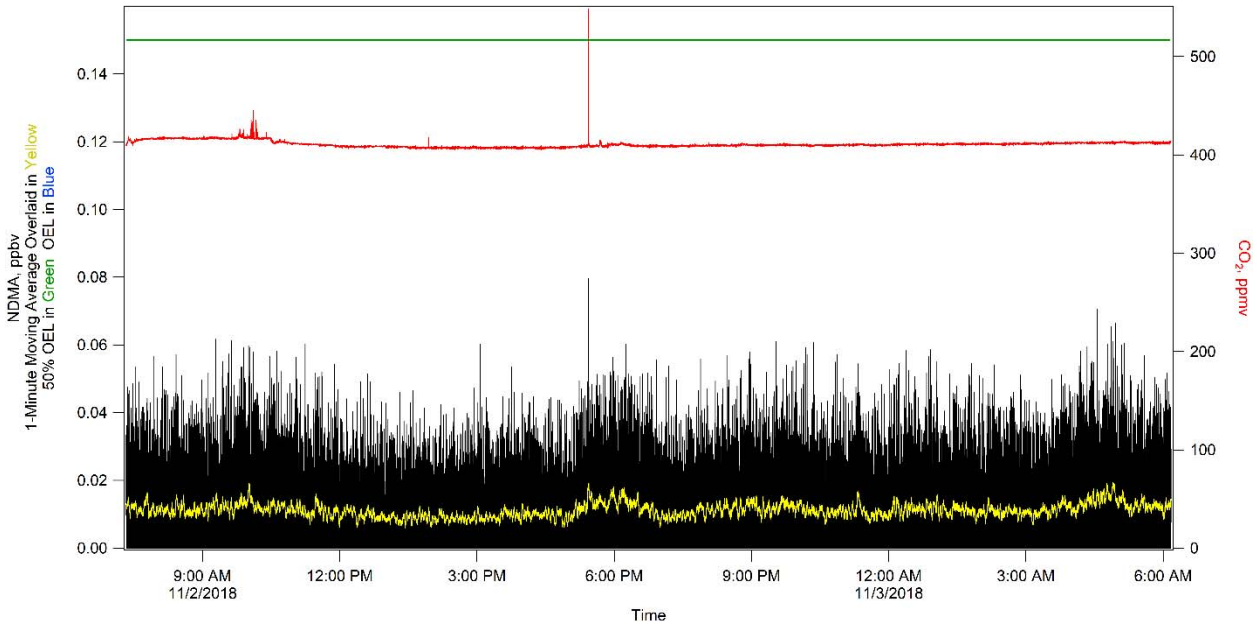

Figure 6-7. N-nitrosodimethylamine (NDMA).

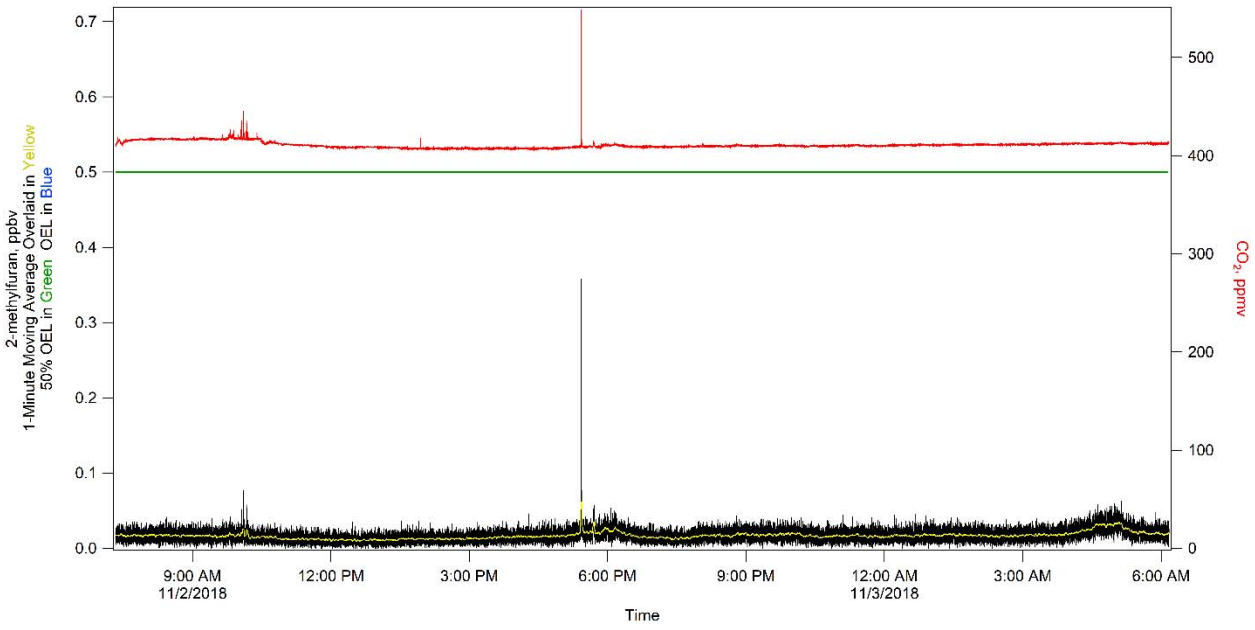

Figure 6-8. 2-methylfuran.

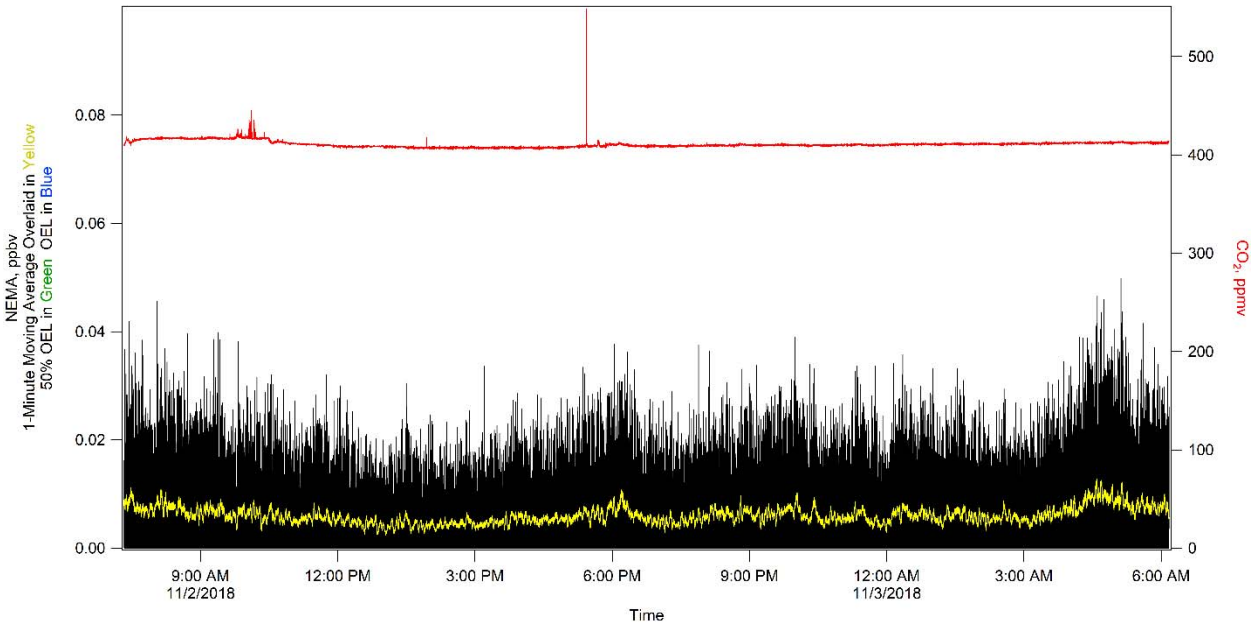

Figure 6-9. N-nitrosomethylethylamine (NEMA).

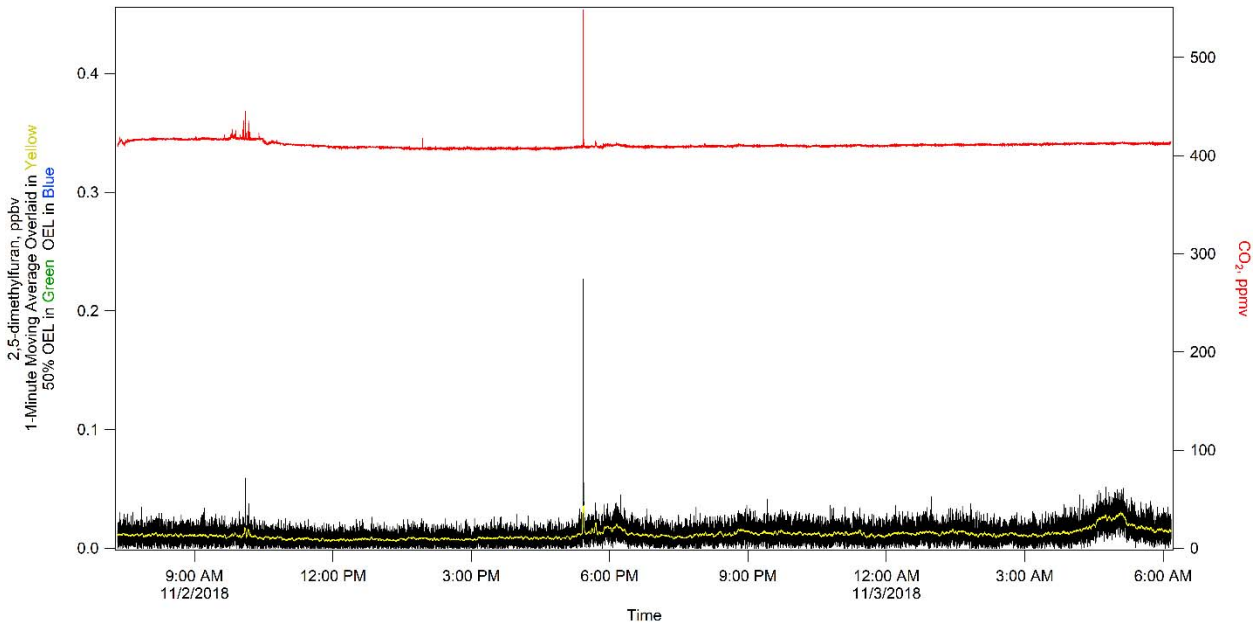

Figure 6-10. 2,5-dimethylfuran.

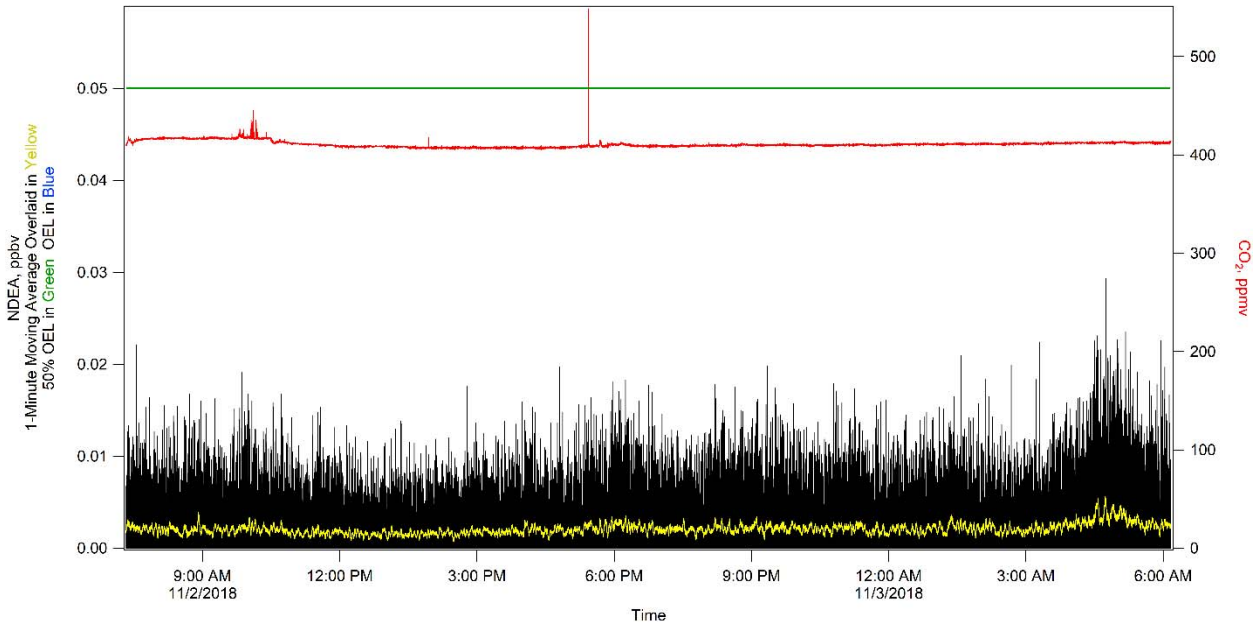

Figure 6-11. N-nitrosodiethylamine (NDEA).

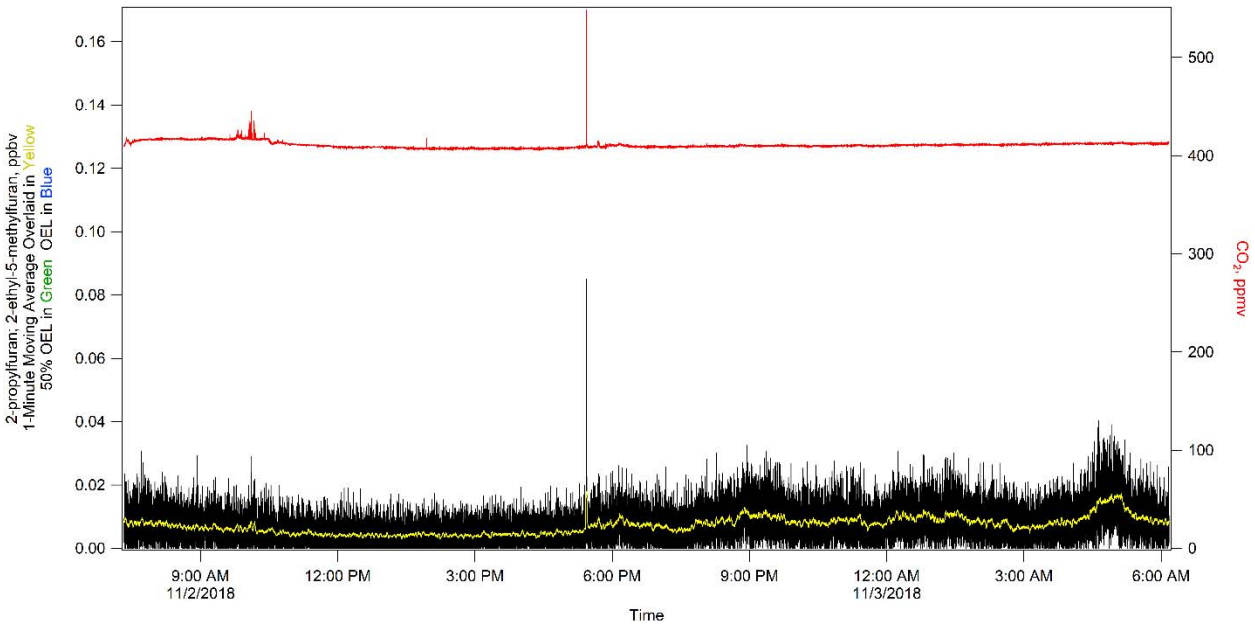

Figure 6-12. 2-propylfuran + 2-ethyl-5-methylfuran.

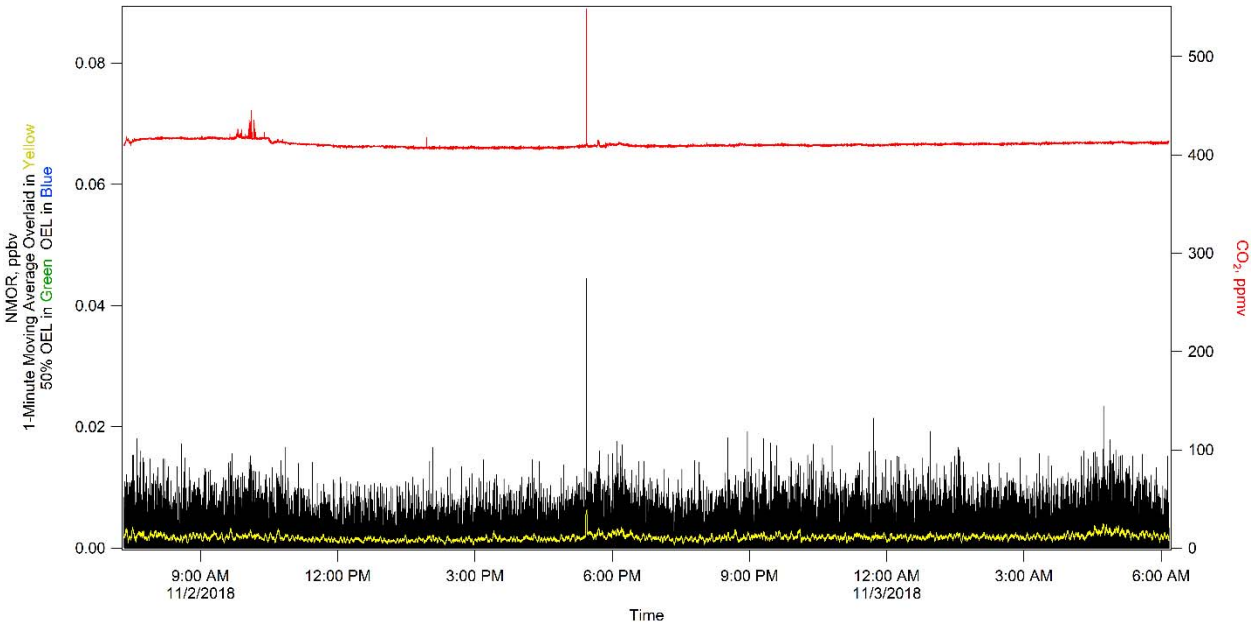

Figure 6-13. N-nitrosomorpholine (NMOR).

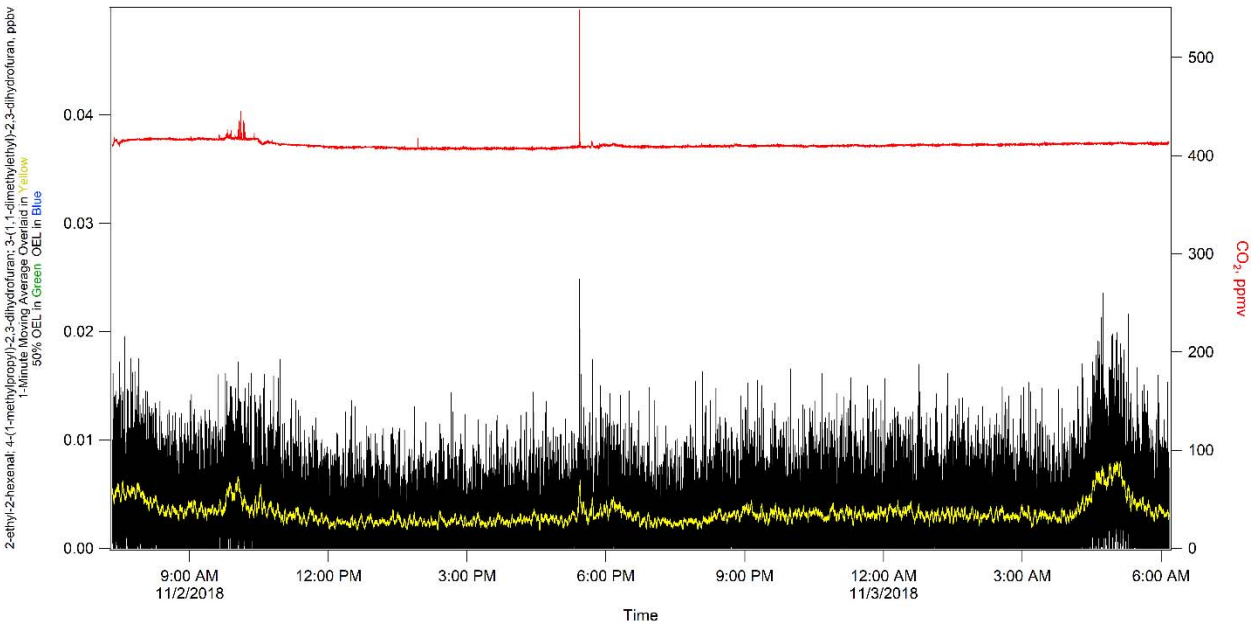

Figure 6-14. 2-ethyl-2-hexenal;4-(1-methylpropyl);2,3-dihydrofuran; 3-1(1,-1-dimethylethyl)-2,3-dihydrofuran.

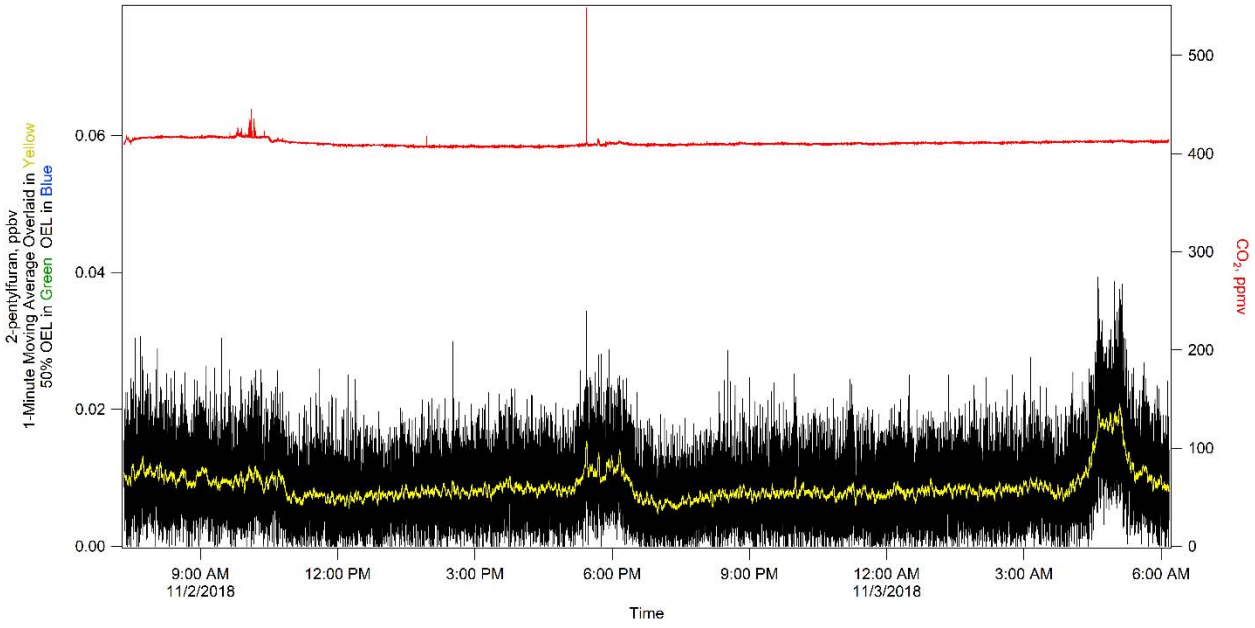

Figure 6-15. 2-pentylfuran.

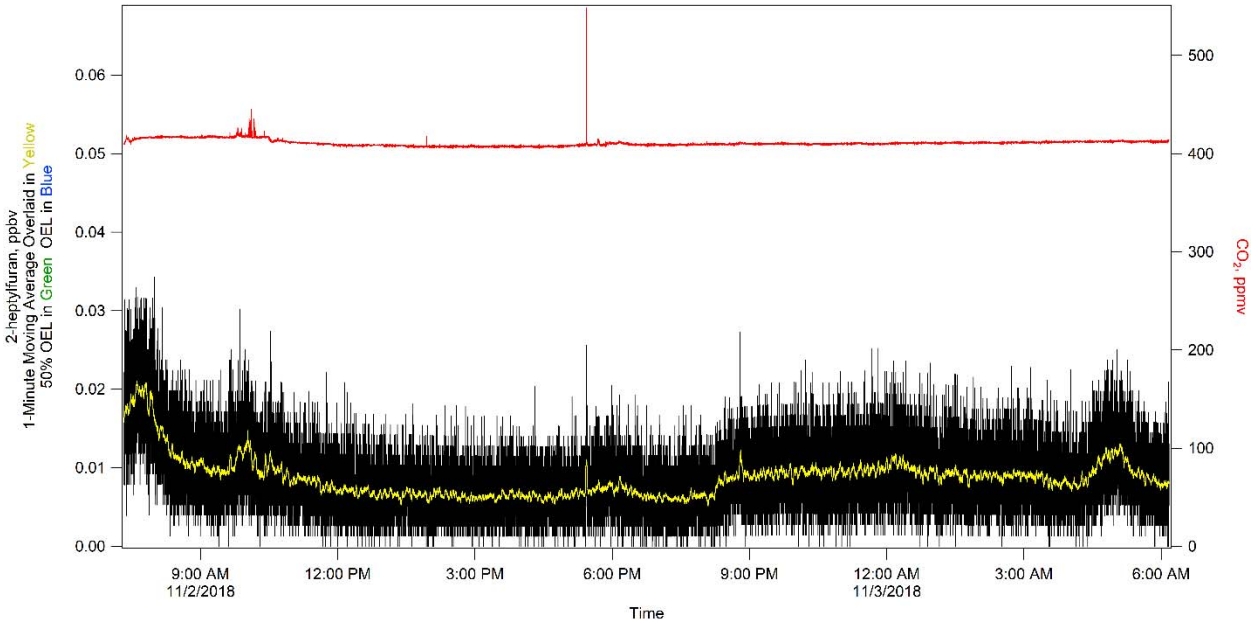

Figure 6-16. 2-heptylfuran.

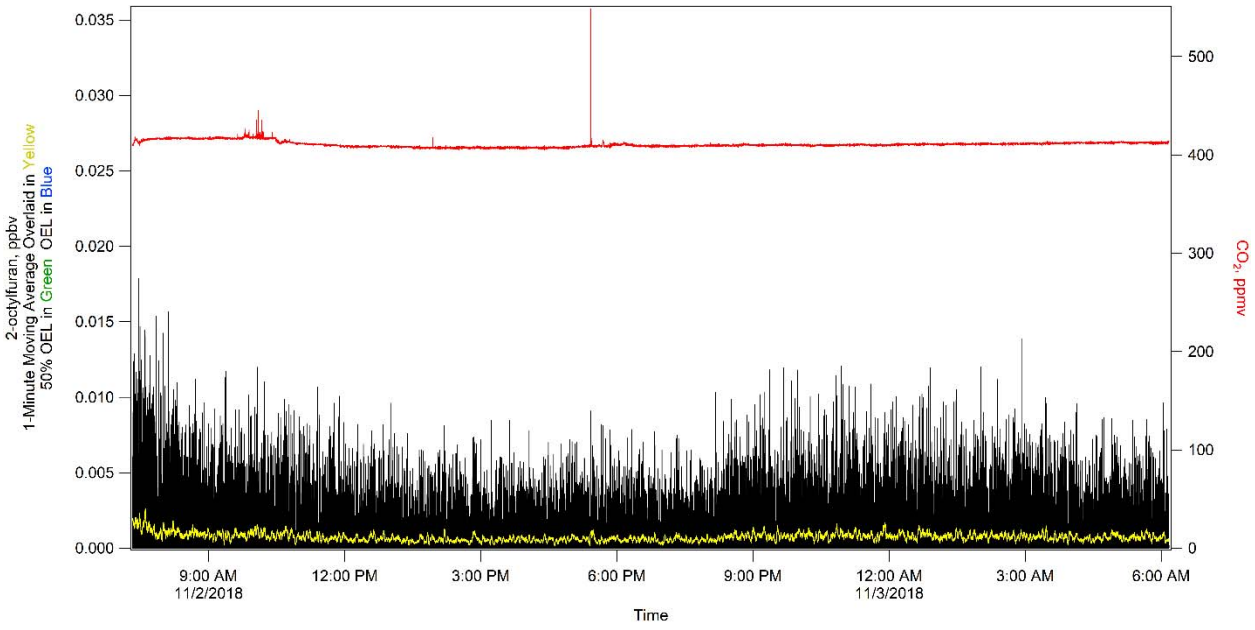

Figure 6-17. 2-octylfuran.

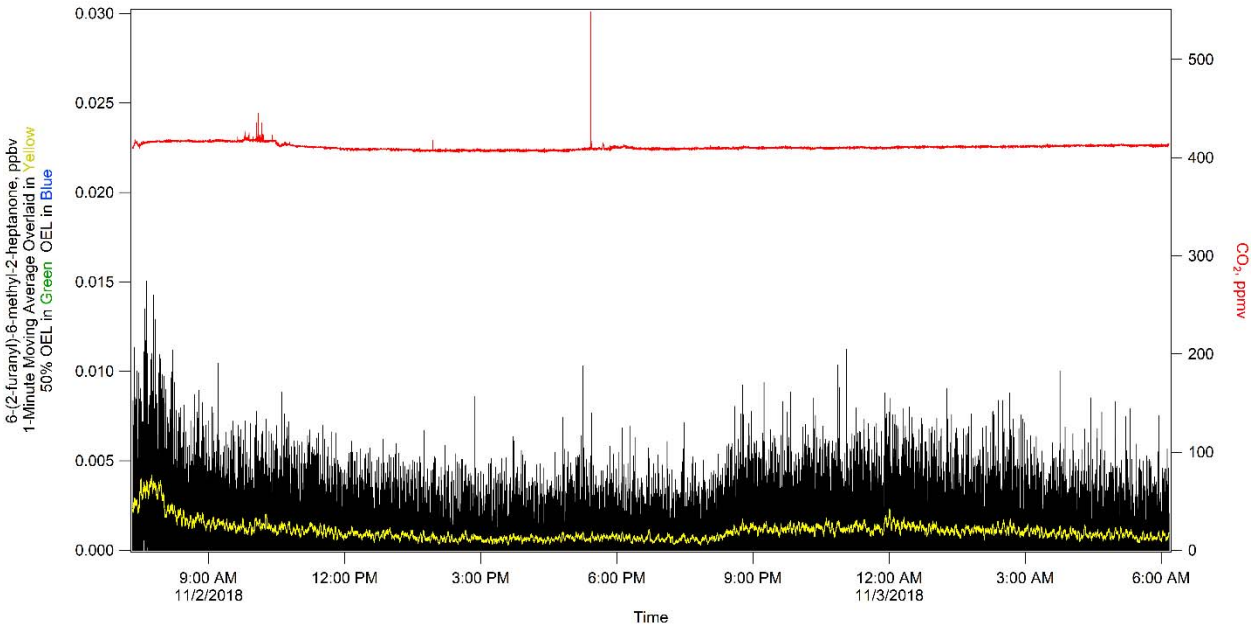

Figure 6-18. 6-(2-furanyl)-6-methyl-2-heptanone.

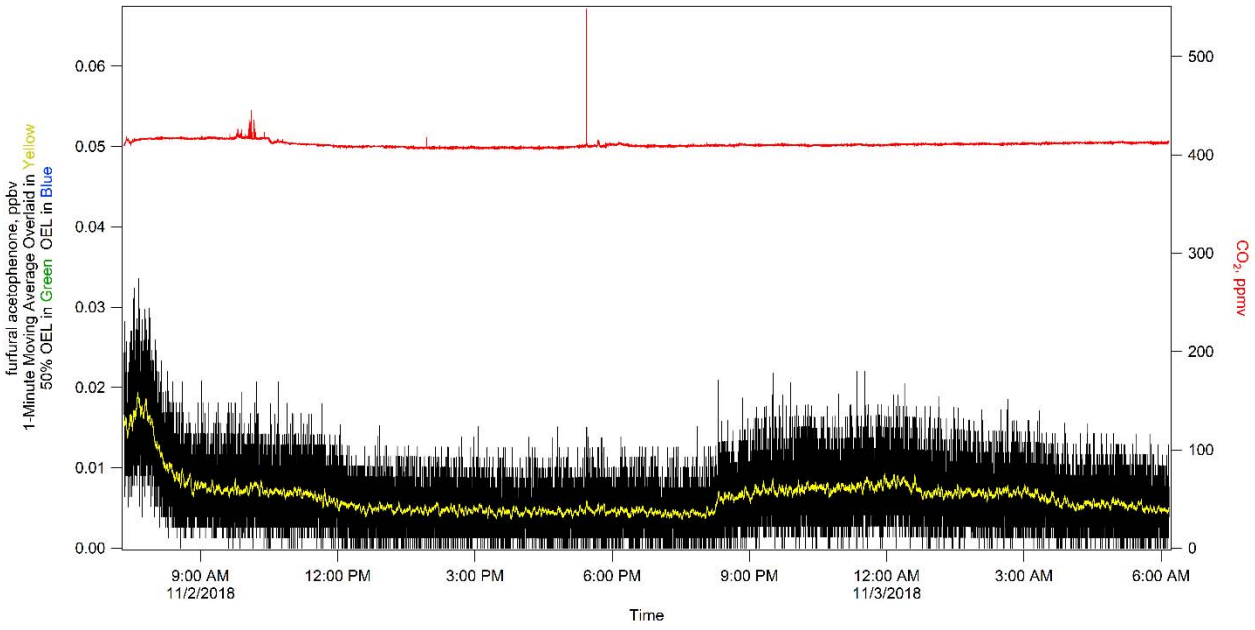

Figure 6-19. Furfural Acetophenone.

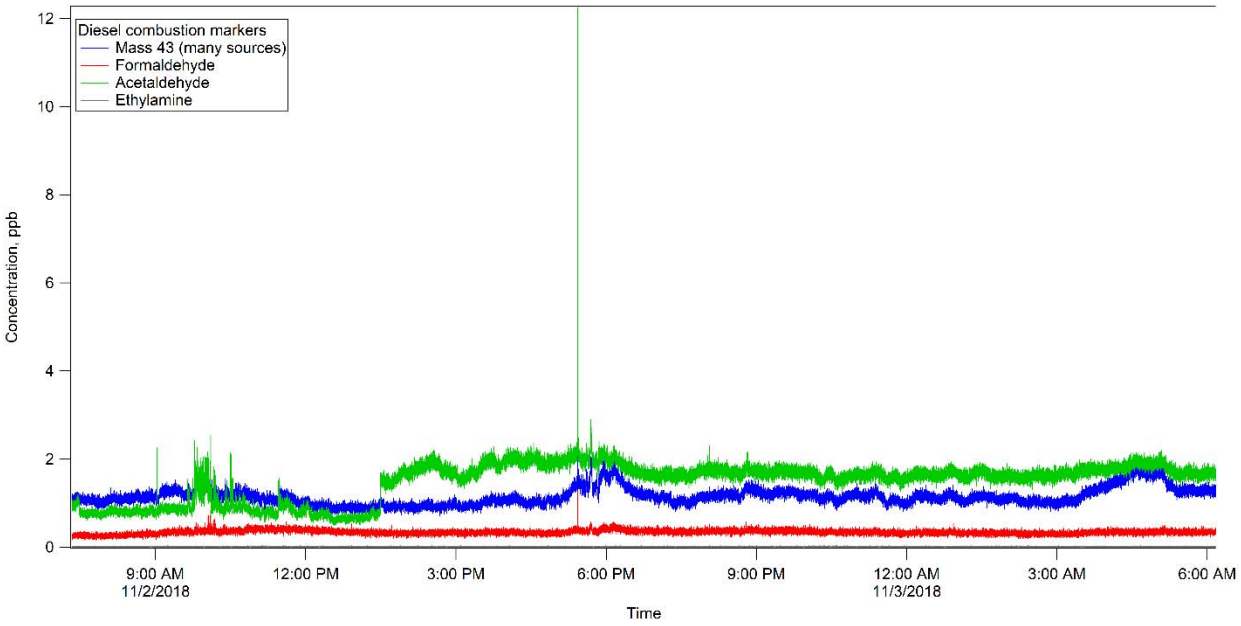

Figure 6-20. Diesel Combustion Markers.

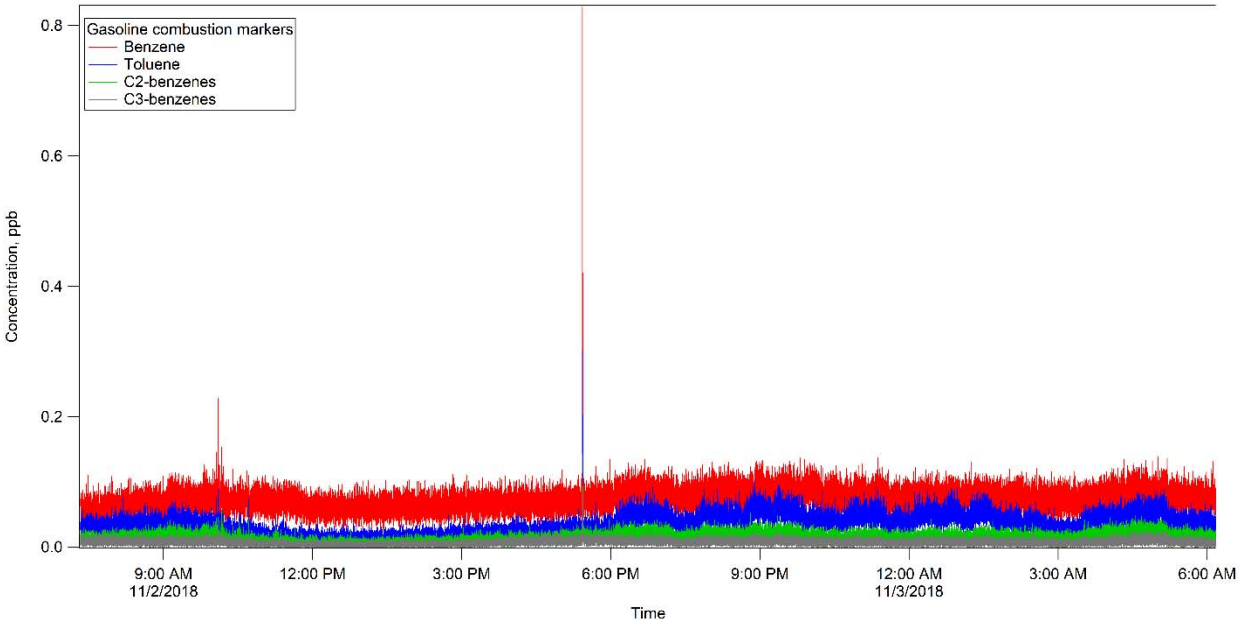

Figure 6-21. Gasoline Combustion Markers.

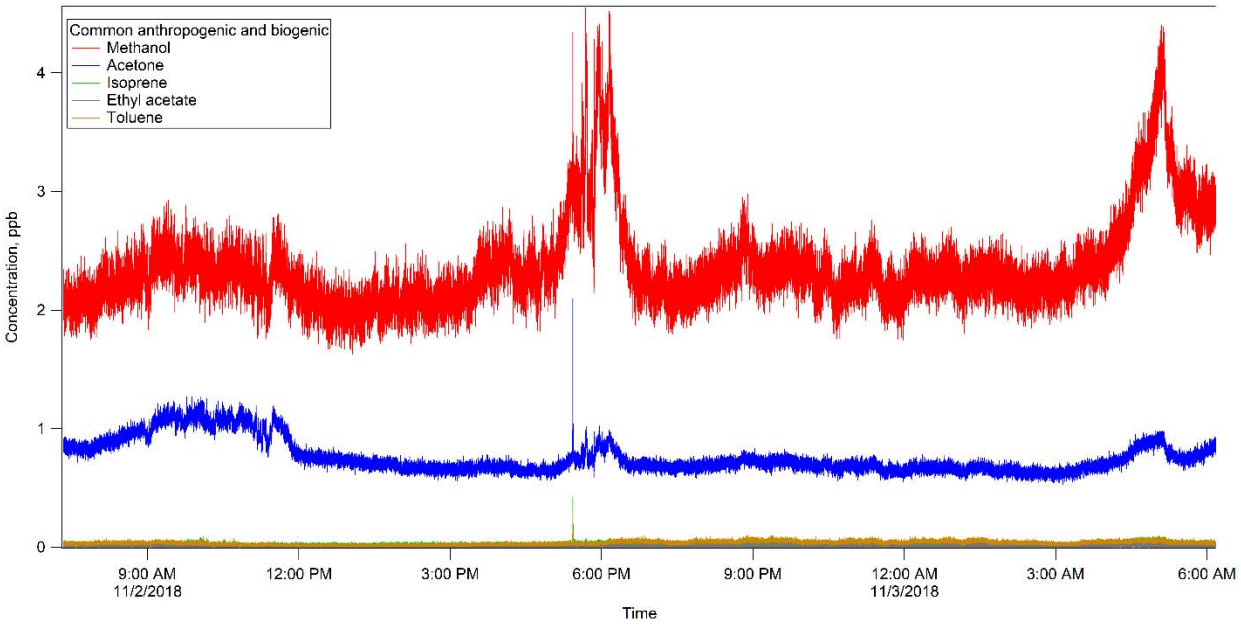

Figure 6-22. Plant and Human Markers.

7.0 NOVEMBER 3, 2018 – NOVEMBER 4, 2018 – STUDY SITE #2

7.1 Quality Assessment

Data from November 3, 2018, were assessed using Procedure 17124-DOE-HS-102. A Data Exchange Checklist was completed. The data were accepted by TerraGraphics with the following comments. Report No. 66409-RPT-004 was adequately documented and all checks passed the acceptance limits.

7.2 Summary

The ML personnel performed background sampling using the ML from November 3, 2018, to November 4, 2018, at Site 2. Site 2 is located near the southern end of the 200W Tank Farms. The ML arrived at Site 2 at 07:05 on November 3, 2018. The initial QA/QC zero-air/sensitivity checks were performed on the LI-COR CO_2 monitor, Picarro NH_3 analyzer, and the PTR-MS beginning at 06:29, prior to Site 2 arrival. Collection of confirmatory samples began at 07:29. The ML staff departed the monitoring site at 10:35 and checked out with the CSO.

The ML staff returned to Site 2 at 07:28 on November 4, 2018. At 07:33, confirmatory sorbent samples were disconnected from the sampling station. The ML moved to Site 3 by 08:12.

Figure 7-1. Mobile Laboratory Site #2 for the Duration of the Monitoring Period.

Figure 7-2. The Location of the Mobile Laboratory for the Duration of the Monitoring Period.

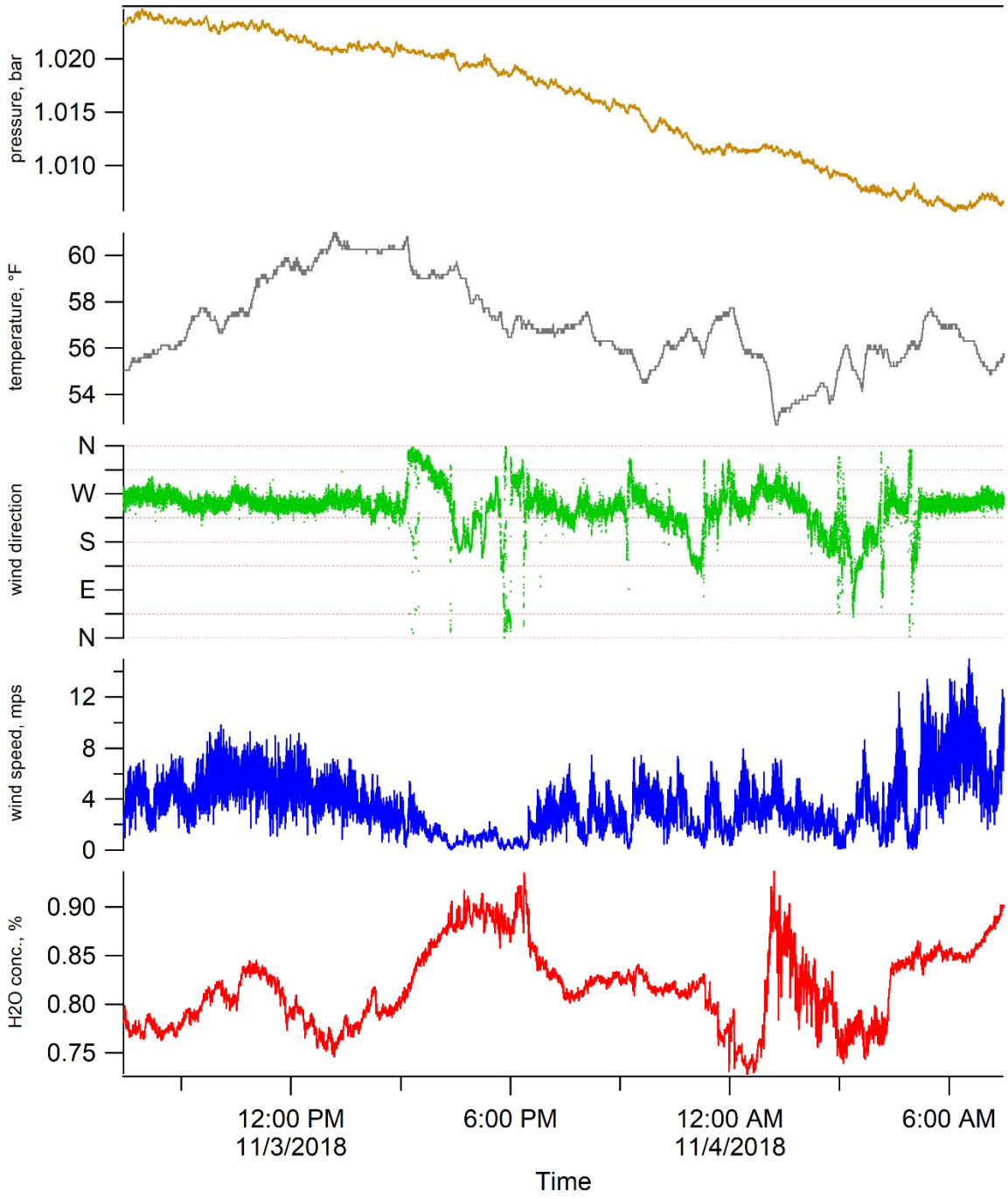

Figure 7-3. Weather Data.

7.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-MS,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were collected as follows.

Table 7-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
2	11/03/18	Thermosorb/N	EL33357	07:29	10:29	180
2	11/03/18	Carbotrap-300	A060160	07:29	13:29	360
2	11/03/18	LpDNPH	181103-A	07:29	10:29	180

Table 6-2 displays the statistical information for the monitoring period of November 3, 2018, to November 4, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 7-2. Statistical Information for the Monitoring Period of November 3, 2018 – November 4, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	Ammonia	25000	7.436	1.963	26.394	19.650	7.175
2	formaldehyde	300	0.358	0.076	21.178	2.864	0.353
3	Methanol	200000	2.644	0.591	22.341	5.708	2.536
4	acetonitrile	20000	0.145	0.052	35.825	6.513	0.148
5	acetaldehyde	25000	1.746	0.559	32.027	9.728	1.856
6	ethylamine	5000	0.010	0.005	55.651	0.038	0.008
7	1,3-butadiene	1000	0.067	0.042	62.217	0.994	0.064
8	propanenitrile	6000	0.024	0.008	33.847	0.114	0.023
9	2-propenal	100	0.072	0.052	72.257	2.479	0.065
10	1-butanol + butenes	20000	0.053	0.017	32.648	0.514	0.051
11	methyl isocyanate	20	0.024	0.010	40.598	0.167	0.023
12	methyl nitrite	100	0.042	0.025	59.114	1.013	0.039
13	furan	1	0.026	0.010	38.219	0.246	0.024
14	butanenitrile	8000	0.007	0.004	65.473	0.042	0.006
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.021	0.014	68.144	N/A*	N/A*
16	butanal	25000	0.078	0.016	20.914	0.226	0.077
17	NDMA**	0.3	0.014	0.013	92.755	0.088	0.011
18	benzene	500	0.086	0.020	22.802	0.571	0.084
19	2,4-pentadienenitrile + pyridine	300, 1000	0.017	0.006	34.574	0.073	0.016
20	2-methylene butanenitrile	300	0.009	0.005	53.038	0.079	0.008
21	2-methylfuran	1	0.020	0.010	50.858	0.282	0.018
22	pentanenitrile	6000	0.005	0.003	65.900	0.028	0.004
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.015	0.008	52.909	0.222	0.014
24	NEMA**	0.3	0.007	0.009	114.940	0.076	0.004
25	2,5-dimethylfuran	1	0.012	0.007	63.438	0.176	0.010
26	hexanenitrile	6000	0.002	0.002	105.264	0.020	0.001
27	2-hexanone (MBK)	5000	0.006	0.004	65.909	0.039	0.005
28	NDEA**	0.1	0.002	0.003	145.294	0.028	0.000
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.010	0.004	39.841	0.031	0.010
30	2,4-dimethylpyridine	500	0.003	0.003	94.288	0.026	0.002
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.007	0.005	71.760	0.093	0.006

Table 7-2. Statistical Information for the Monitoring Period of November 3, 2018 – November 4, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
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34	NMOR**	0.6	0.002	0.003	151.740	0.051	0.000
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36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.003	0.003	88.412	0.028	0.002
37	6-methyl-2-heptanone	8000	0.003	0.003	77.925	0.018	0.003
38	2-pentylfuran	1	0.011	0.006	49.888	0.045	0.010
39	Biphenyl	200	0.002	0.003	111.289	0.016	0.001
40	2-heptylfuran	1	0.008	0.004	46.558	0.028	0.007
41	1,4-butanediol dinitrate	50	0.003	0.002	79.345	0.019	0.002
42	2-octylfuran	1	0.001	0.001	212.257	0.014	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.001	0.002	293.717	0.018	0.000
44	PCB	1000	0.006	0.003	55.649	0.023	0.005
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.001	0.001	144.022	0.012	0.000
46	furfural acetophenone	1	0.005	0.003	55.537	0.021	0.004

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.499 ppb and the median value was 0.018 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

** Nitrosamine results are suspect due to isobaric interferants causing positive bias that have been encountered during previous background studies [53005-81-RPT-007, *PTR-MS Mobile Laboratory Vapor Monitoring Background Study, (3/18/2018 – 4/20/2018)*, and *Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study*, RJ Lee Group, Inc., 2017].

The following figures display a selection of 16 COPC signals, overlaid with the same signal smoothed using a 1-minute moving average (in cases where a moving average assists with data visualization), and CO_2, for the monitoring period November 3, 2018, to November 4, 2018. If within range of the plot's left axis, a green horizontal line representing 50% of the COPC's OEL and a blue horizontal line representing the COPC's OEL are shown.

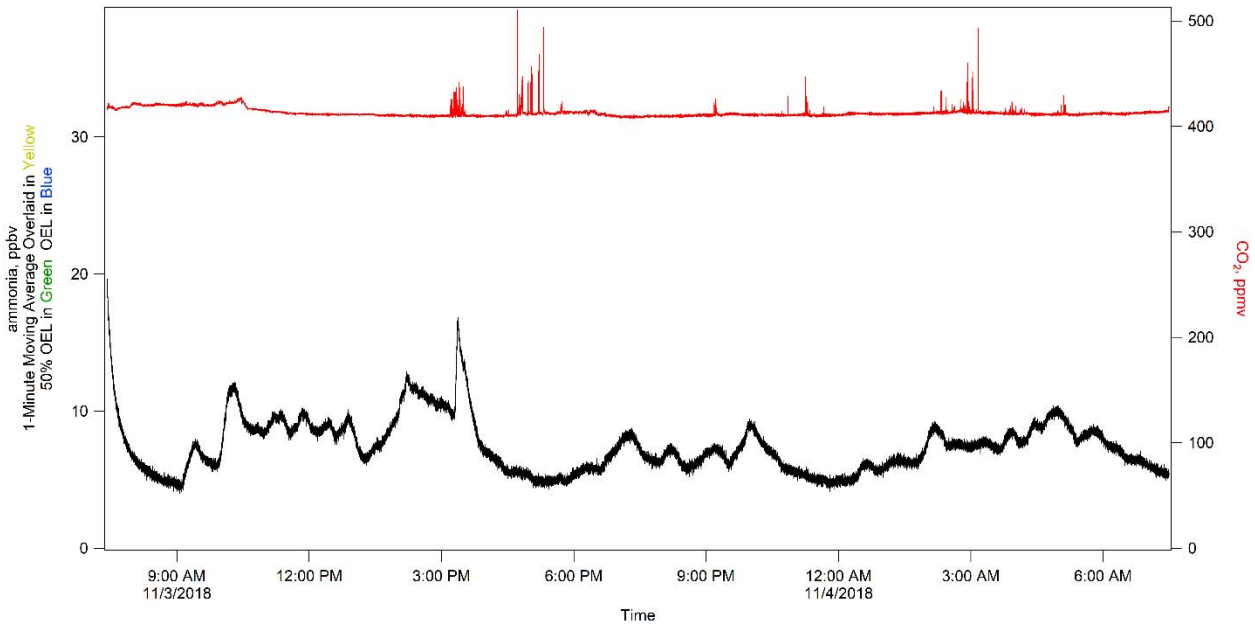

Figure 7-4. Ammonia.

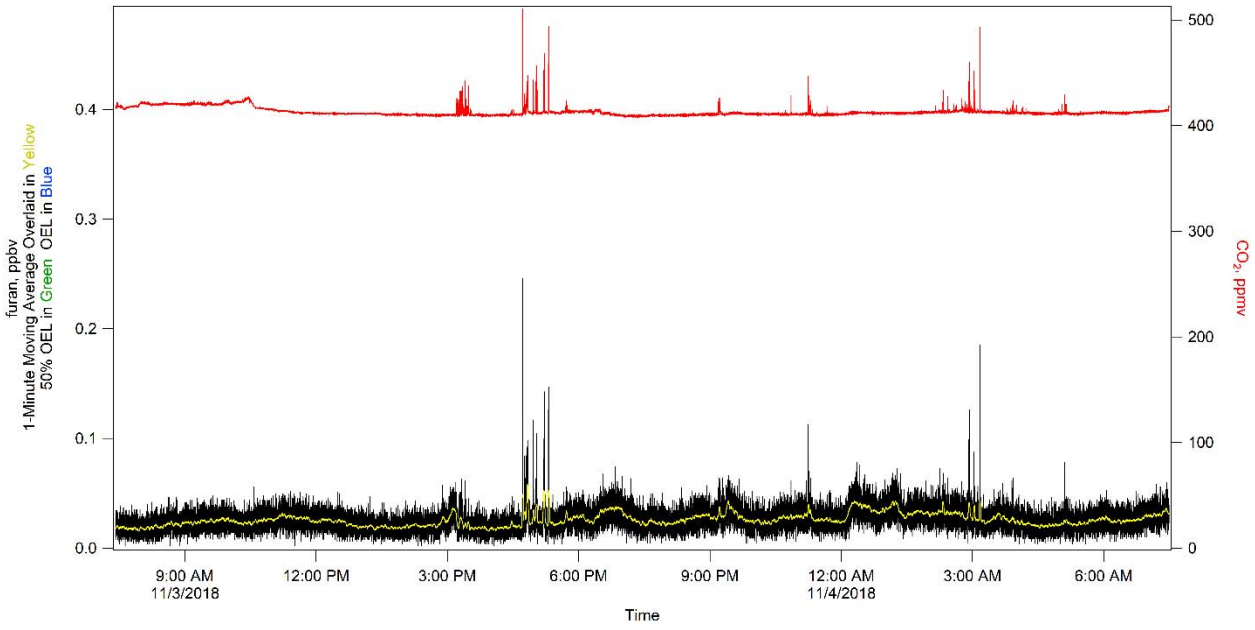

Figure 7-5. Furan.

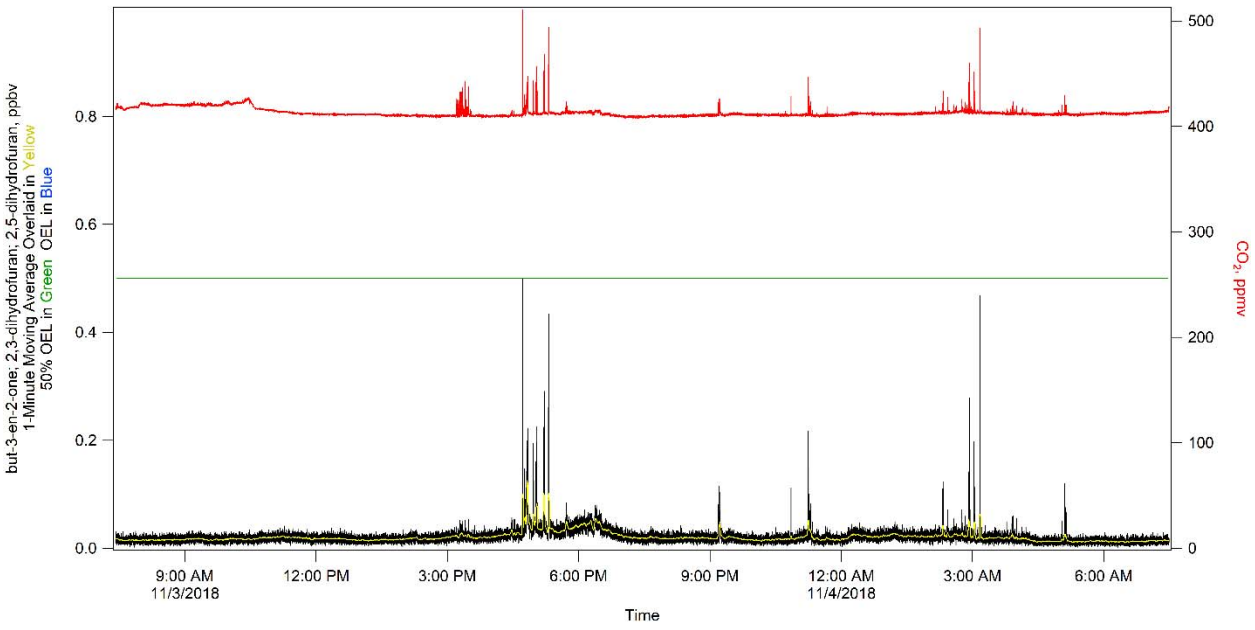

Figure 7-6. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

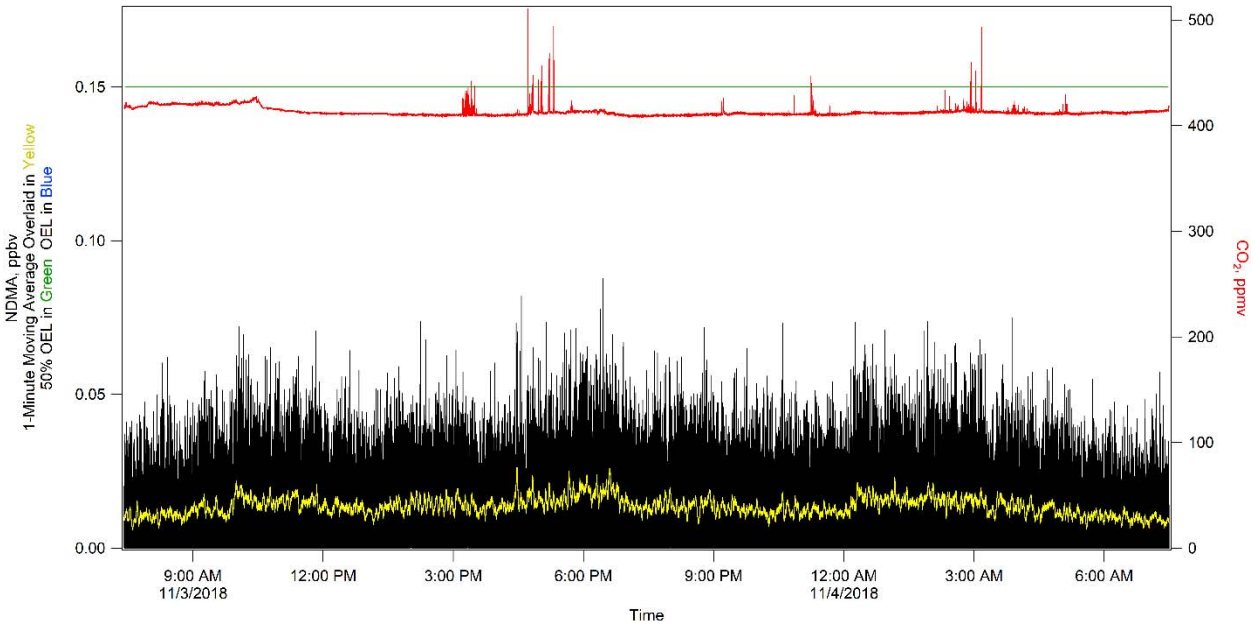

Figure 7-7. N-nitrosodimethylamine (NDMA).

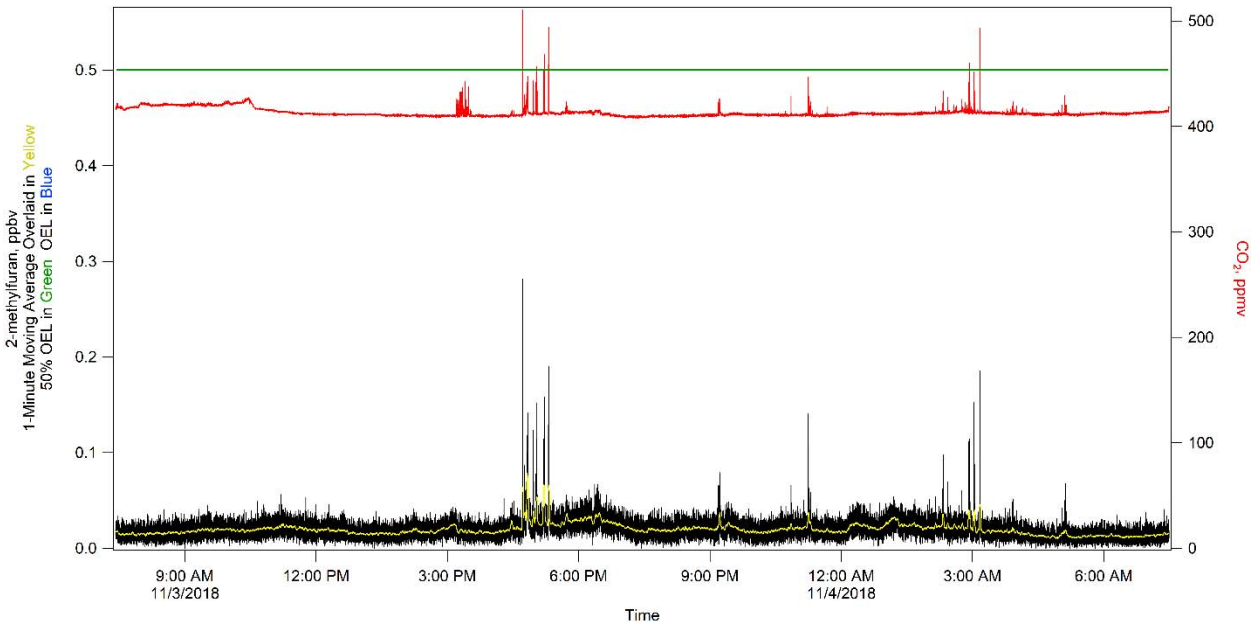

Figure 7-8. 2-methylfuran.

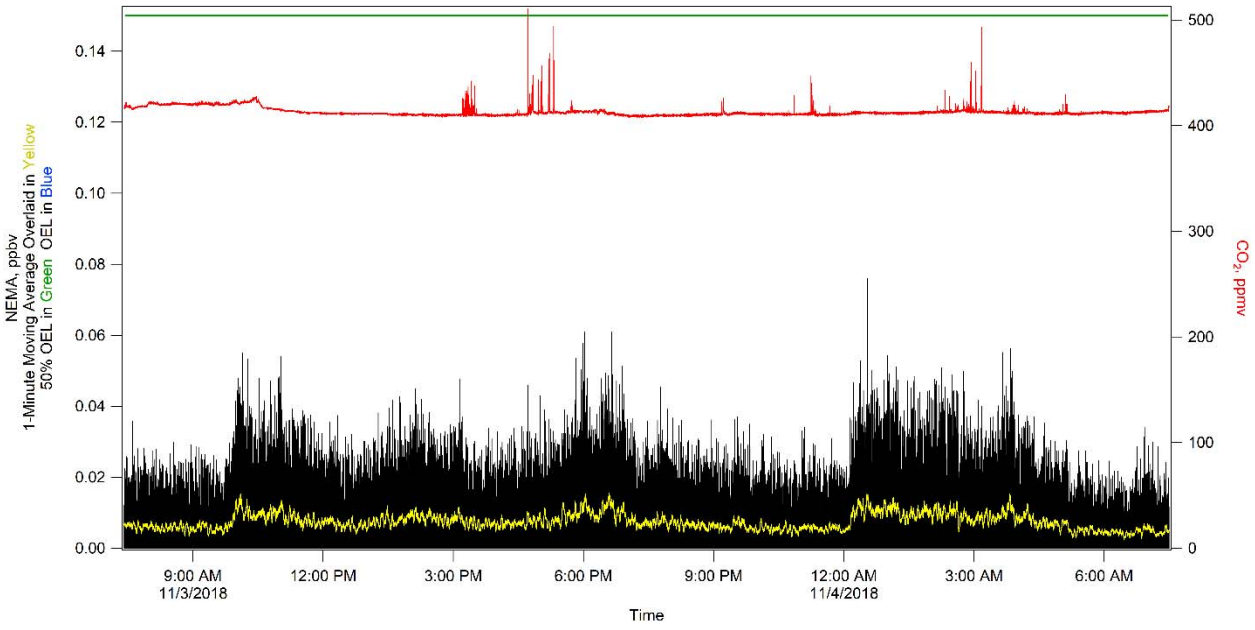

Figure 7-9. N-nitrosomethylethylamine (NEMA).

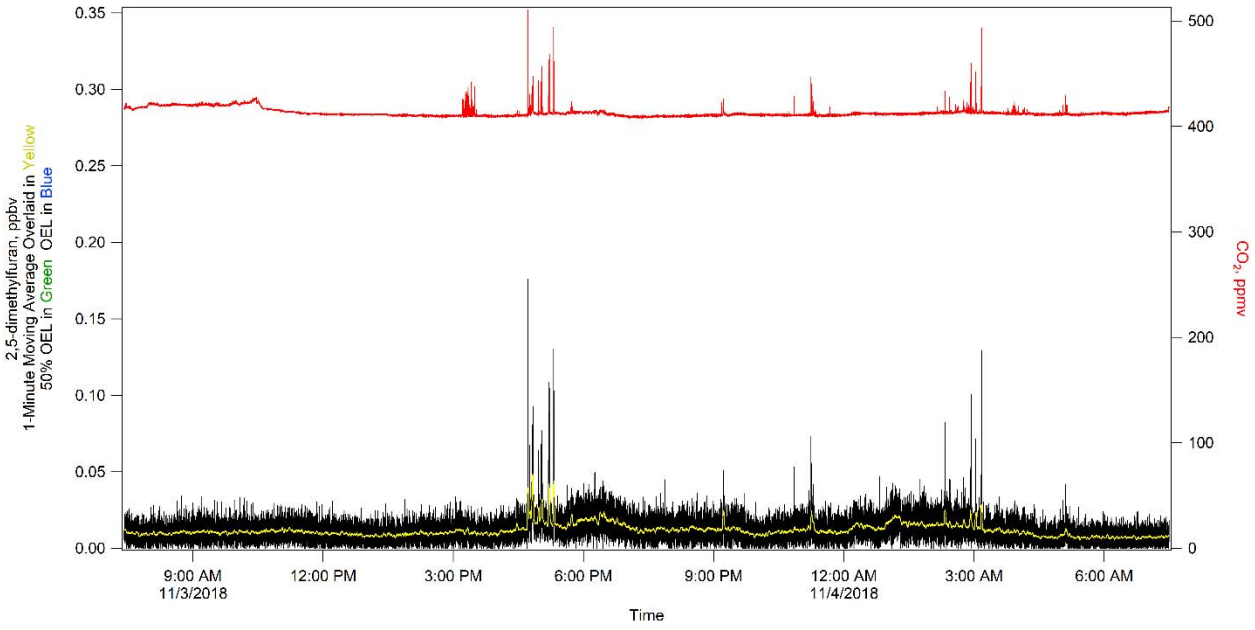

Figure 7-10. 2,5-dimethylfuran.

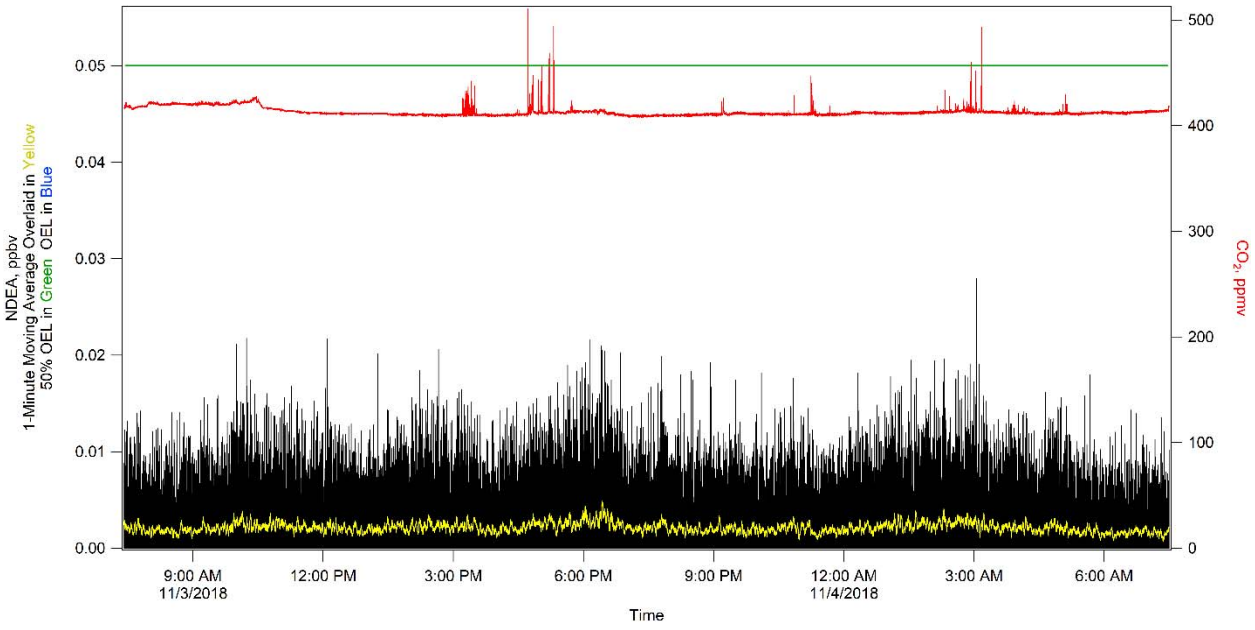

Figure 7-11. N-nitrosodiethylamine (NDEA).

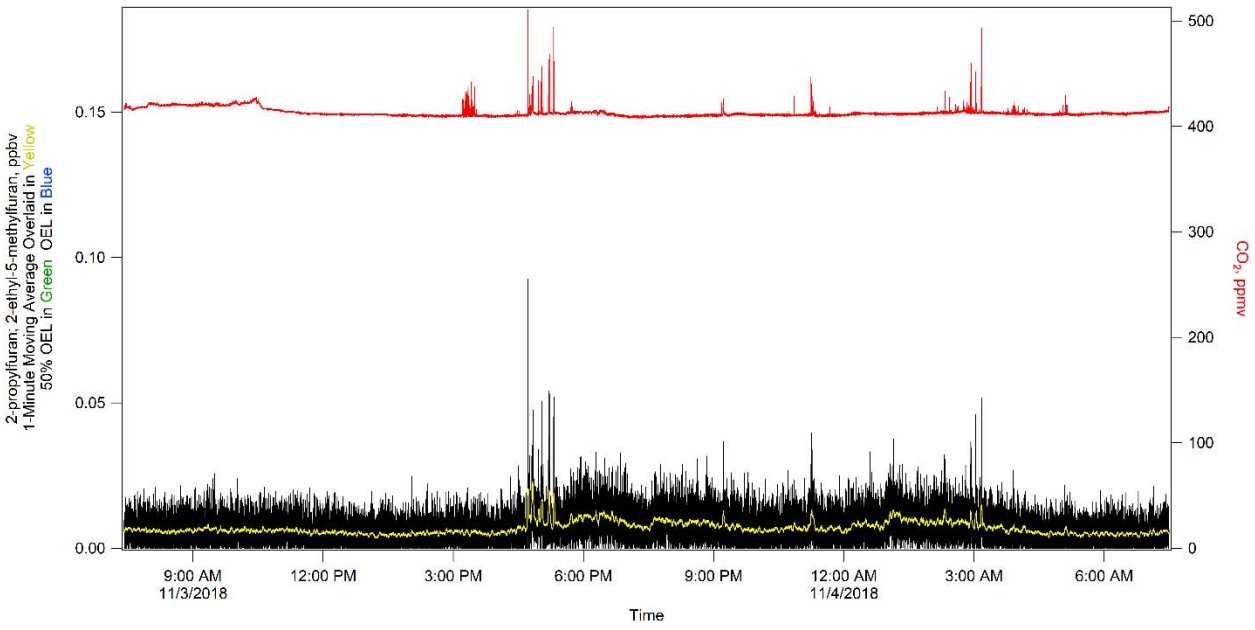

Figure 7-12. 2-propylfuran + 2-ethyl-5-methylfuran.

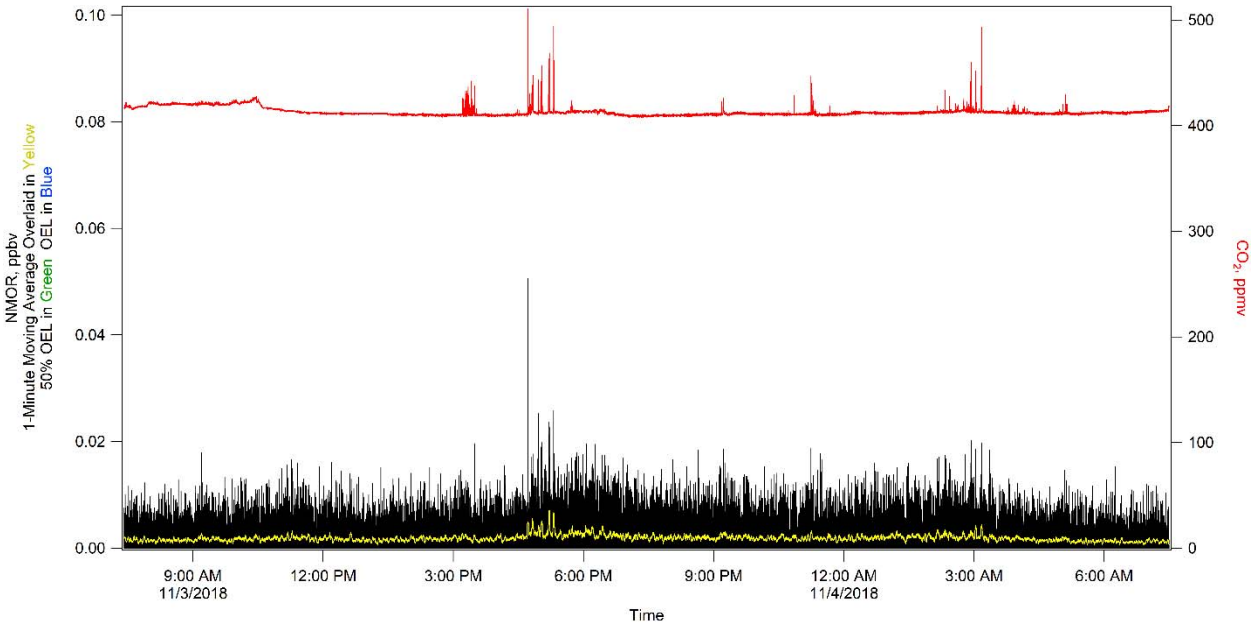

Figure 7-13. N-nitrosomorpholine (NMOR).

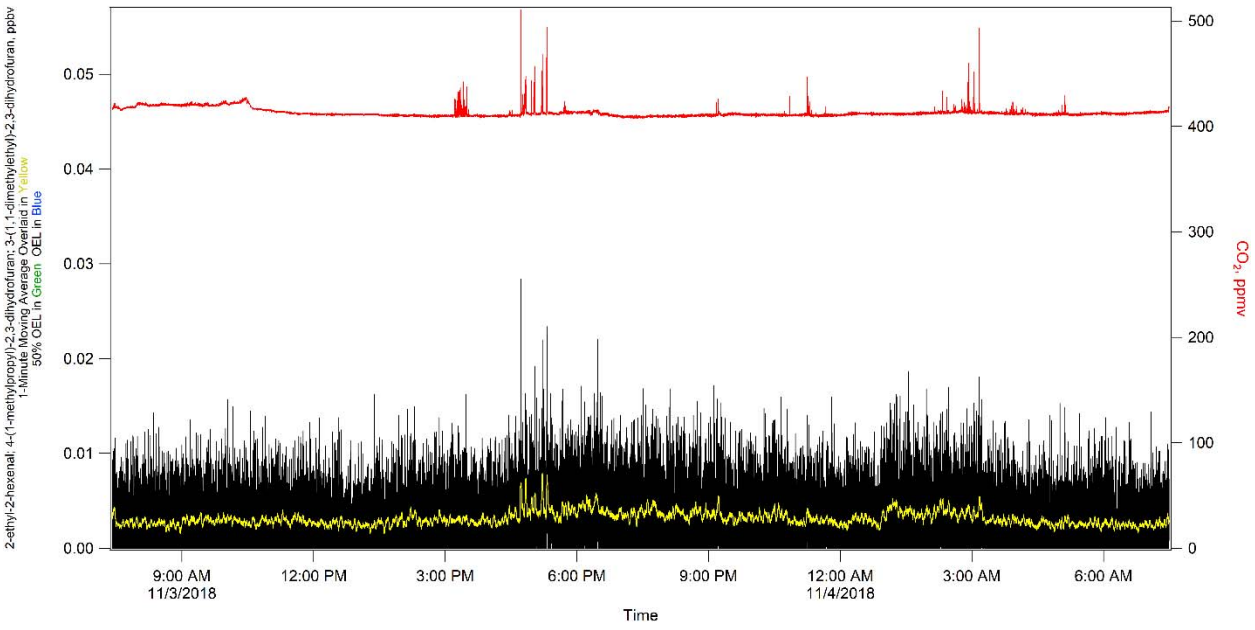

Figure 7-14. 2-ethyl-2-hexenal;4-(1-methylpropyl);2,3-dihydrofuran; 3-1(1,-1-dimethylethyl)-2,3-dihydrofuran.

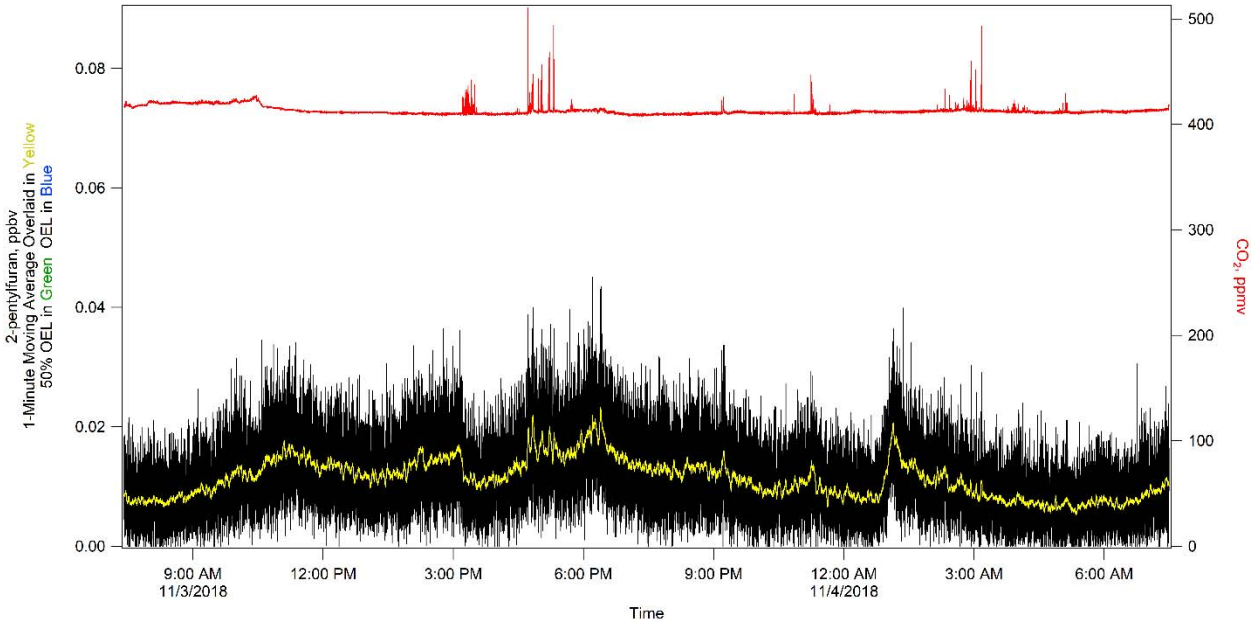

Figure 7-15. 2-pentylfuran.

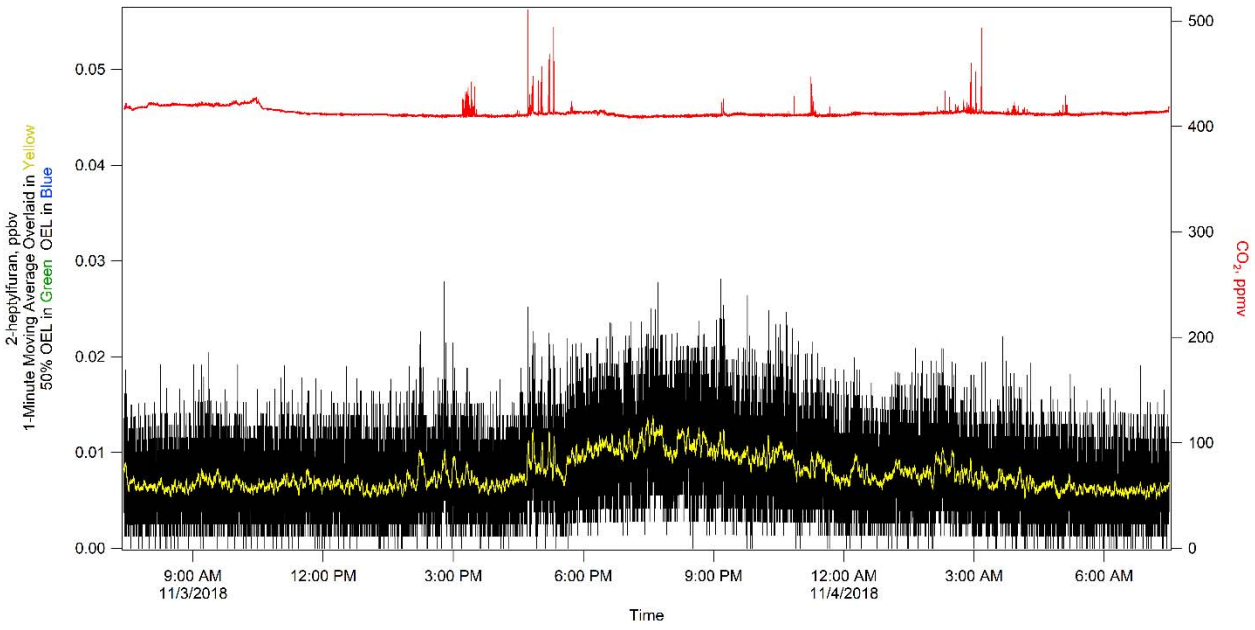

Figure 7-16. 2-heptylfuran.

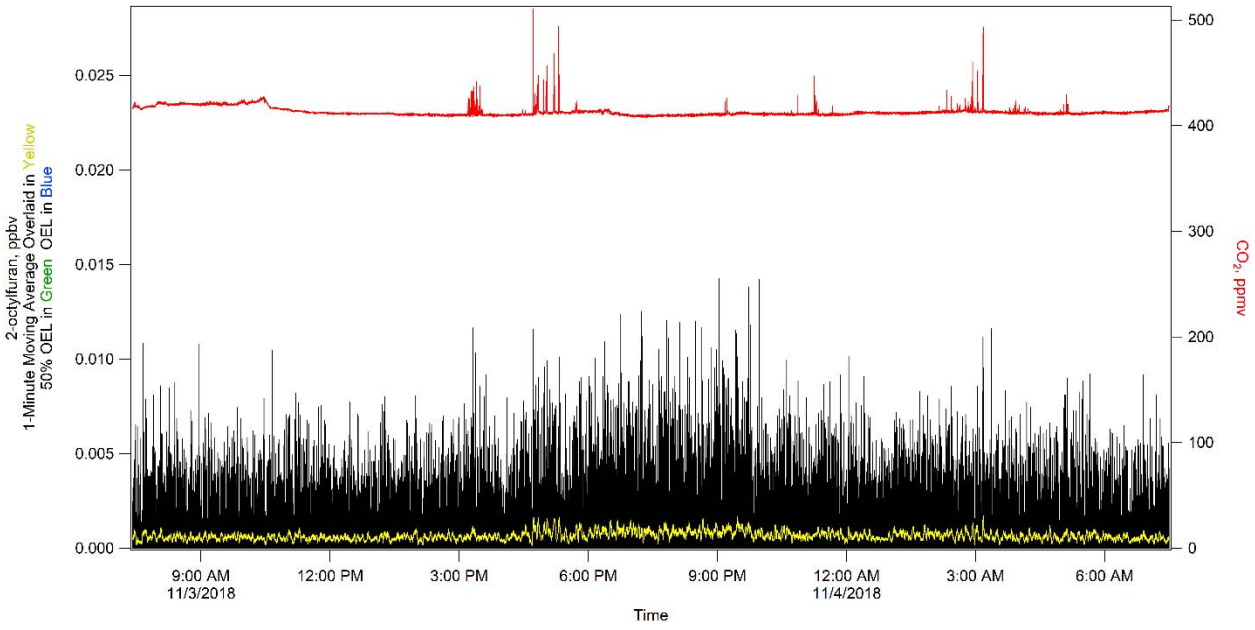

Figure 7-17. 2-octylfuran.

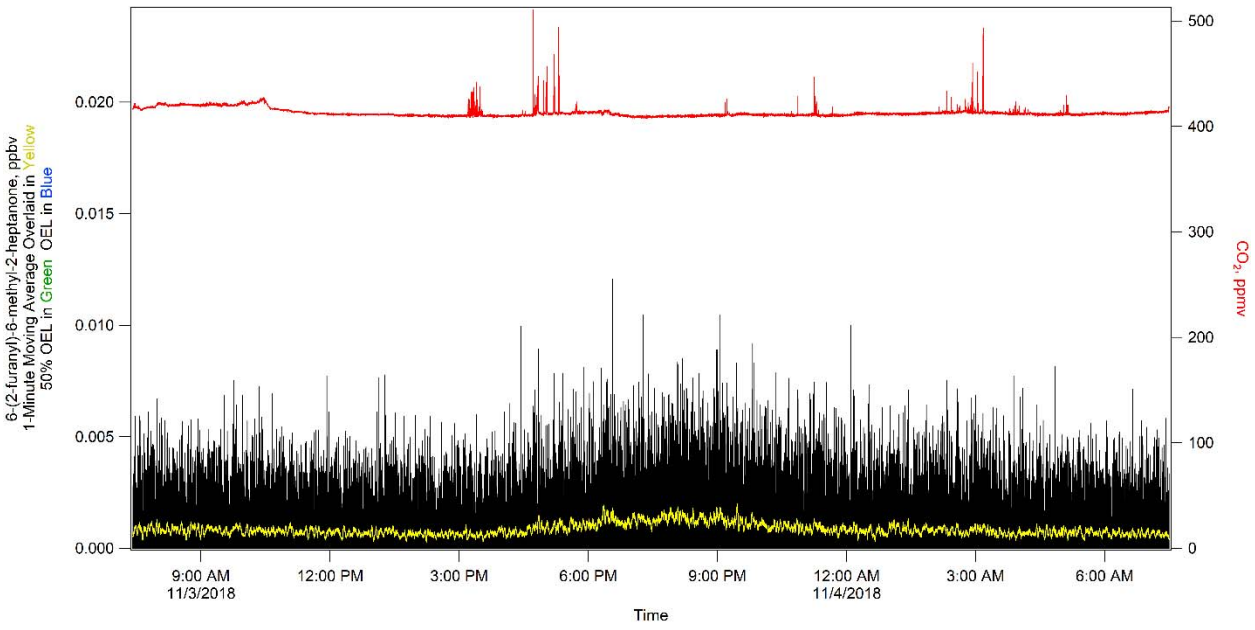

Figure 7-18. 6-(2-furanyl)-6-methyl-2-heptanone.

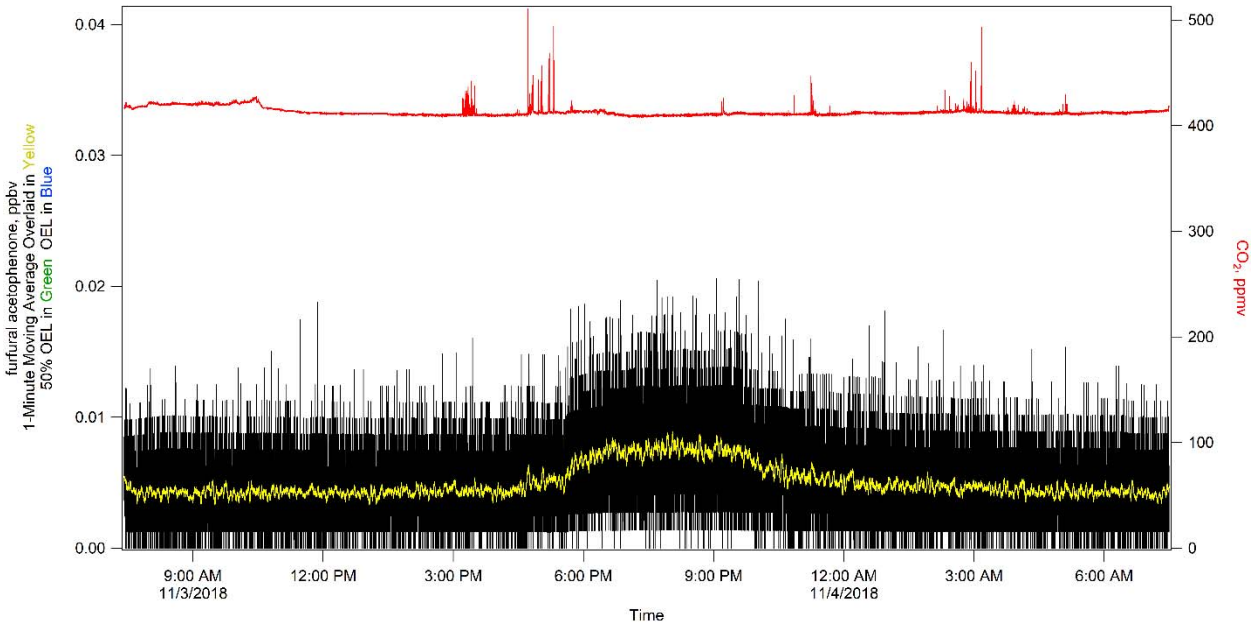

Figure 7-19. Furfural Acetophenone.

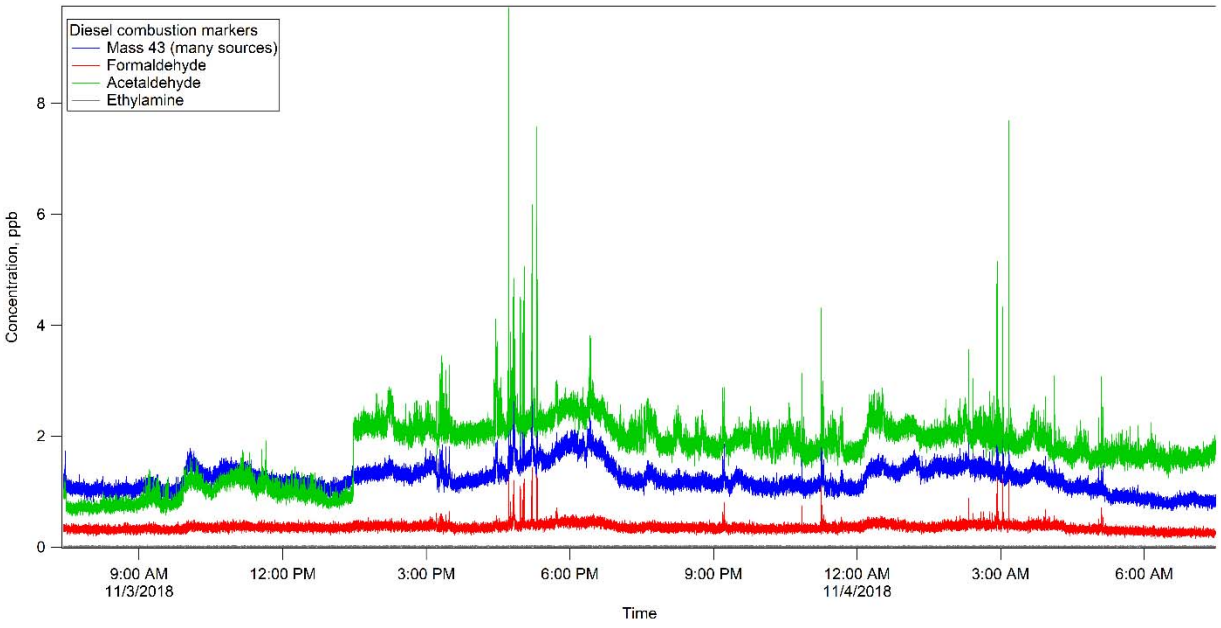

Figure 7-20. Diesel Combustion Markers.

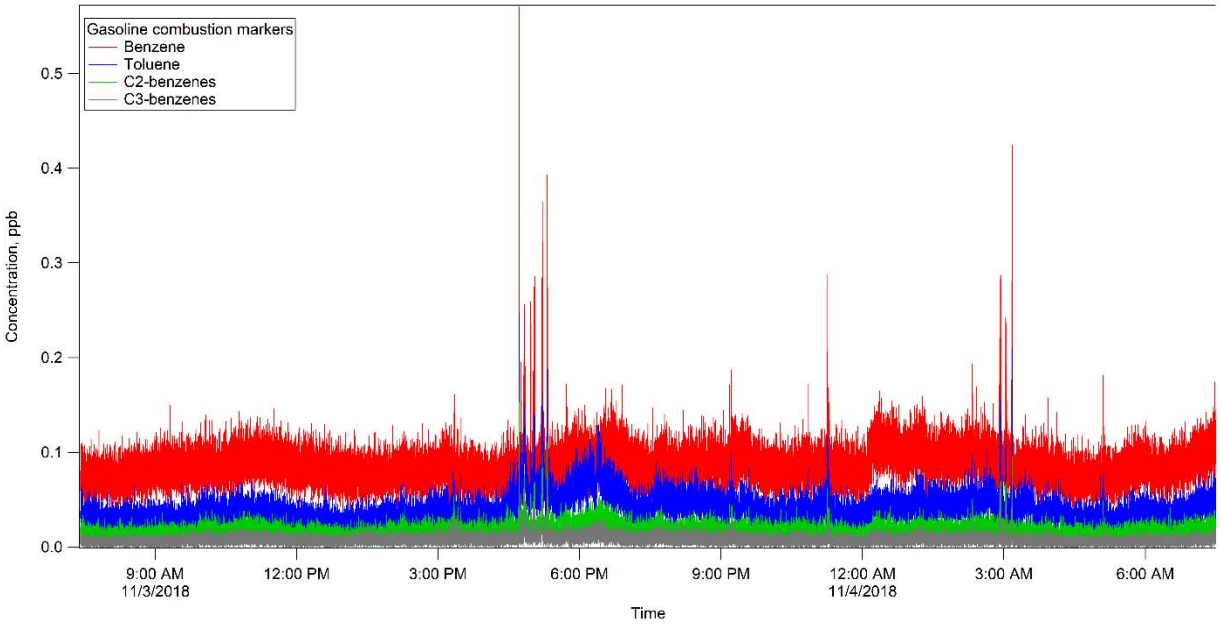

Figure 7-21. Gasoline Combustion Markers.

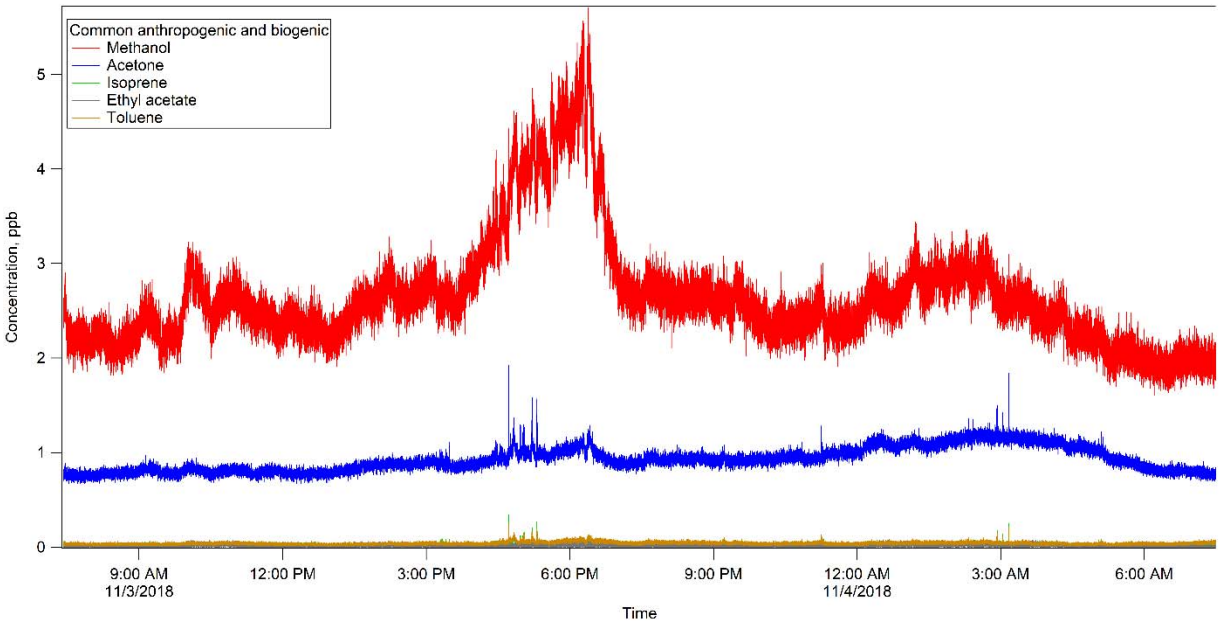

Figure 7-22. Plant and Human Markers.

8.0 REFERENCES

17124-DOE-HS-102, 2018, "Mobile Laboratory Data Processing – Analysis," Revision 2, TerraGraphics Environmental Engineering, Inc., Pasco, Washington.

53005-81-RPT-007, *PTR-MS Mobile Laboratory Vapor Monitoring Background Study, (3/18/2018 – 4/20/2018)*, Revision 0, TerraGraphics Environmental Engineering, Inc., Pasco, Washington.

66409-RPT-004, *Mobile Laboratory Operational Procedure*, Revision 7, TerraGraphics Environmental Engineering, Inc., Pasco, Washington.

Fiscal Year 2017 Mobile Laboratory Vapor Monitoring at the Hanford Site: Monitoring During Waste Disturbing Activities and Background Study, 2017, RJ Lee Group, Inc., Pasco, Washington.