WEEKLY REPORT FOR WEEK 5
(AUGUST 31, 2018 – SEPTEMBER 8, 2018)

Report No. 53005-81-RPT-013
Revision 0

December 2018

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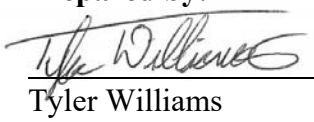

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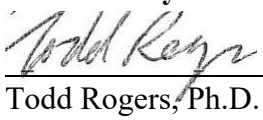

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Todd Rogers, Ph.D.

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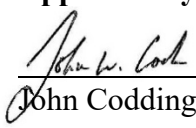

Date: 12/12/2018

John Coddington, Ph.D.

Record of Revision

Revision	Date	Pages/Sections Changed	Brief Description
0	12/2018	All	Original Issue.

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Acronyms

COPC	Chemical of Potential Concern
CSO	Central Shift Office
ML	Mobile Laboratory
NDEA	N-nitrosodiethylamine
NDMA	N-nitrosodimethylamine
NEMA	N-nitrosomethylethylamine
NMOR	N-nitrosomorpholine
OEL	Occupational Exposure Limit
PST	Pacific Standard Time
PTR-MS	Proton Transfer Reaction – Mass Spectrometer
PTR-TOF	Proton Transfer Reaction – Time of Flight
QA	Quality Assurance
QC	Quality Control

1.0 AUGUST 31, 2018 – SX PAVING

1.1 Quality Assessment

Data from August 31, 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

All times reported in this document are recorded in Pacific Standard Time (PST).

On August 31, 2018, the Mobile Laboratory (ML) performed area monitoring on the Hanford Site in support of the SX Paving Project.

The ML arrived on site and checked in with the Central Shift Office (CSO) at 05:30. A quality assurance/quality control (QA/QC) zero air/sensitivity check was performed on the LI-COR®[1] CO_2 monitor and the Proton Transfer Reaction-Mass Spectrometer (PTR-MS) prior to arrival at 04:23. At 05:50, the ML arrived at SX Farm. The ML performed mobile monitoring of SX from 06:00-07:55 before attending a pre-job briefing. After the briefing, the ML staff positioned the ML downwind of SX Farm at 08:32.

At 13:40, the ML staff checked out with the CSO and departed the site for the TerraGraphics warehouse in Pasco, WA. The QA/QC zero air/sensitivity check on the Picarro Ammonia Analyzer was initiated at 13:29 during transport.

Table 1-1. Mobile Laboratory Sampling Mode Throughout the Monitoring Period.

Time	Location	Sampling Mode
05:50 - 06:00	SX Farm Circling SX	Mobile Area Sampling
06:00 - 07:55	SX Farm Downwind of SX	Mobile Area Sampling
07:55 - 08:32	SX Farm Pre-job briefing	Mobile Area Sampling
08:21 - 08:32	SX (*Note: Asphalt will not begin pouring for a couple hours*)	Mobile Area Sampling
08:32 - 13:10	SX Farm Downwind of SX	Mobile Area Sampling

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

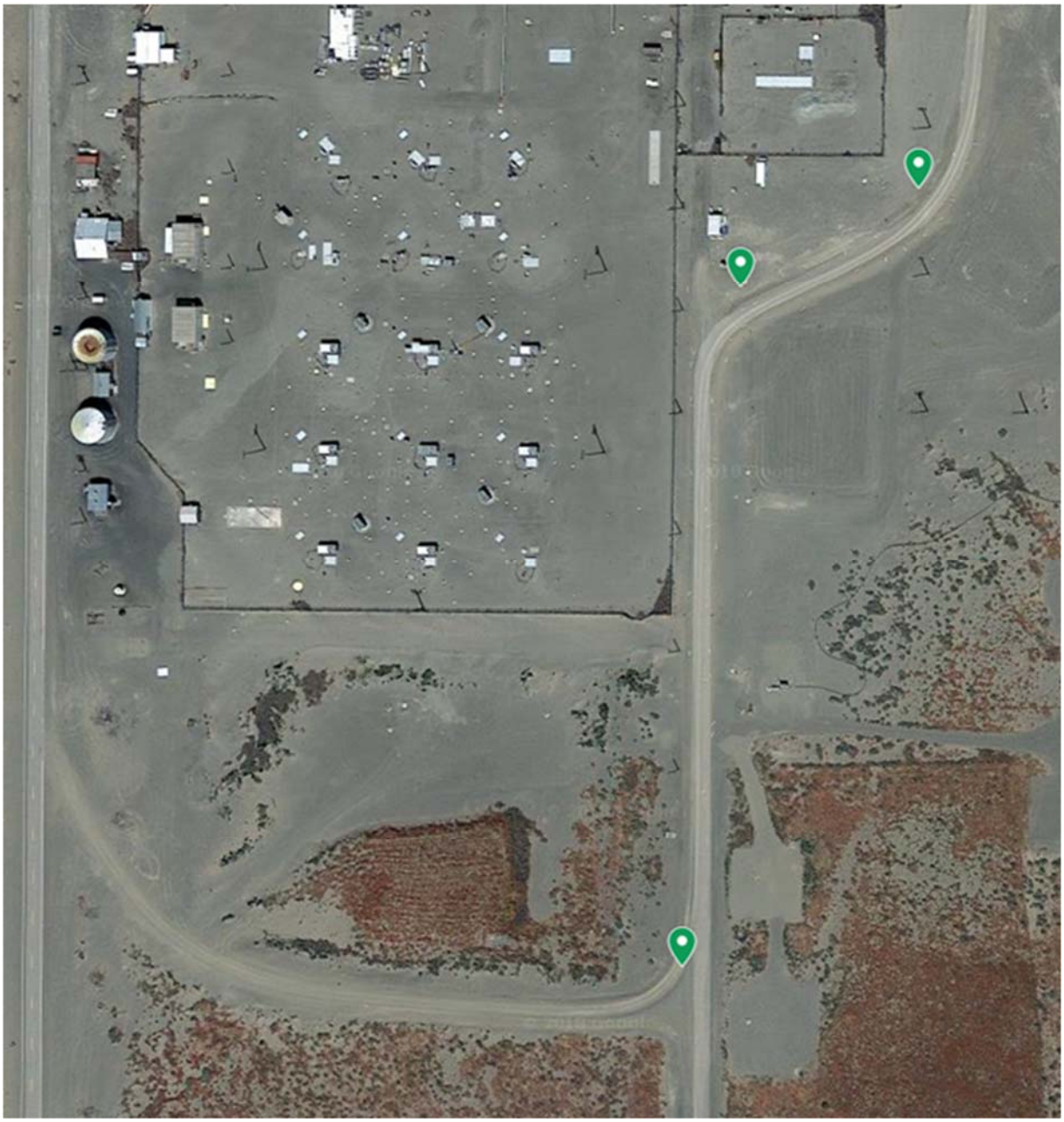

Figure 1-1. Mobile Laboratory Location for the Duration of the Monitoring Period.

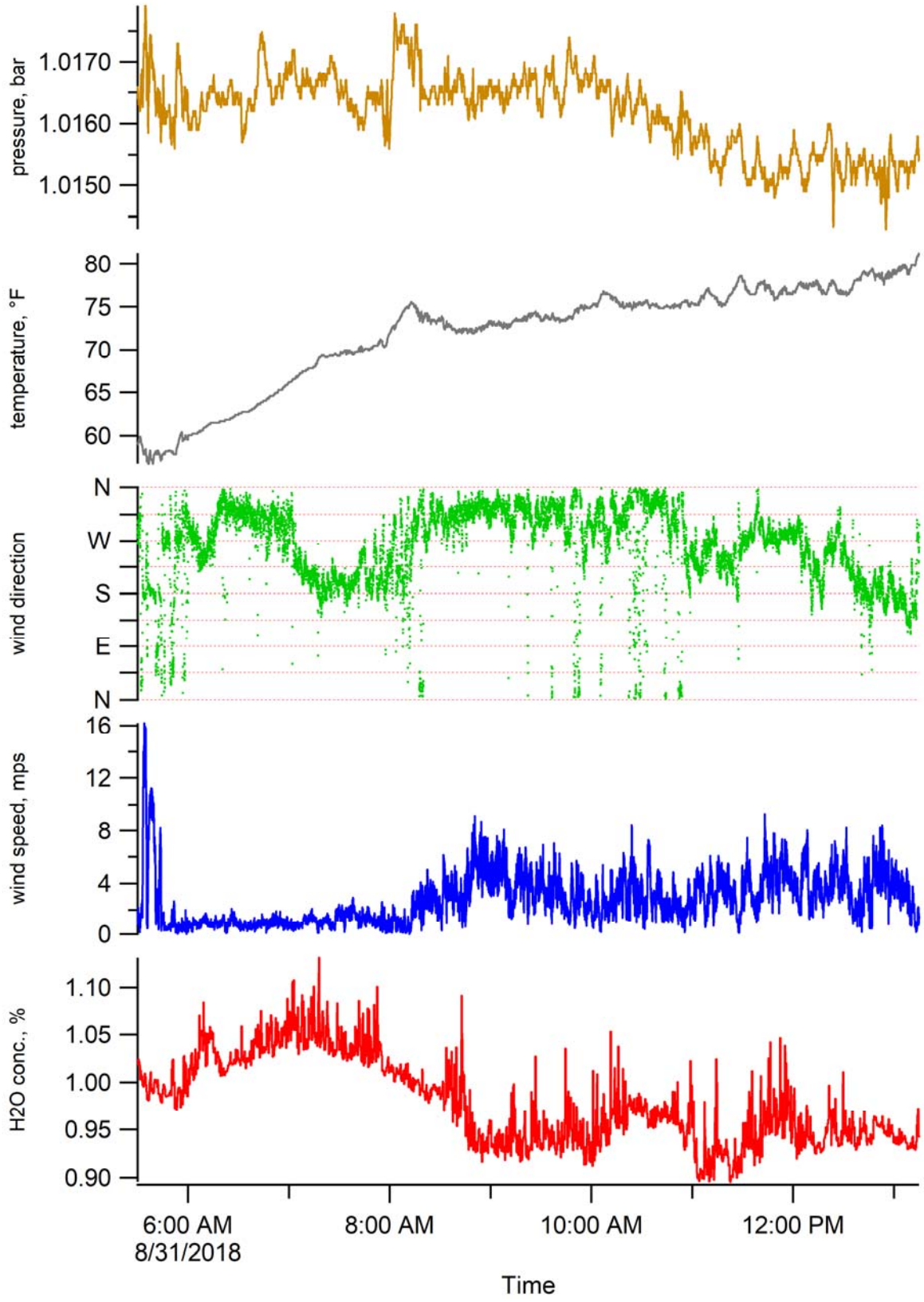

Figure 1-2. Weather Data for the Duration of Monitoring Period.

1.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- Proton Transfer Reaction – Time of Flight (PTR-TOF) 6000 X2,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were not collected during this period.

Table 1-2. COPC Statistical Information for the Monitoring Period of August 31, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max (ppb)	Median (ppb)
1	ammonia	25000	8.881	4.891	55.072	31.021	7.171
2	formaldehyde	300	0.603	0.229	37.890	6.868	0.568
3	methanol	200000	5.347	1.706	31.907	55.639	4.986
4	acetonitrile	20000	0.142	0.025	17.761	0.285	0.14
5	acetaldehyde	25000	1.948	1.187	60.914	20.828	1.465
6	ethylamine	5000	0.023	0.011	49.562	0.076	0.021
7	1,3-butadiene	1000	0.020	0.069	351.241	2.690	0
8	propanenitrile	6000	0.041	0.015	36.913	0.197	0.039
9	2-propenal	100	0.108	0.112	103.821	5.493	0.077
10	1-butanol + butenes	20000	0.125	0.092	73.846	1.778	0.098
11	methyl isocyanate	20	0.024	0.013	54.968	0.150	0.022
12	methyl nitrite	100	0.103	0.069	67.114	1.361	0.078
13	furan	1	0.030	0.022	73.778	0.356	0.022
14	butanenitrile	8000	0.012	0.008	68.758	0.095	0.01
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	100, 1, 1	0.042	0.040	95.538	N/A*	N/A*
16	butanal	25000	0.084	0.054	64.408	0.584	0.062
17	NDMA	0.3	0.021	0.025	116.984	0.180	0.013
18	benzene	500	0.086	0.142	165.650	2.336	0.052
19	2,4-pentadienenitrile + pyridine	300, 1000	0.024	0.014	57.299	0.191	0.021
20	2-methylene butanenitrile	30	0.011	0.007	62.159	0.088	0.009
21	2-methylfuran	1	0.029	0.023	78.757	0.620	0.022

Table 1-2. COPC Statistical Information for the Monitoring Period of August 31, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max (ppb)	Median (ppb)
22	pentanenitrile	6000	0.009	0.006	73.092	0.052	0.007
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.032	0.025	77.548	0.600	0.024
24	NEMA	0.3	0.013	0.017	126.205	0.121	0.006
25	2,5-dimethylfuran	1	0.029	0.017	60.565	0.423	0.025
26	hexanenitrile	6000	0.018	0.008	47.190	0.063	0.017
27	2-hexanone (MBK)	5000	0.022	0.012	53.548	0.101	0.02
28	NDEA	0.1	0.073	0.039	52.972	0.244	0.072
29	butyl nitrite + 2-nitro-2-methylpropane	100, 30	0.262	0.051	19.491	0.494	0.249
30	2,4-dimethylpyridine	500	0.078	0.027	33.928	0.436	0.073
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.061	0.024	39.849	0.213	0.057
32	heptanenitrile	6000	0.078	0.022	28.599	0.186	0.074
33	4-methyl-2-hexanone	500	0.073	0.023	31.789	0.199	0.069
34	NMOR	0.6	0.012	0.020	168.530	0.206	0
35	butyl nitrate	2500	0.042	0.018	42.269	0.125	0.04
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.065	0.021	32.930	0.178	0.061
37	6-methyl-2-heptanone	8000	0.064	0.020	31.620	0.169	0.06
38	2-pentylfuran	1	0.058	0.021	35.663	0.180	0.054
39	biphenyl	200	0.051	0.022	43.974	0.153	0.049
40	2-heptylfuran	1	0.218	0.052	24.013	0.432	0.203
41	1,4-butanediol dinitrate	50	0.072	0.022	30.476	0.170	0.069
42	2-octylfuran	1	0.003	0.011	333.596	0.133	0
43	1,2,3-propanetriol 1,3-dinitrate	50	0.003	0.012	380.629	0.137	0
44	PCB	1000	0.085	0.022	25.707	0.184	0.081
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.042	0.016	37.470	0.114	0.039
46	furfural acetophenone	1	0.198	0.047	23.941	0.402	0.185

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 1.222 ppb and the median value was 0.027 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 also suspect due to interferants identified during the background study.

The following figures display a selection of chemical of potential concern (COPC) signals, overlaid with the same signal smoothed using a one-minute moving average, and CO_2, for the monitoring period of August 31, 2018.

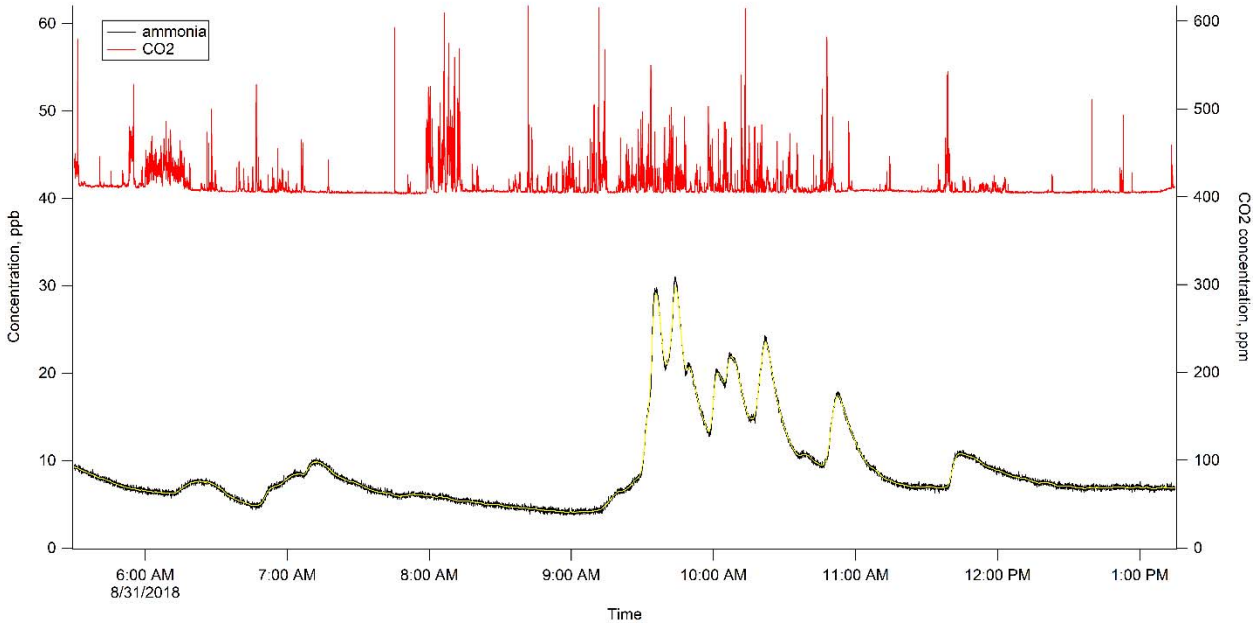

Figure 1-3. Ammonia.

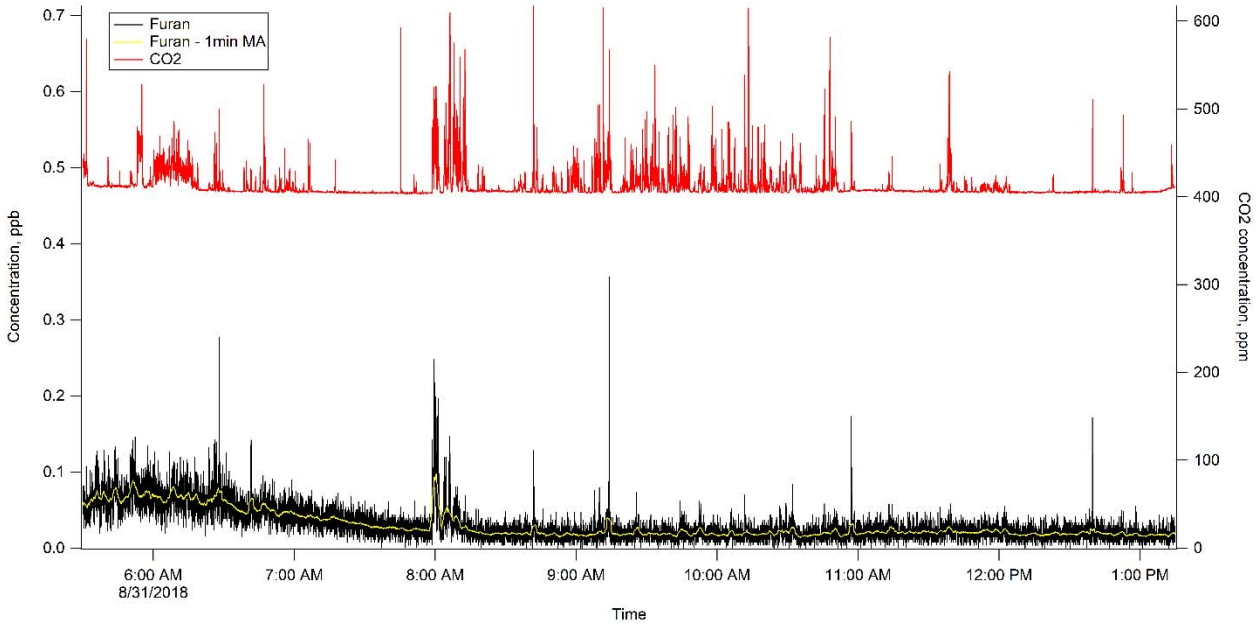

Figure 1-4. Furan.

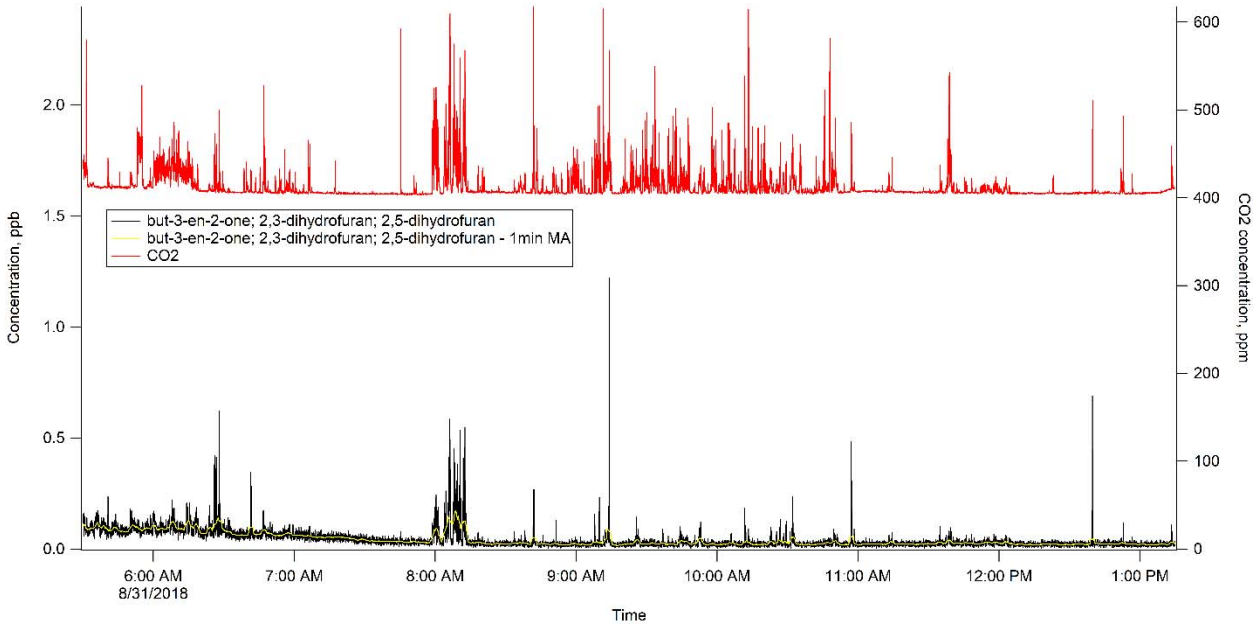

Figure 1-5. but-3-en-2-one; 2,3-dihydrofuran; 2,5-dihydrofuran.

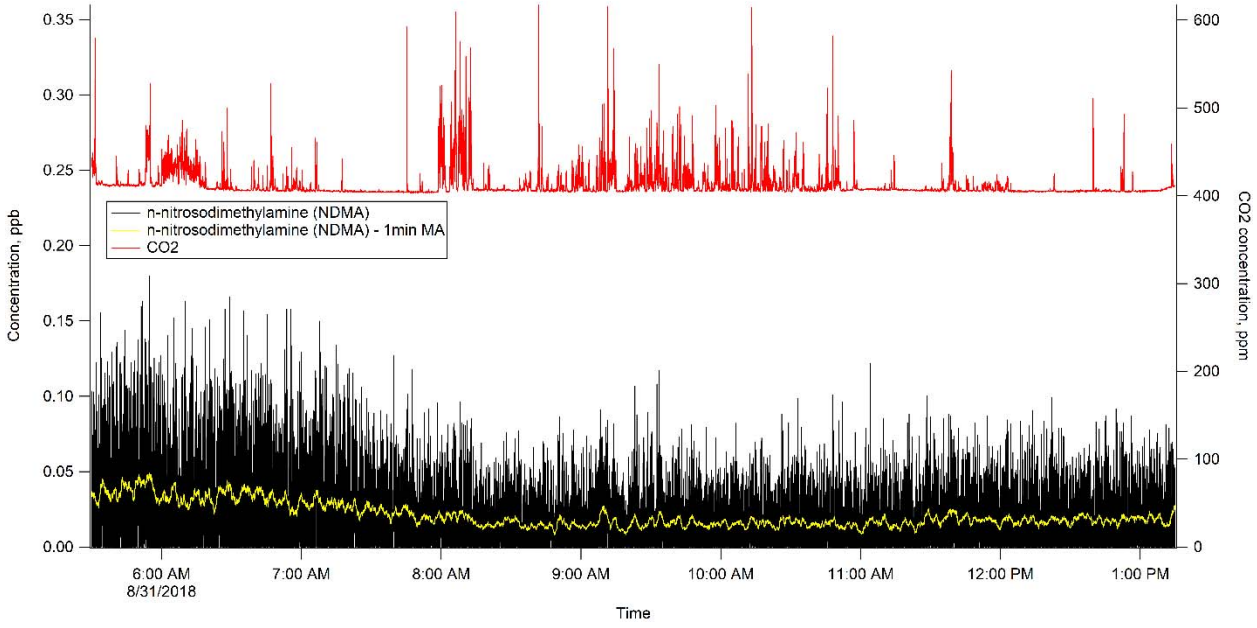

Figure 1-6. N-nitrosodimethylamine (NDMA).

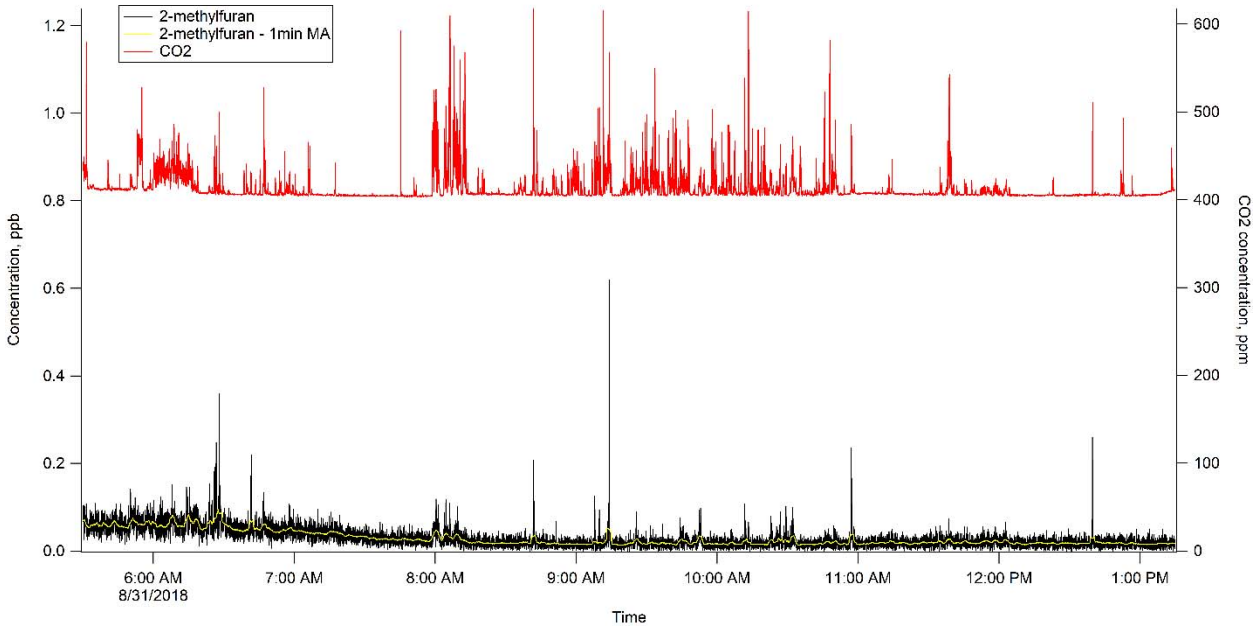

Figure 1-7. 2-methylfuran.

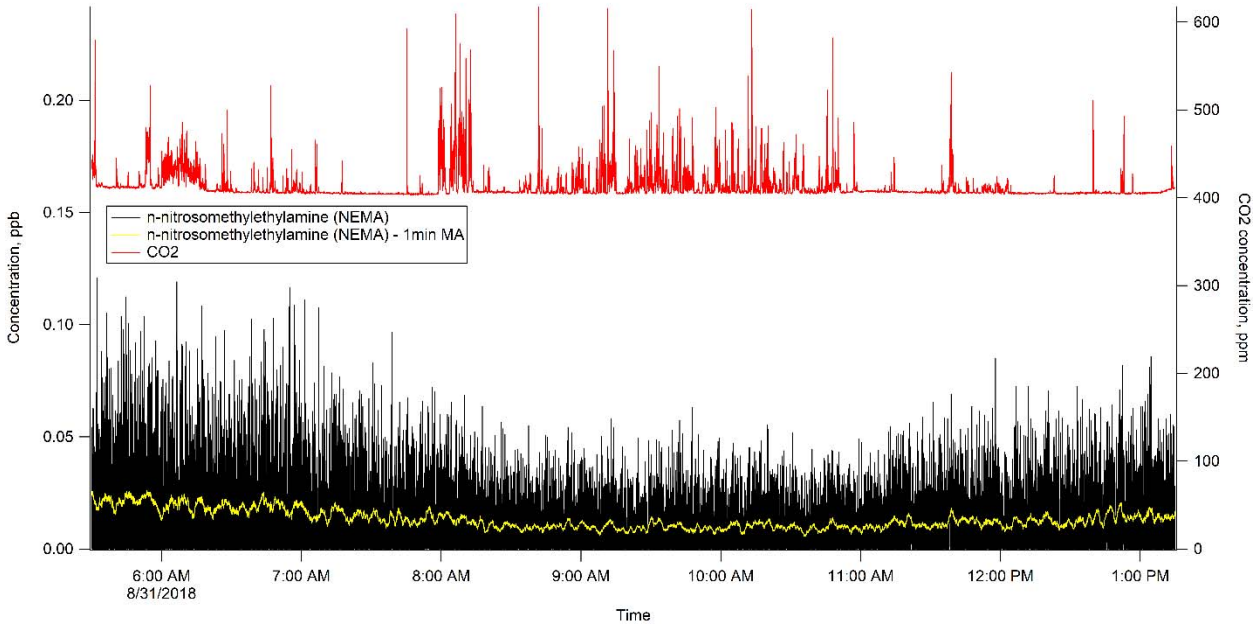

Figure 1-8. N-nitrosomethylethylamine (NEMA).

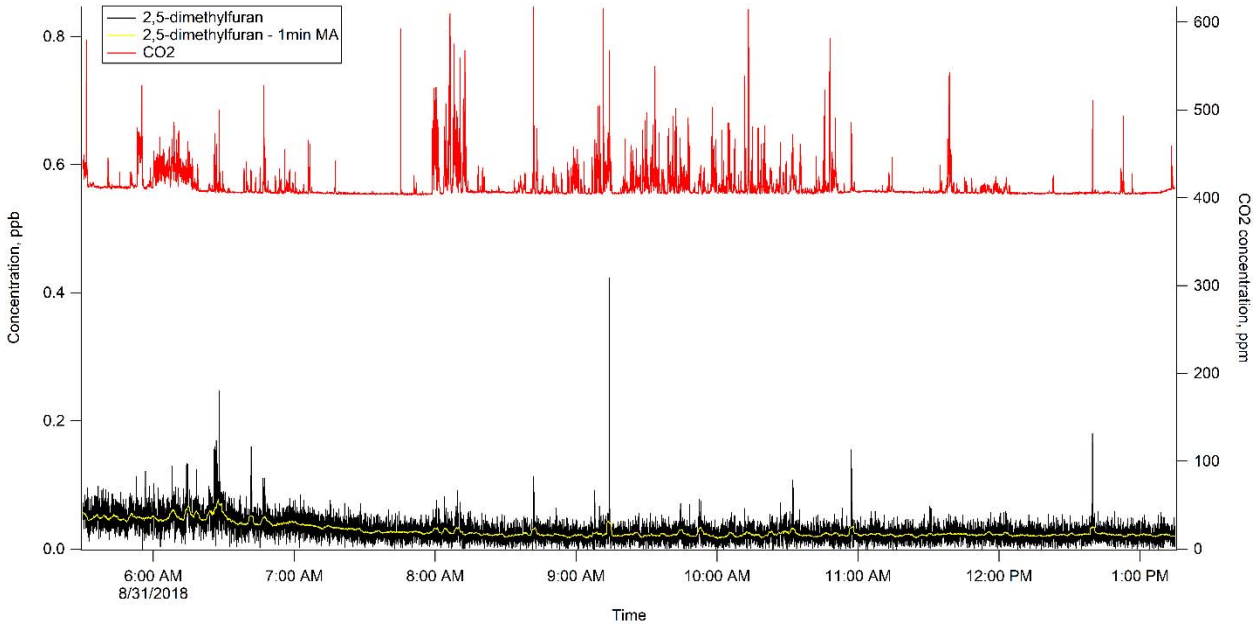

Figure 1-9. 2, 5-dimethylfuran.

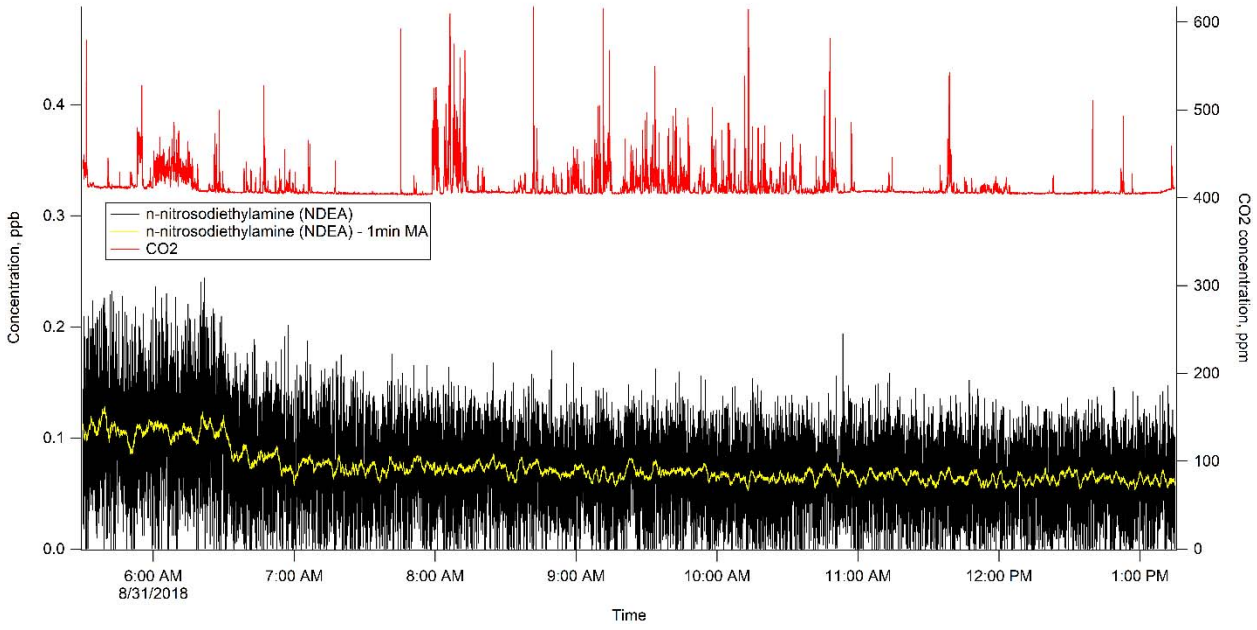

Figure 1-10. N-nitrosodiethylamine (NDEA).

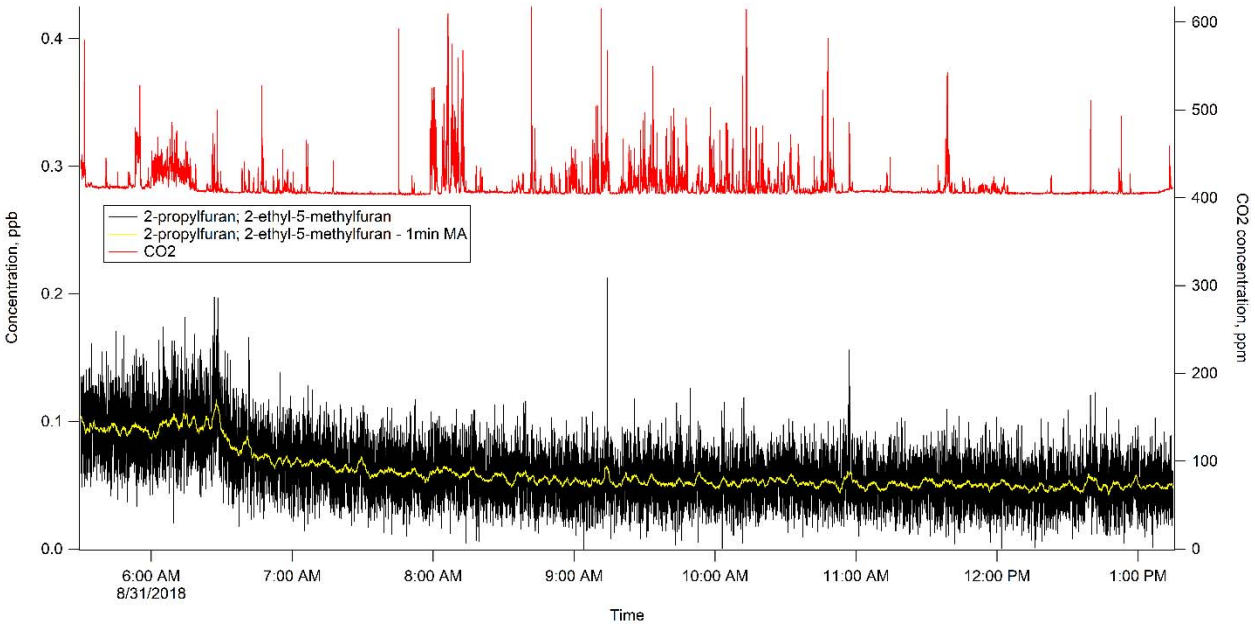

Figure 1-11. 2-propylfuran; 2-ethyl-5-methylfuran.

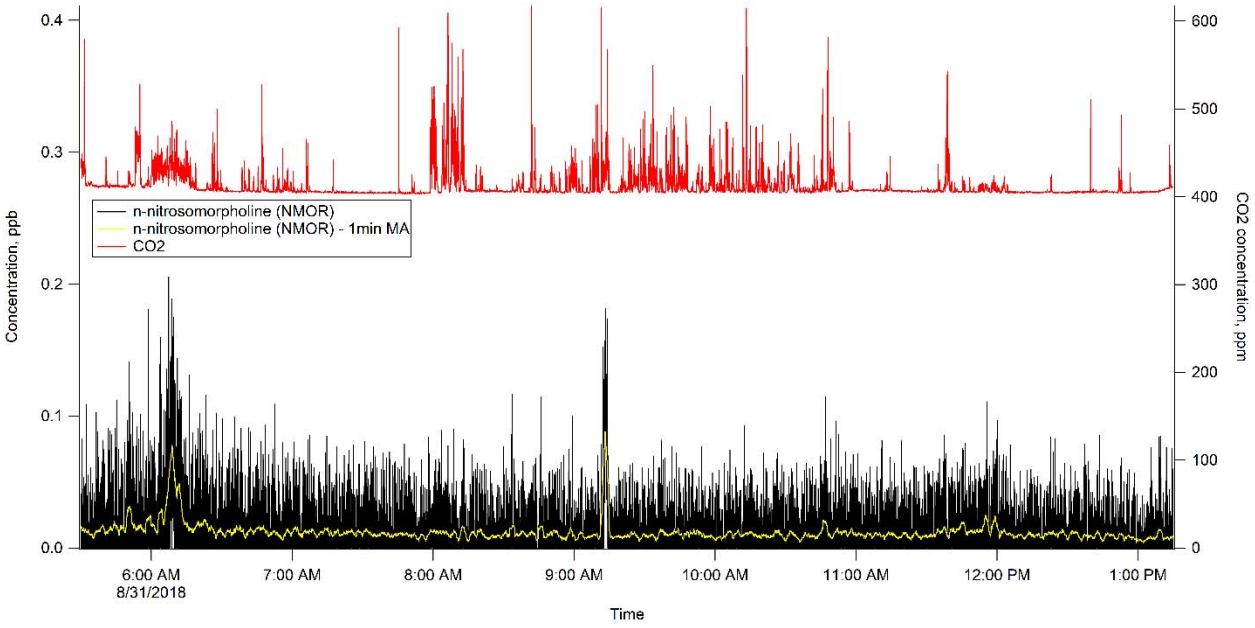

Figure 1-12. N-nitrosomorpholine (NMOR).

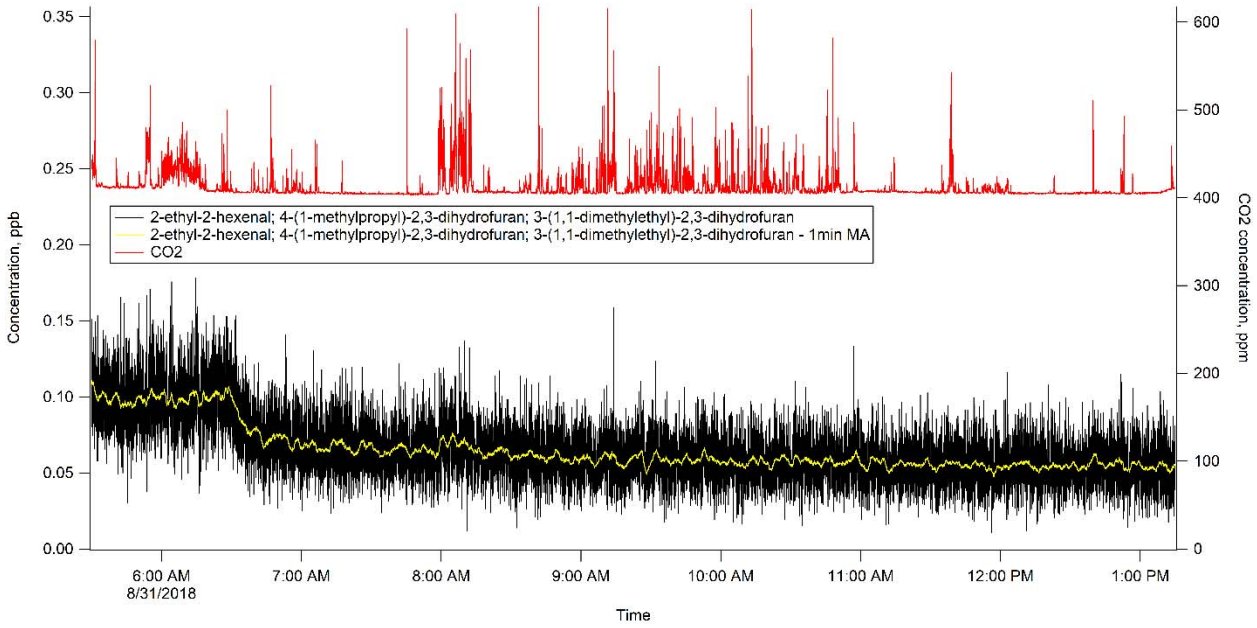

Figure 1-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran.

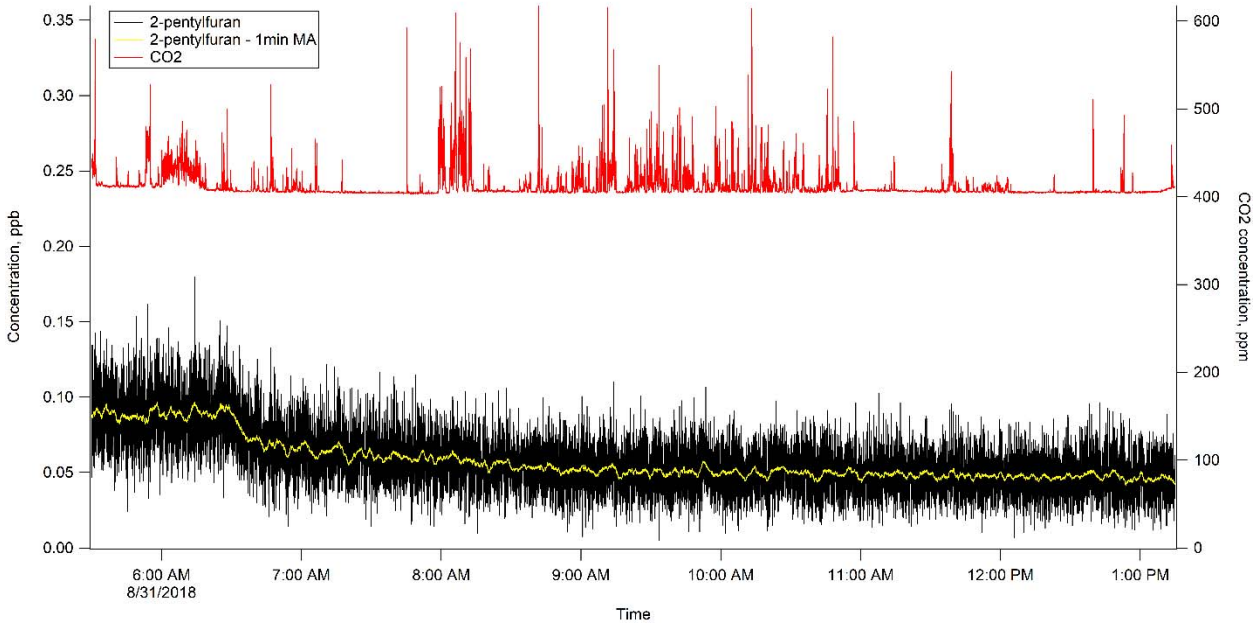

Figure 1-14. 2-pentylfuran.

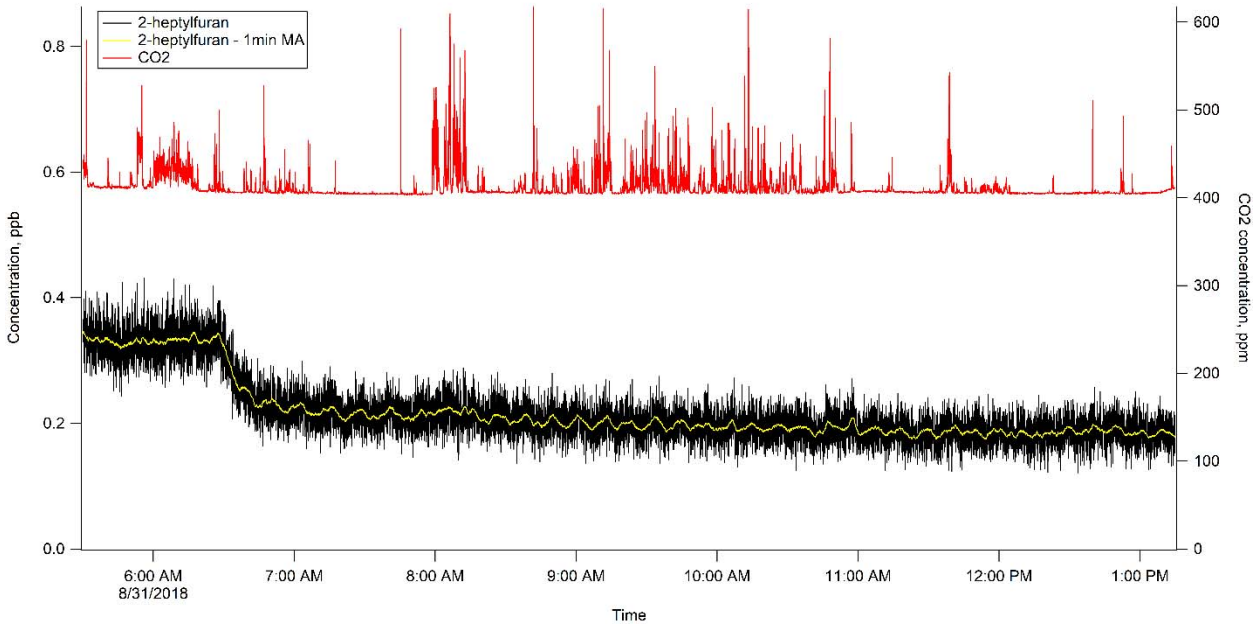

Figure 1-15. 2-heptylfuran.

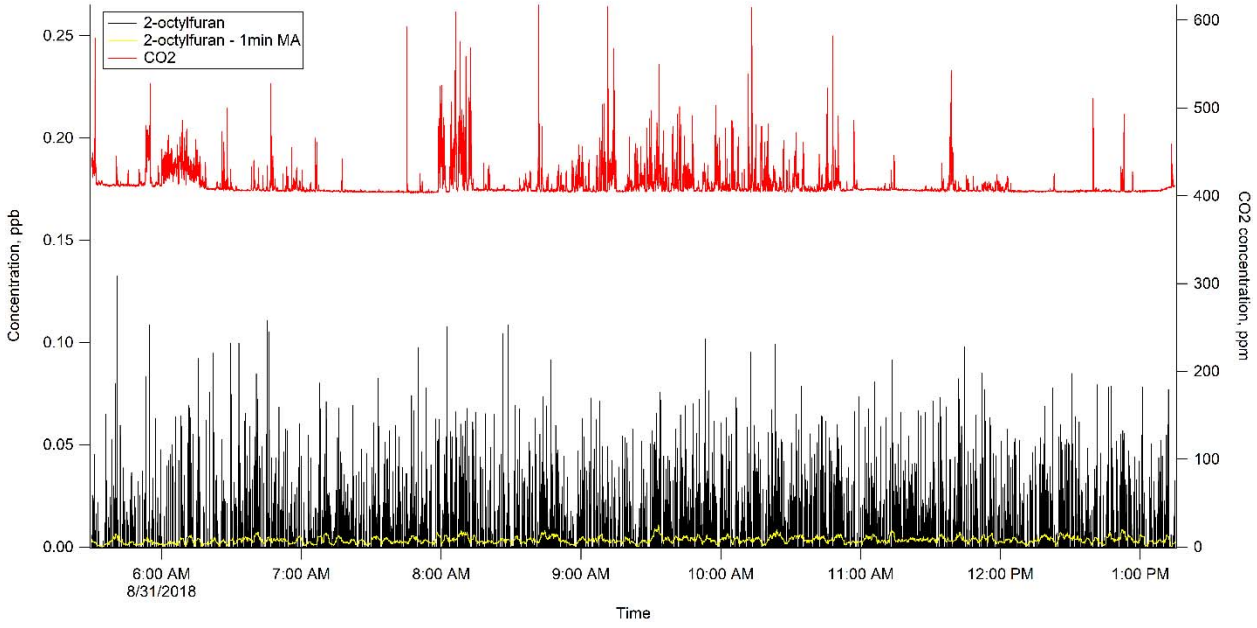

Figure 1-16. 2-octylfuran.

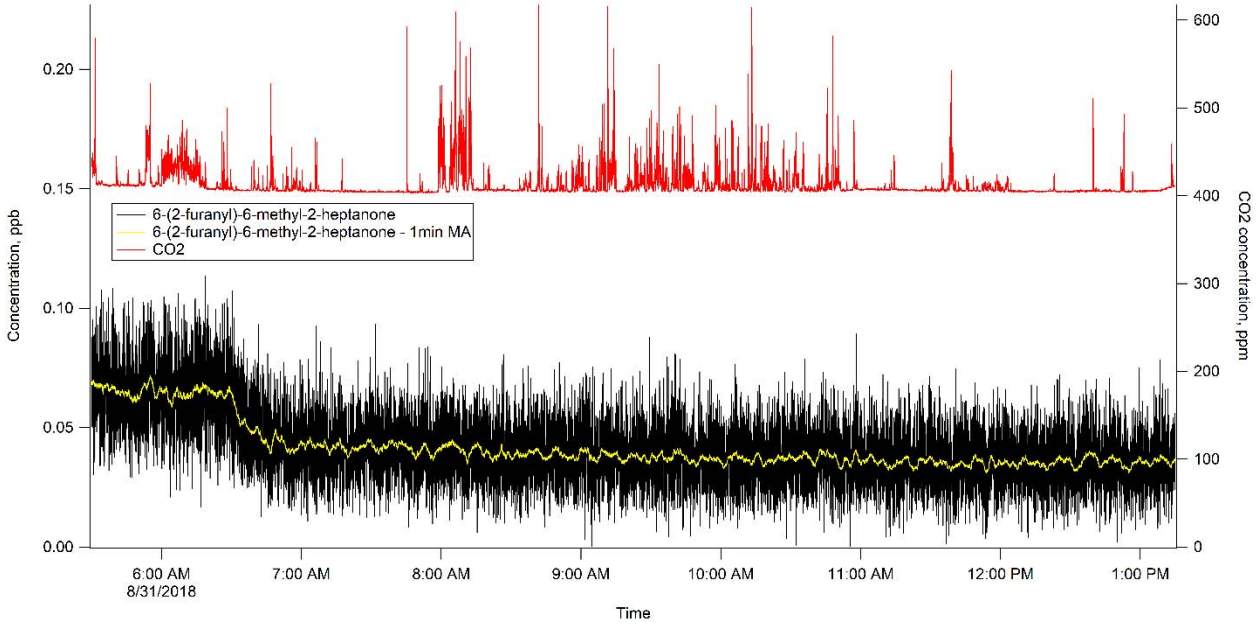

Figure 1-17. 6-(2-furanyl)-6-methyl-2-heptanone.

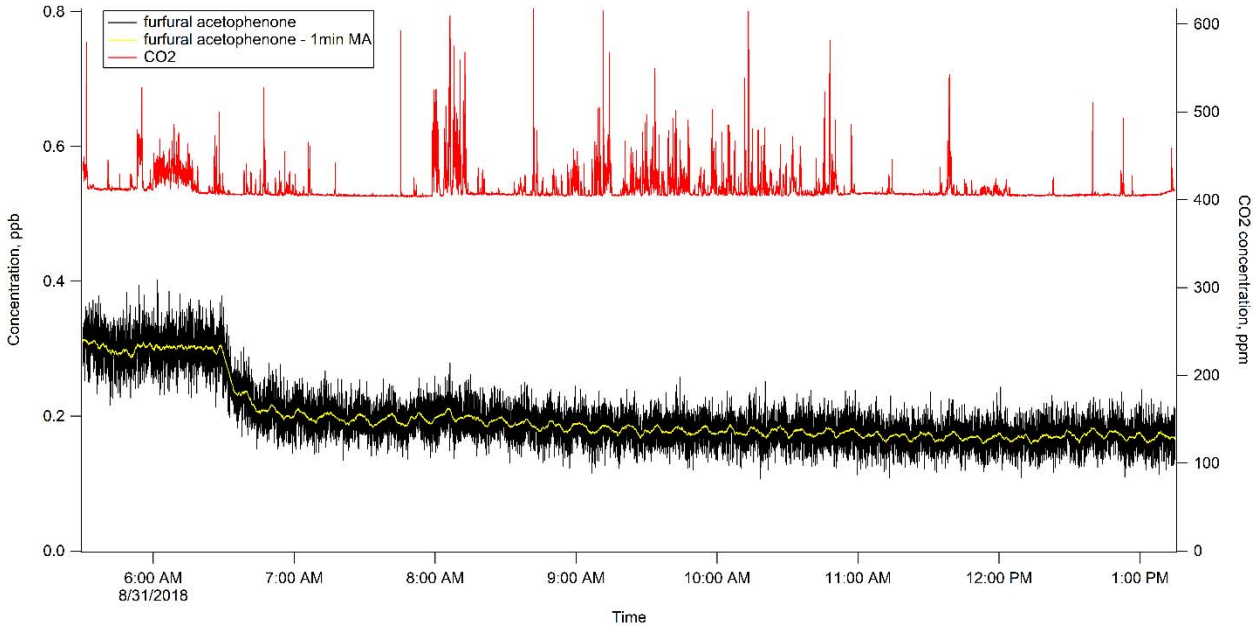

Figure 1-18. Furfural Acetophenone.

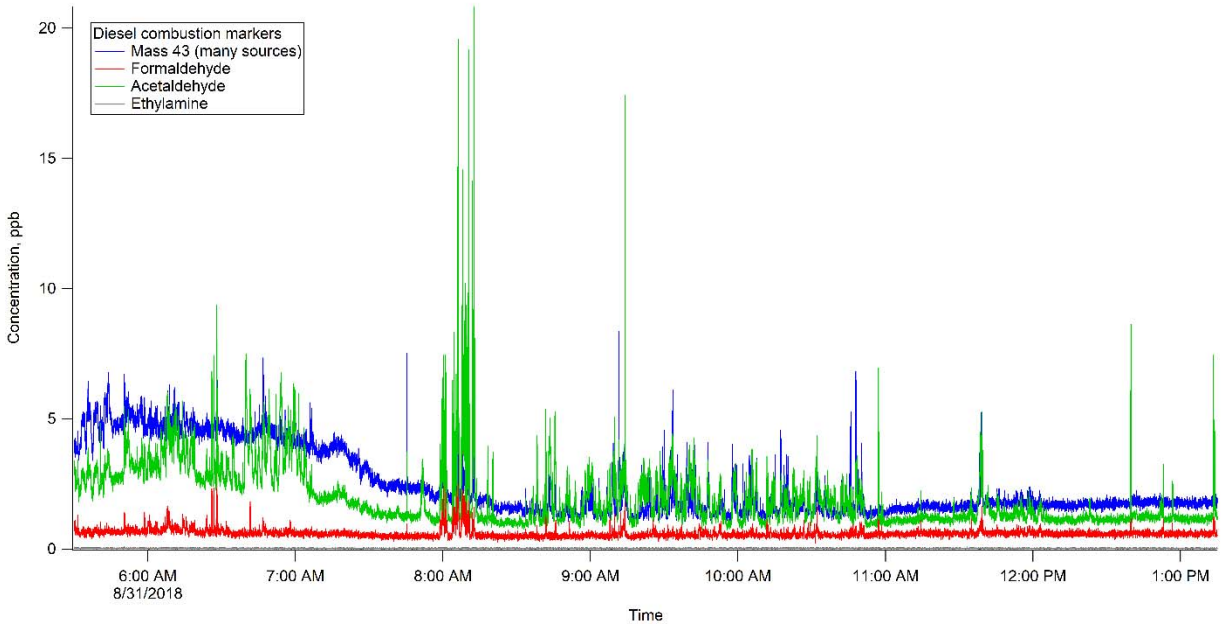

Figure 1-19. Diesel Combustion Markers.

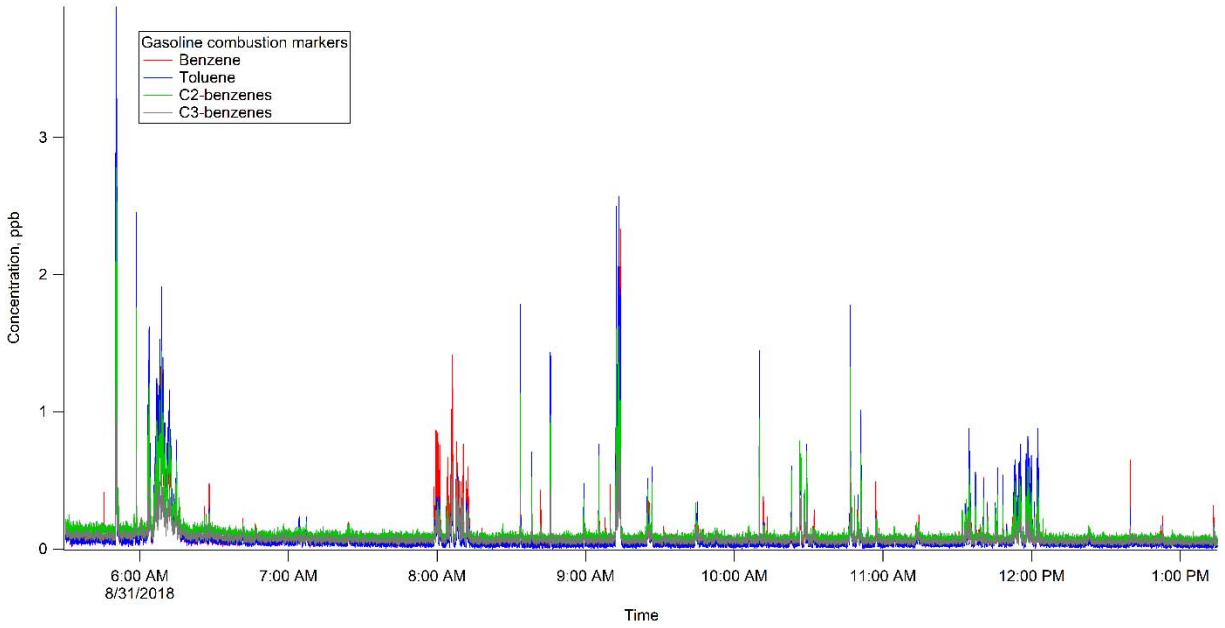

Figure 1-20. Gasoline Combustion Markers.

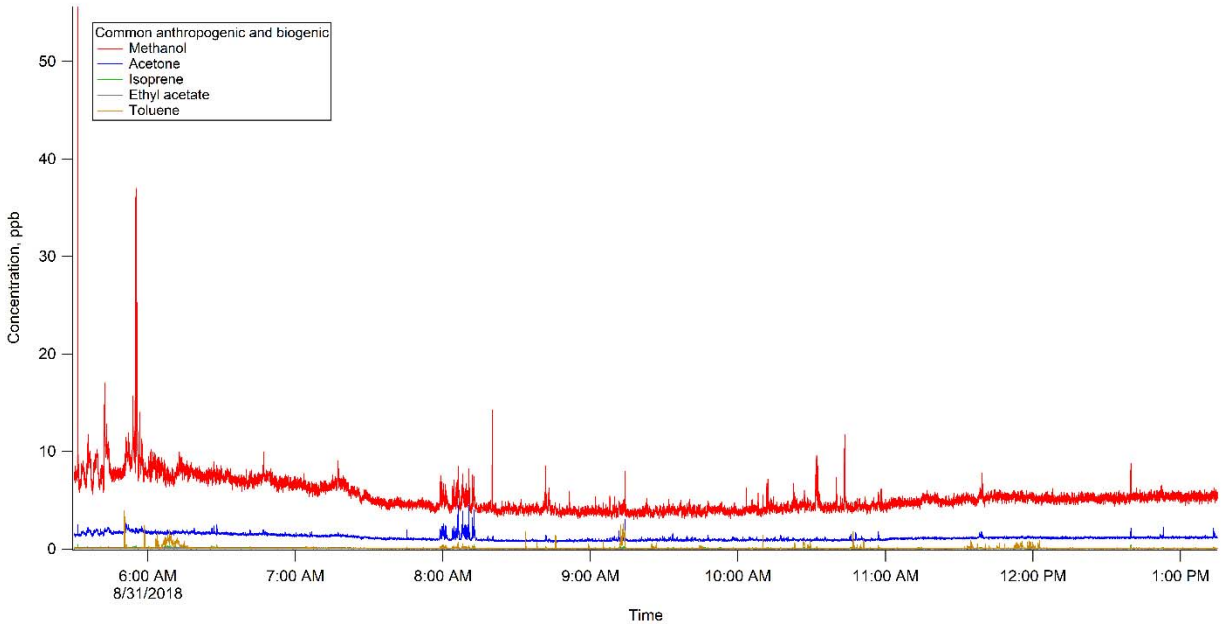

Figure 1-21. Plant and Human Markers.

2.0 SEPTEMBER 4, 2018 – SX PAVING

2.1 Quality Assessment

Data from September 4, 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

On September 4, 2018, the ML performed area monitoring on the Hanford Site in support of the SX Paving Project.

The ML arrived on site and checked in with the CSO at 05:21. A QA/QC zero air/sensitivity check was performed on the LI-COR CO_2 monitor prior to arrival at 04:18. At 05:43, the ML began mobile monitoring of SX Farms. The ML moved downwind of SX Farm at 09:16. The ML monitored workers inside SX Farm until paving began at 11:30.

The ML staff checked out with the CSO at 13:40. A QA/QC zero air/sensitivity check was initiated on the Picarro Ammonia Analyzer and the PTR-MS at 14:08 during the return to the TerraGraphics shop.

Table 2-1. Mobile Laboratory Sampling Mode Throughout the Monitoring Period.

Time	Location	Sampling Mode
05:43 - 07:30	SX Farm south & east of farm	Mobile Area Sampling
07:30 - 08:55	SX Farm workers leave farm	Mobile Area Sampling
08:55 - 09:16	SX Farm workers return to farm	Mobile Area Sampling
09:16 - 11:30	SX Farm downwind of SX, no paving occurring	Mobile Area Sampling
11:30 - 13:20	SX Farm paving within SX	Mobile Area Sampling

Figure 2-1. Mobile Laboratory Route Monitoring SX Farm Paving.

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

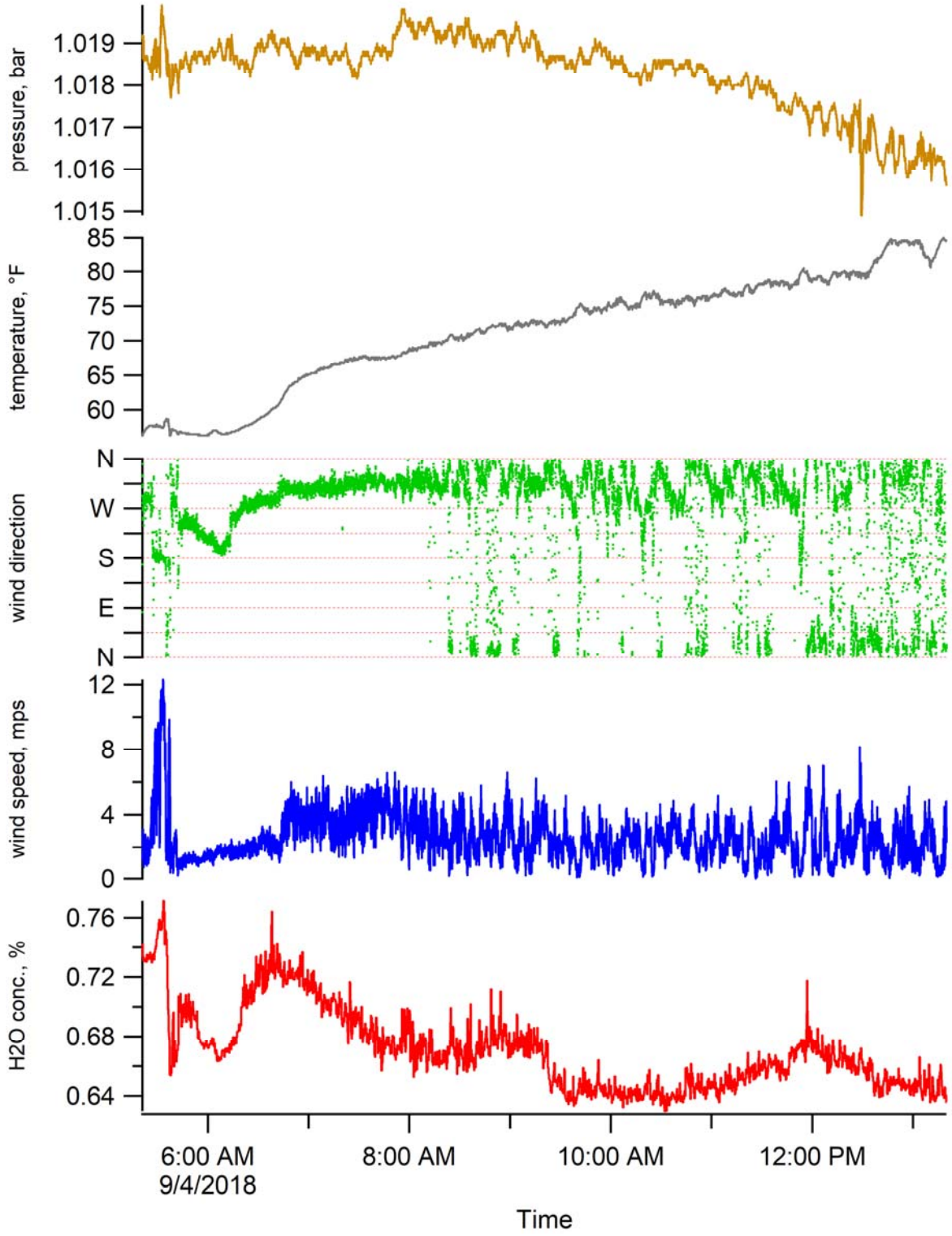

Figure 2-3. Weather Data for the Duration of the Monitoring Period.

2.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-TOF 6000 X2,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were not collected during this period.

2.4 Area Monitoring

Table 2-2. COPC Statistical Information for the Monitoring Period of September 4, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max (ppb)	Median (ppb)
1	ammonia	25000	5.916	1.906	32.214	14.216	5.06
2	formaldehyde	300	1.067	0.300	28.126	3.830	0.99
3	methanol	200000	8.281	3.497	42.225	97.081	7.756
4	acetonitrile	20000	0.302	0.040	13.308	0.599	0.298
5	acetaldehyde	25000	2.797	1.505	53.824	12.711	2.312
6	ethylamine	5000	0.025	0.012	47.715	0.100	0.022
7	1,3-butadiene	1000	0.066	0.092	138.484	0.809	0.031
8	propanenitrile	6000	0.046	0.017	36.739	0.167	0.044
9	2-propenal	100	0.220	0.103	47.108	1.046	0.191
10	1-butanol + butenes	20000	0.177	0.132	74.697	2.407	0.134
11	methyl isocyanate	20	0.033	0.015	44.771	0.115	0.032
12	methyl nitrite	100	0.127	0.115	90.534	1.326	0.091
13	furan	1	0.051	0.019	37.071	0.311	0.049
14	butanenitrile	8000	0.018	0.011	61.675	0.086	0.016
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	100, 1, 1	0.065	0.027	41.101	N/A*	N/A*
16	butanal	25000	0.111	0.036	32.441	0.428	0.103
17	NDMA	0.3	0.024	0.028	116.982	0.262	0.014
18	benzene	500	0.207	0.155	75.141	10.462	0.175
19	2,4-pentadienenitrile + pyridine	300, 1000	0.041	0.015	35.316	0.577	0.039
20	2-methylene butanenitrile	30	0.013	0.007	55.537	0.058	0.012
21	2-methylfuran	1	0.036	0.015	42.326	0.135	0.034

Table 2-2. COPC Statistical Information for the Monitoring Period of September 4, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max (ppb)	Median (ppb)
22	pentanenitrile	6000	0.014	0.009	61.213	0.070	0.013
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.035	0.016	45.024	0.142	0.033
24	NEMA	0.3	0.014	0.018	128.597	0.155	0.006
25	2,5-dimethylfuran	1	0.030	0.014	45.689	0.110	0.028
26	hexanenitrile	6000	0.020	0.010	46.609	0.071	0.019
27	2-hexanone (MBK)	5000	0.026	0.012	47.334	0.106	0.024
28	NDEA	0.1	0.067	0.037	55.900	0.207	0.066
29	butyl nitrite + 2-nitro-2-methylpropane	100, 30	0.251	0.044	17.704	0.375	0.255
30	2,4-dimethylpyridine	500	0.080	0.043	54.287	0.638	0.074
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.055	0.020	35.389	0.148	0.054
32	heptanenitrile	6000	0.072	0.020	28.165	0.155	0.073
33	4-methyl-2-hexanone	500	0.069	0.019	27.542	0.144	0.068
34	NMOR	0.6	0.011	0.018	154.010	0.131	0
35	butyl nitrate	2500	0.038	0.016	42.703	0.106	0.038
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.060	0.018	29.735	0.137	0.059
37	6-methyl-2-heptanone	8000	0.058	0.017	28.815	0.128	0.057
38	2-pentylfuran	1	0.070	0.019	26.969	0.160	0.069
39	biphenyl	200	0.049	0.021	41.757	0.127	0.05
40	2-heptylfuran	1	0.201	0.040	19.857	0.316	0.205
41	1,4-butanediol dinitrate	50	0.065	0.019	28.954	0.150	0.065
42	2-octylfuran	1	0.003	0.011	324.157	0.121	0
43	1,2,3-propanetriol 1,3-dinitrate	50	0.003	0.011	373.152	0.103	0
44	PCB	1000	0.076	0.018	23.584	0.147	0.076
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.037	0.013	35.965	0.097	0.036
46	furfural acetophenone	1	0.178	0.034	19.060	0.272	0.18

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.249 ppb and the median value was 0.059 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 also suspect due to interferants identified during the background study.

The following figures display a selection of COPC signals, overlaid with the same signal smoothed using a one-minute moving average, and CO_2, for the monitoring period of September 4, 2018.

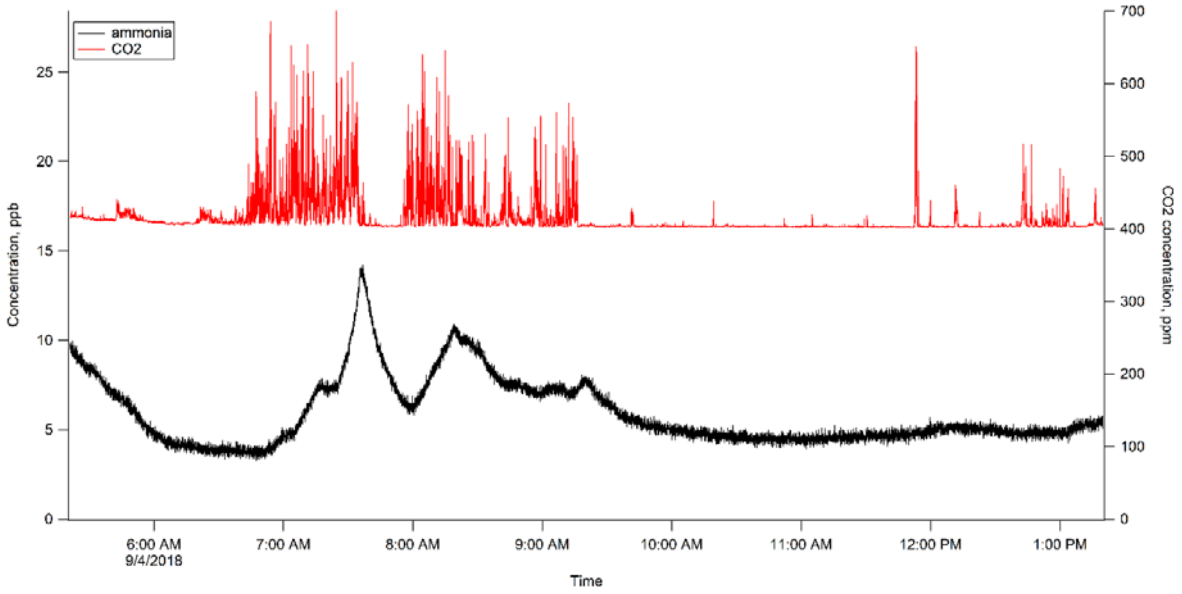

Figure 2-4. Ammonia.

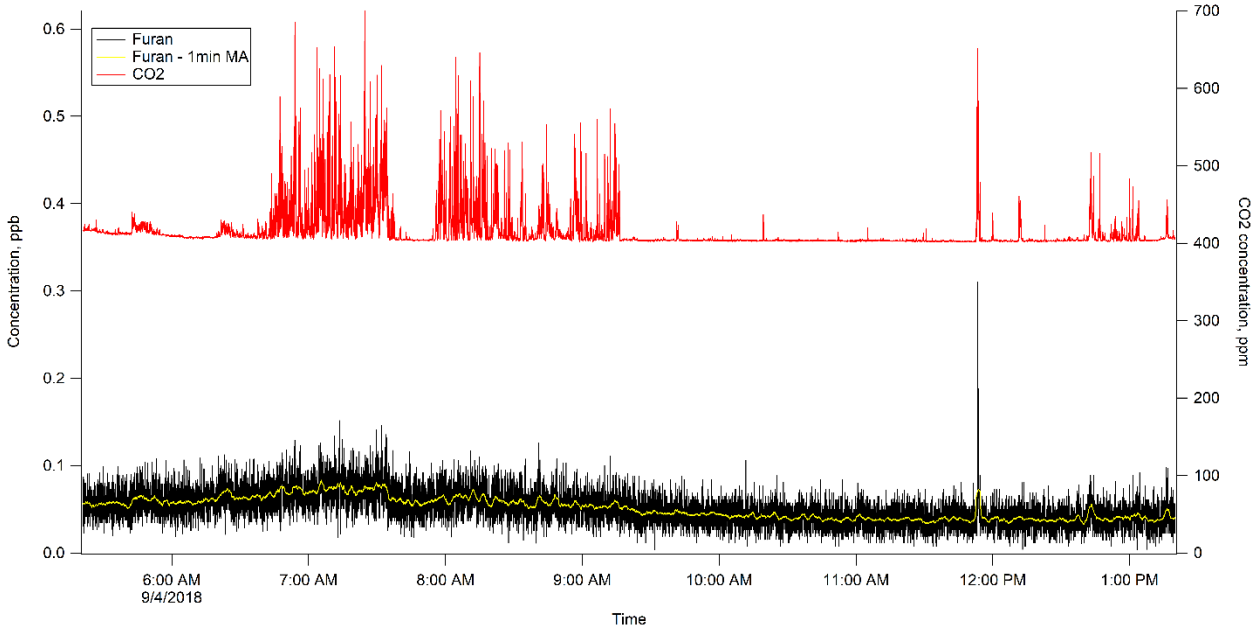

Figure 2-5. Furan.

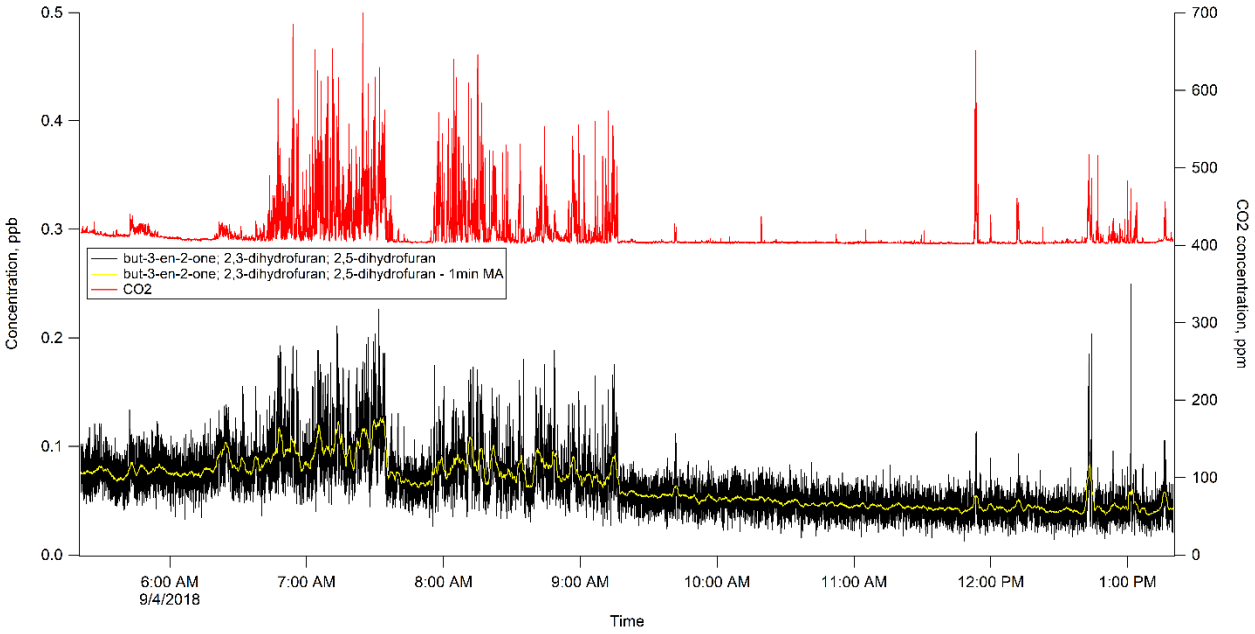

Figure 2-6. but-3-en-2-one; 2,3-dihydrofuran; 2,5-dihydrofuran.

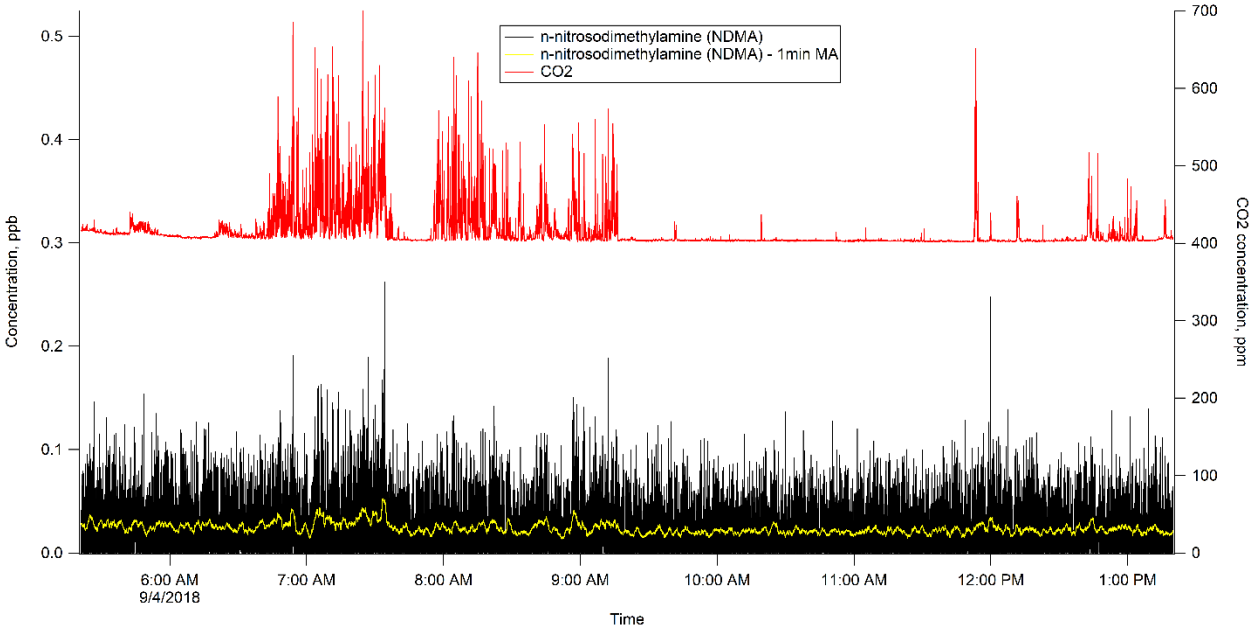

Figure 2-7. N-nitrosodimethylamine (NDMA).

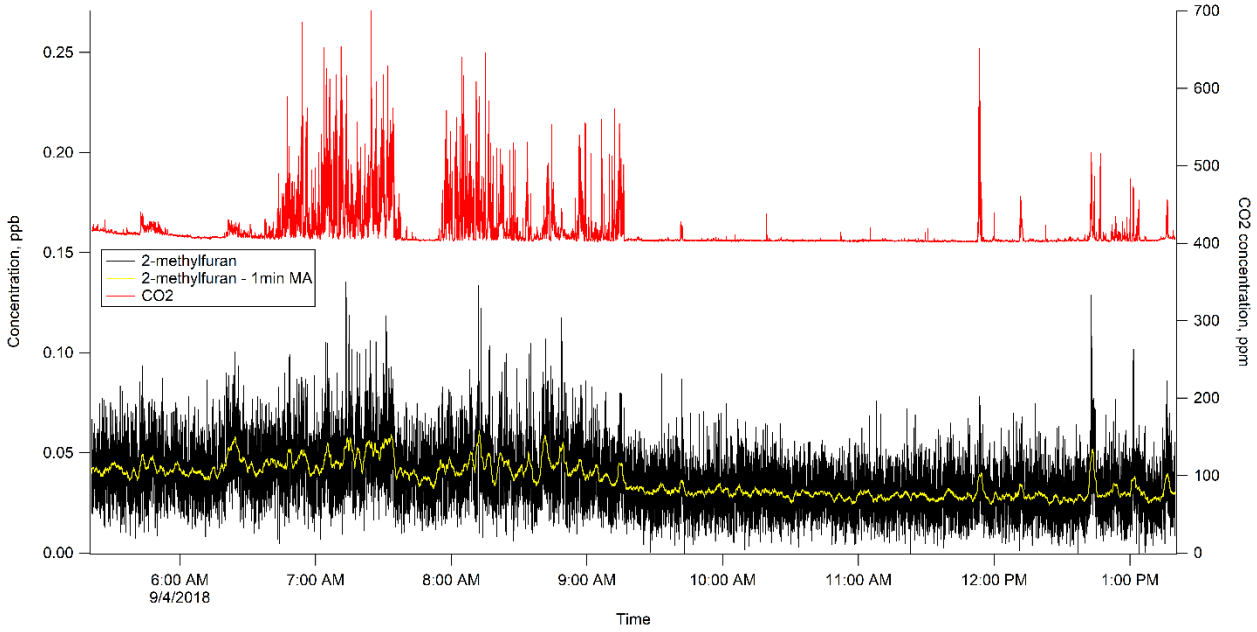

Figure 2-8. 2-methylfuran.

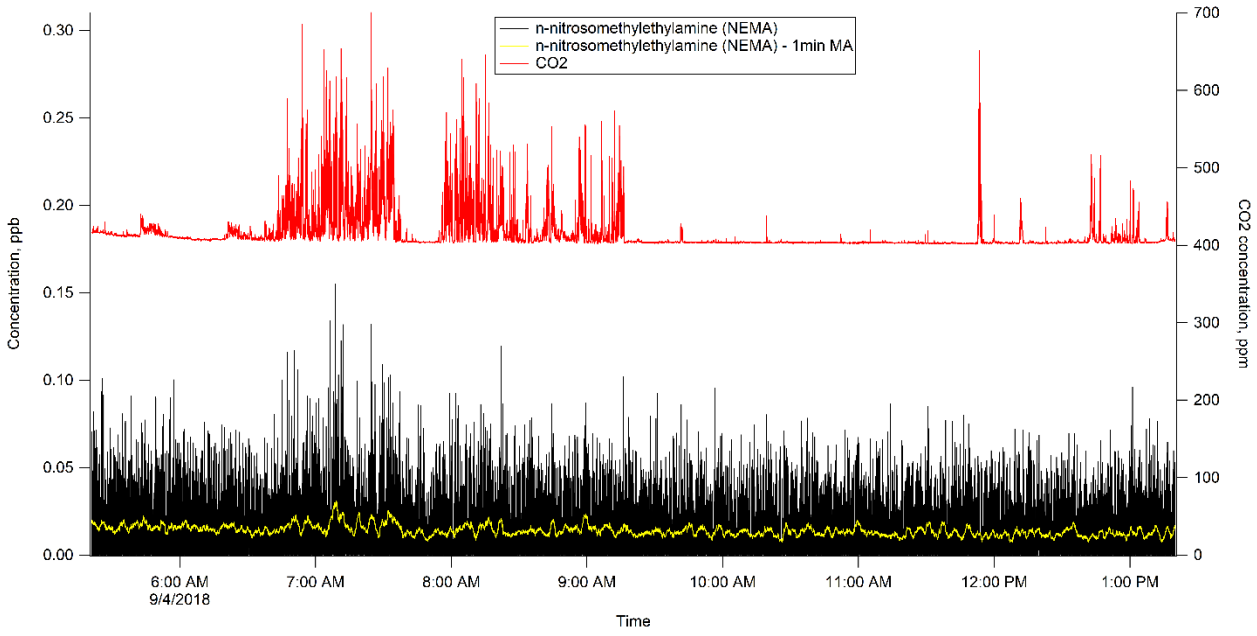

Figure 2-9. N-nitrosomethylethylamine (NEMA).

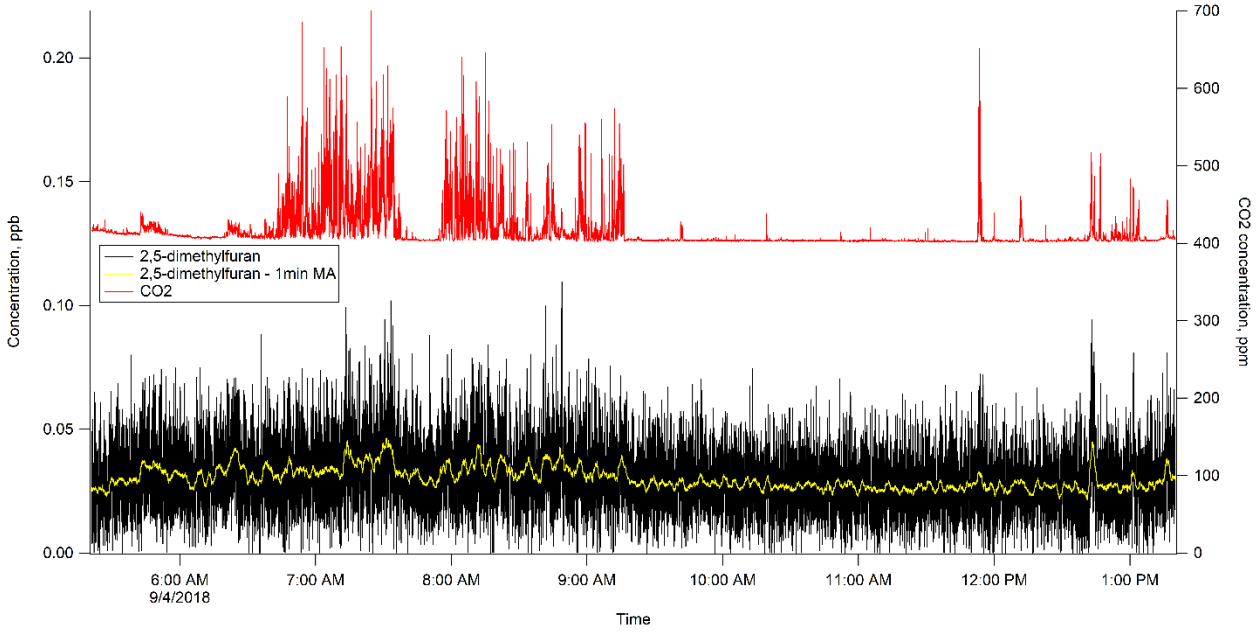

Figure 2-10. 2, 5-dimethylfuran.

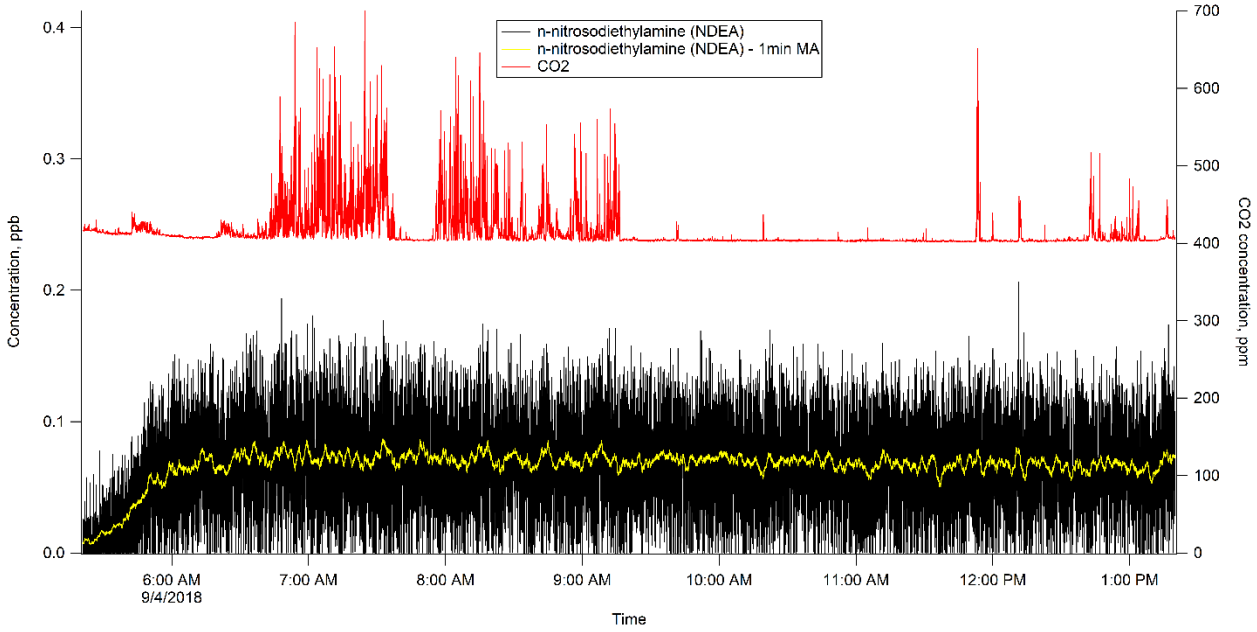

Figure 2-11. N-nitrosodiethylamine (NDEA).

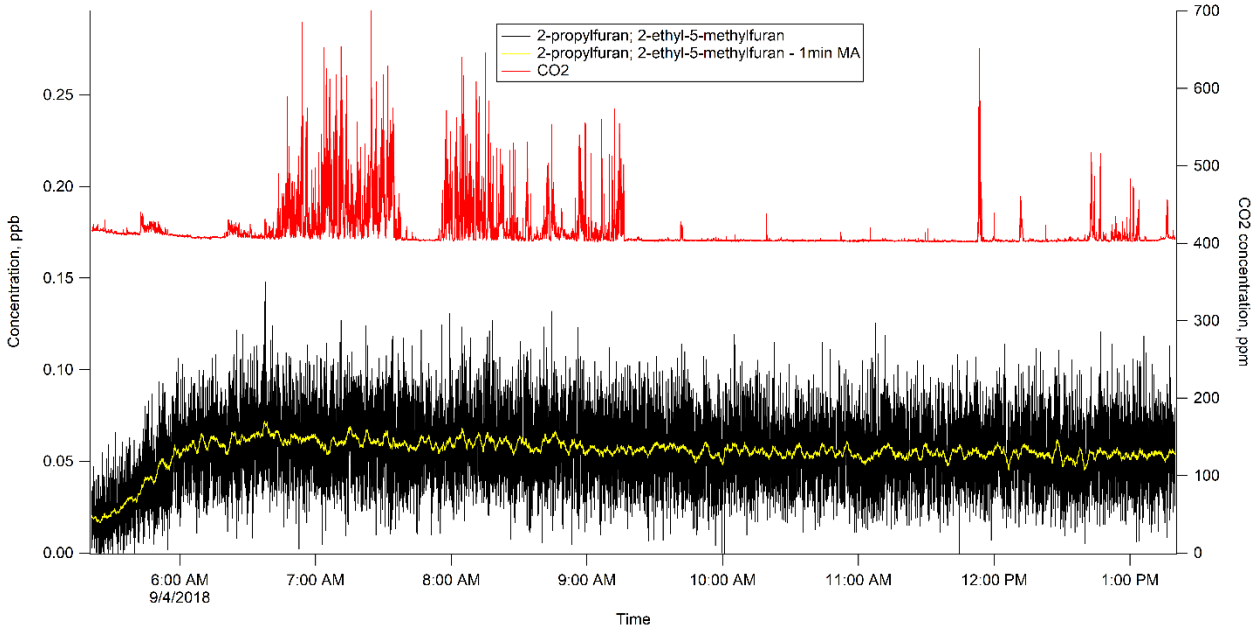

Figure 2-12. 2-propylfuran; 2-ethyl-5-methylfuran.

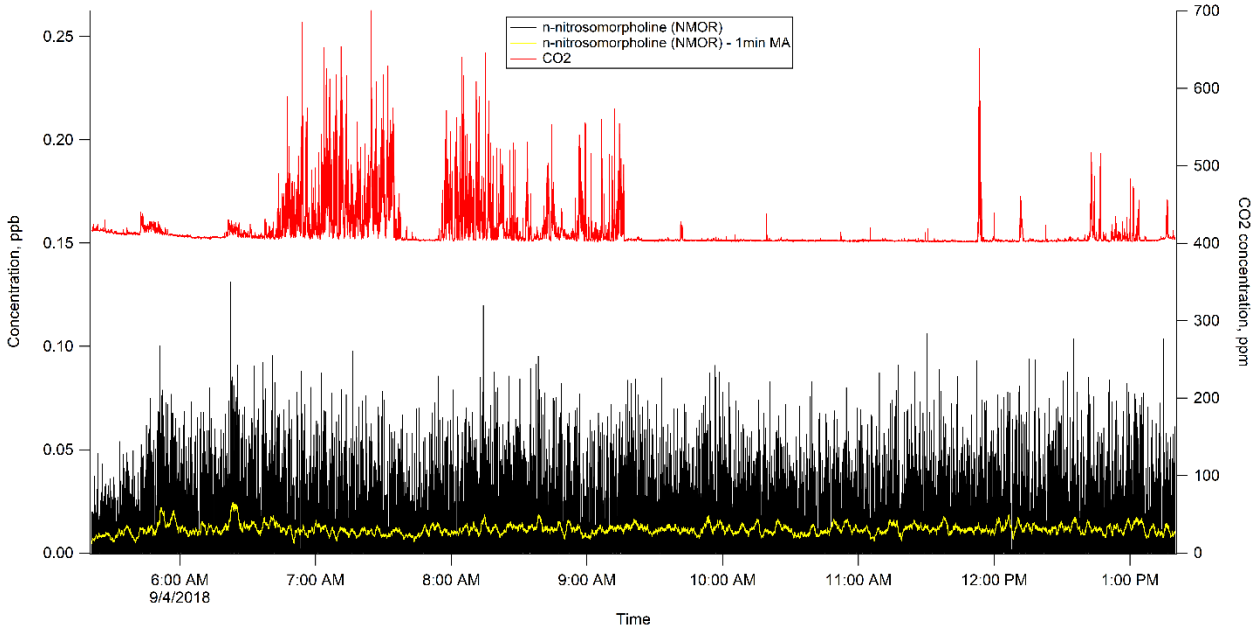

Figure 2-13. N-nitrosomorpholine (NMOR).

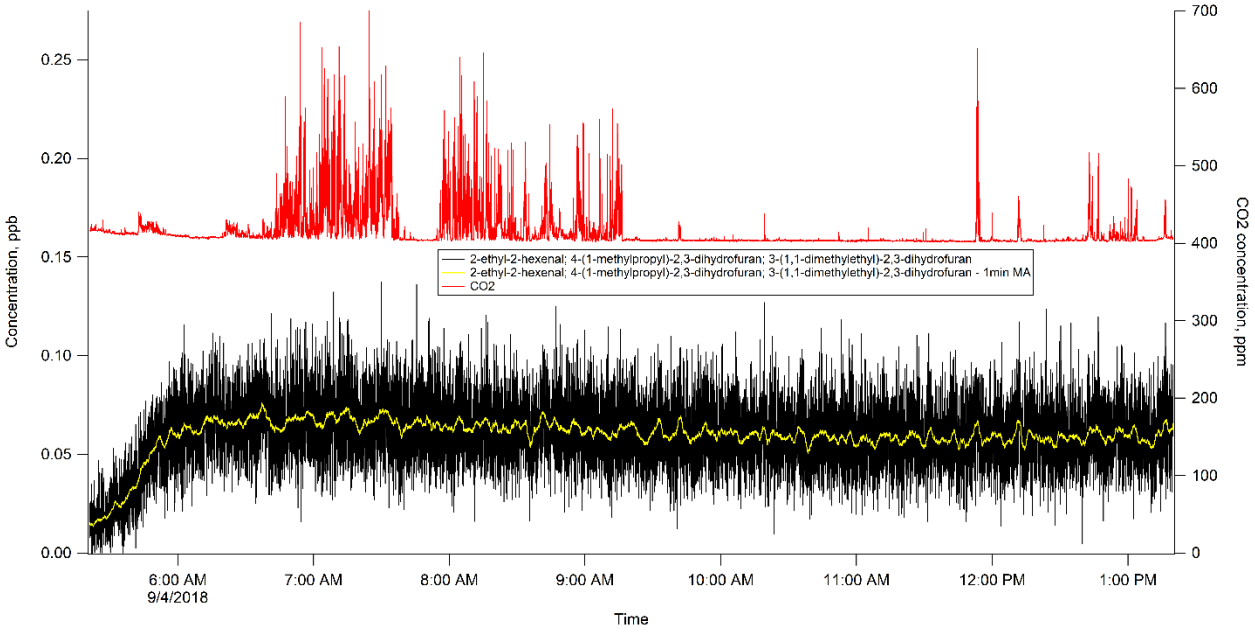

Figure 2-14. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran.

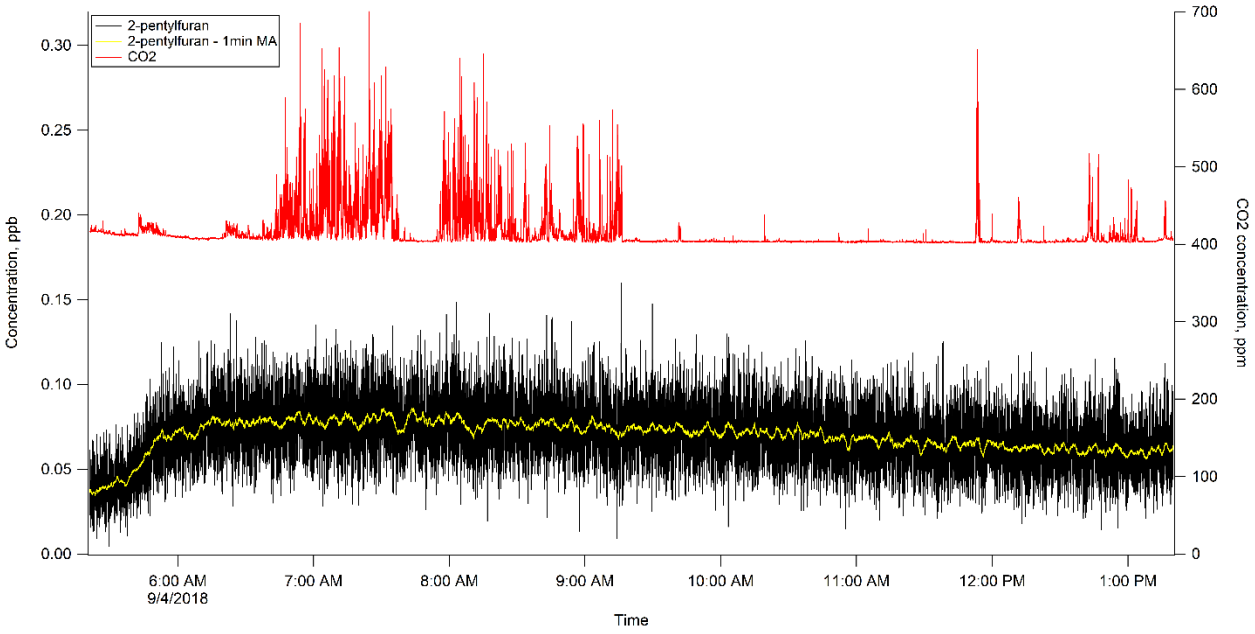

Figure 2-15. 2-pentylfuran.

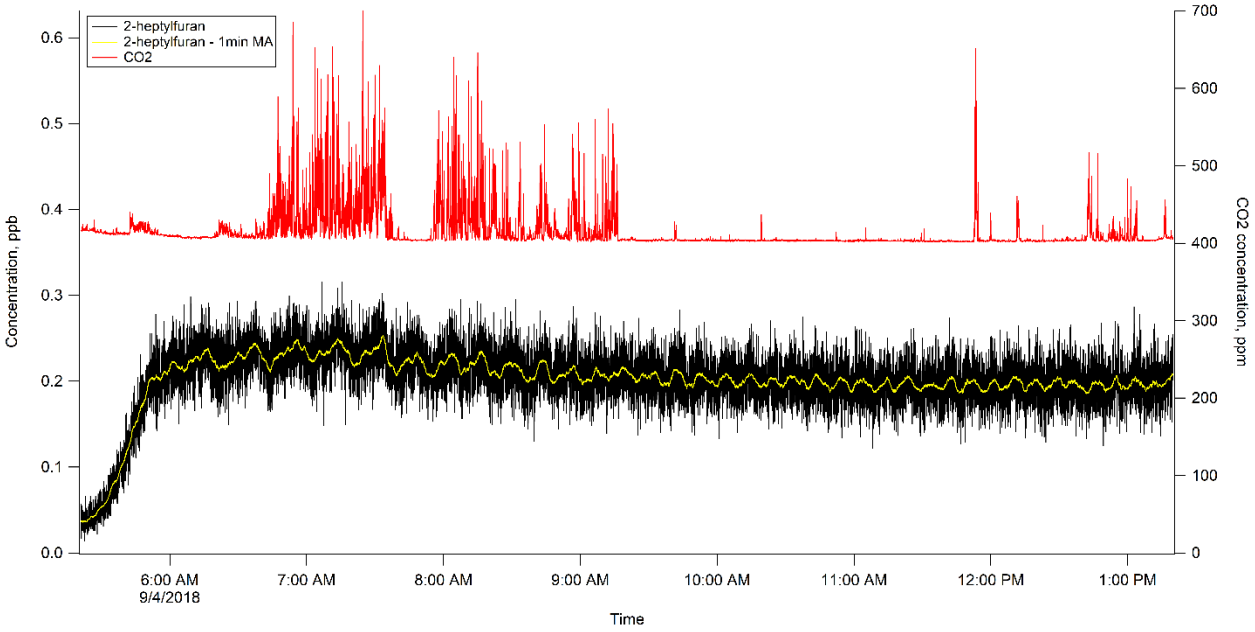

Figure 2-16. 2-heptylfuran.

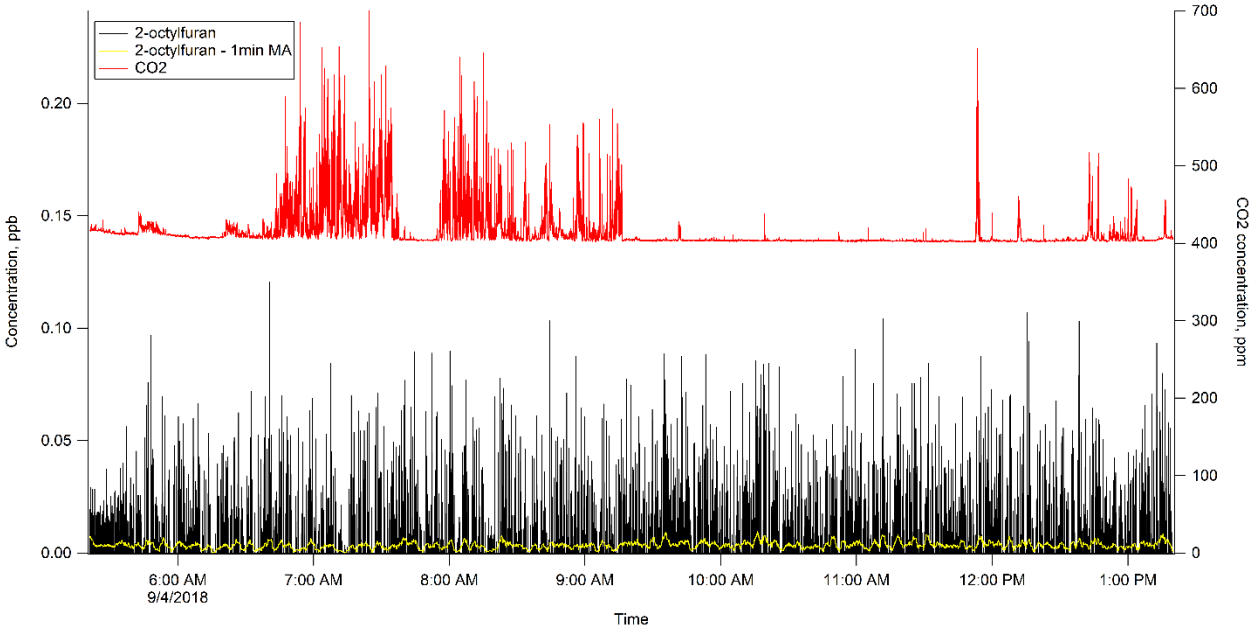

Figure 2-17. 2-octylfuran.

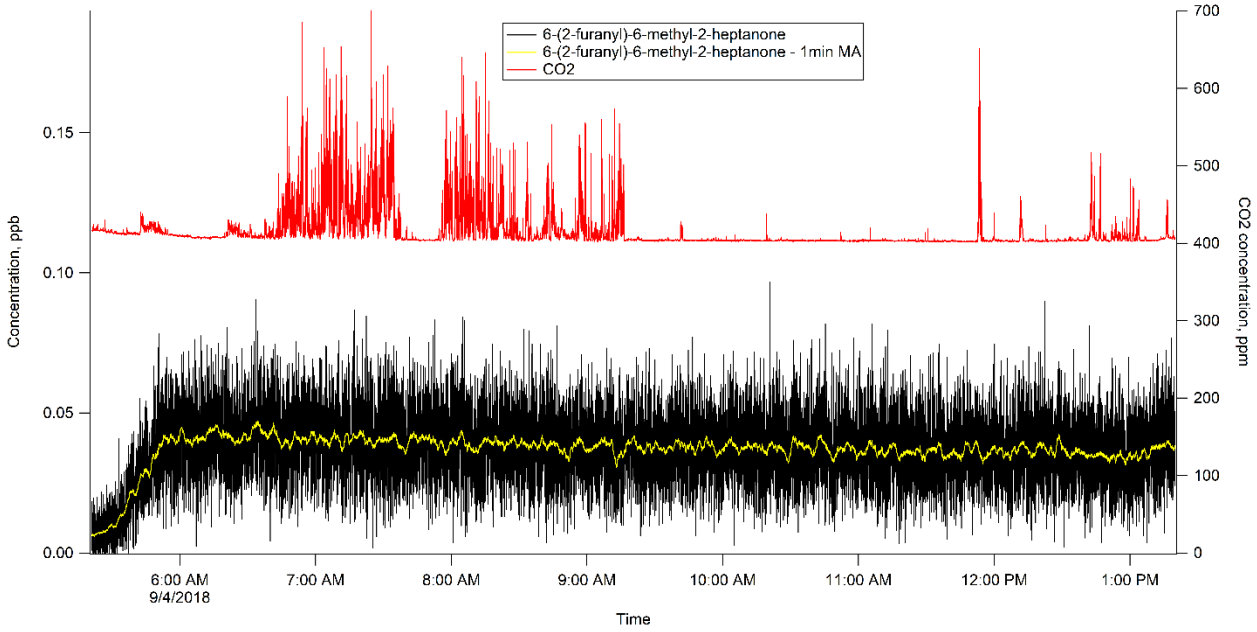

Figure 2-18. 6-(2-furanyl)-6-methyl-2-heptanone.

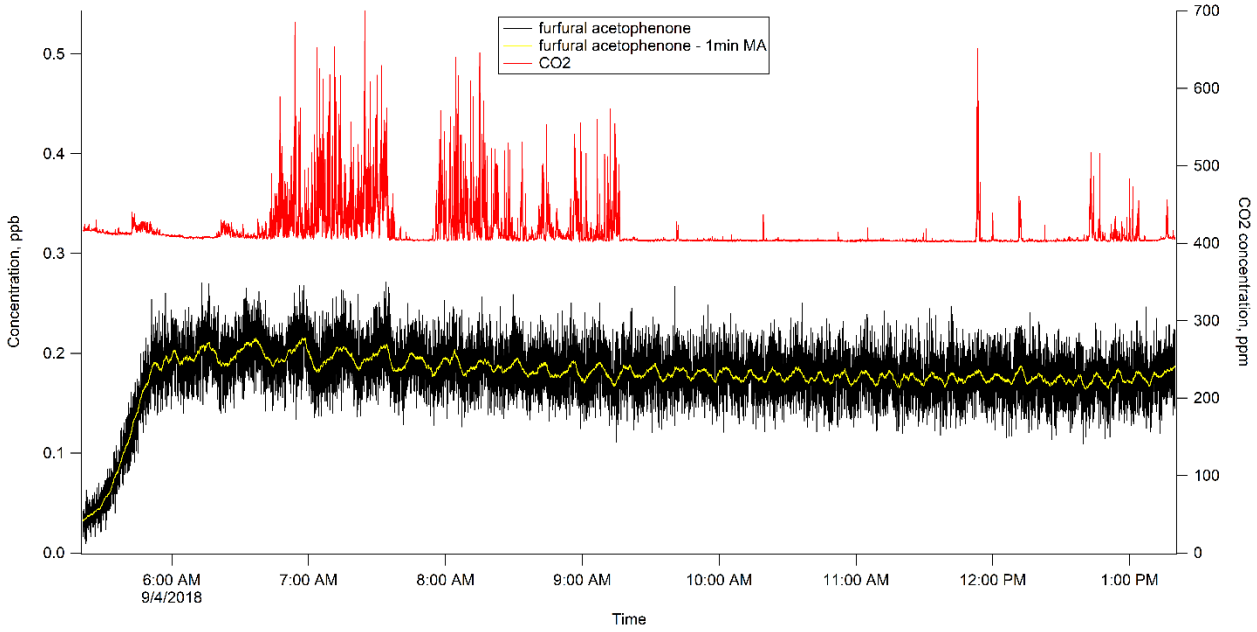

Figure 2-19. Furfural Acetophenone.

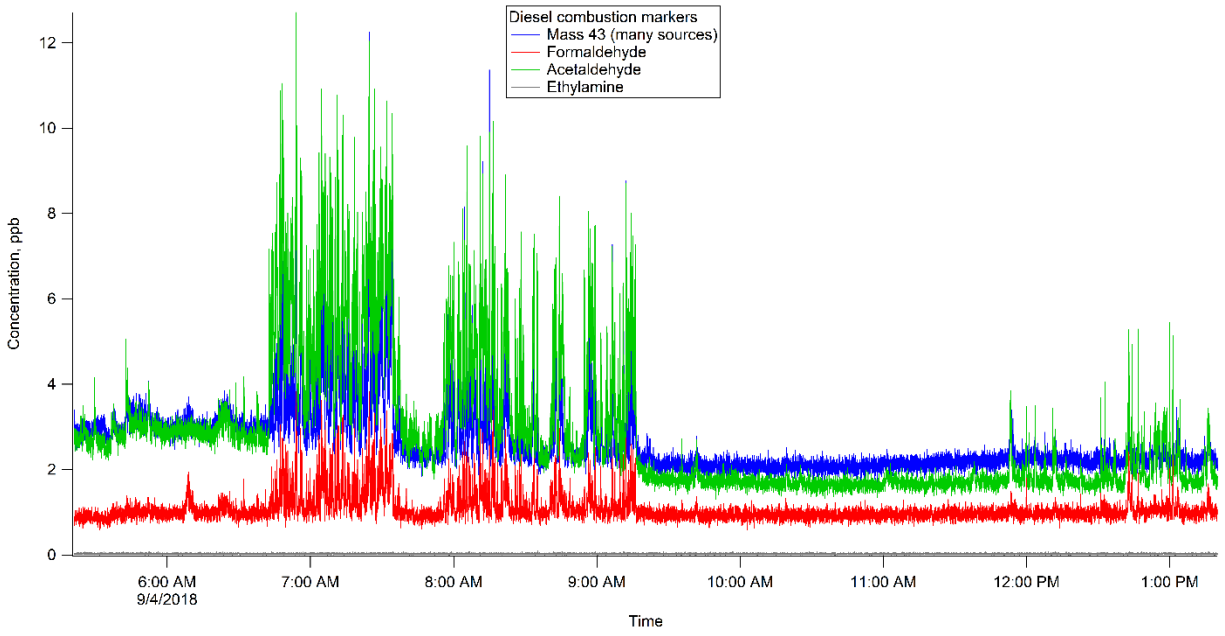

Figure 2-20. Diesel Combustion Markers.

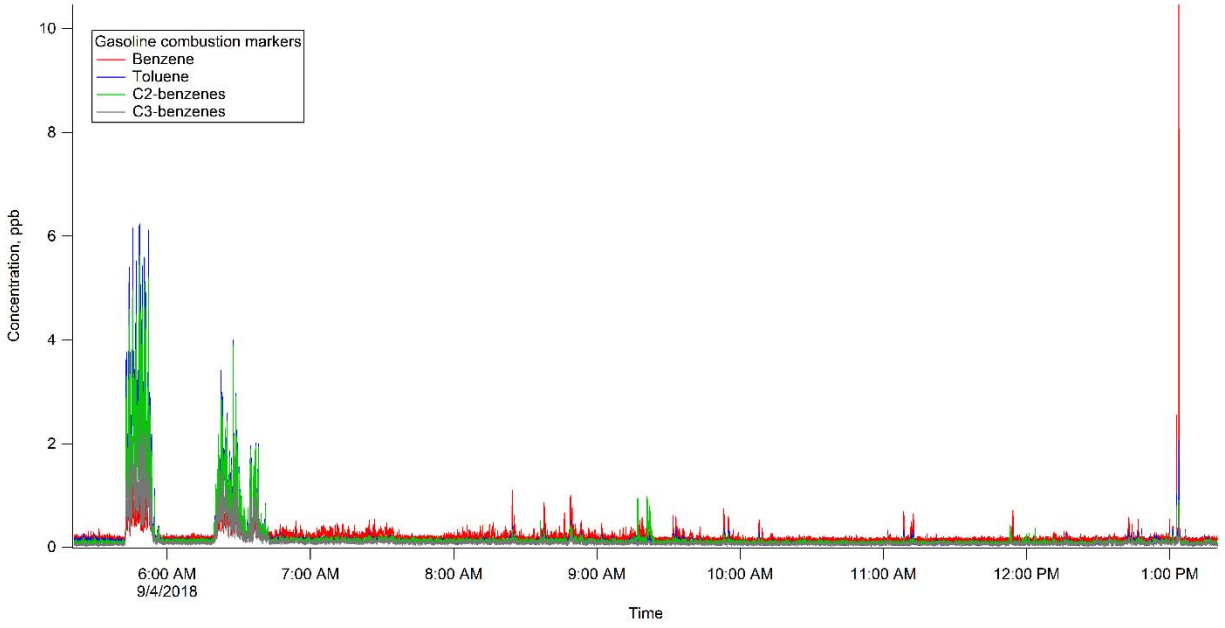

Figure 2-21. Gasoline Combustion Markers.

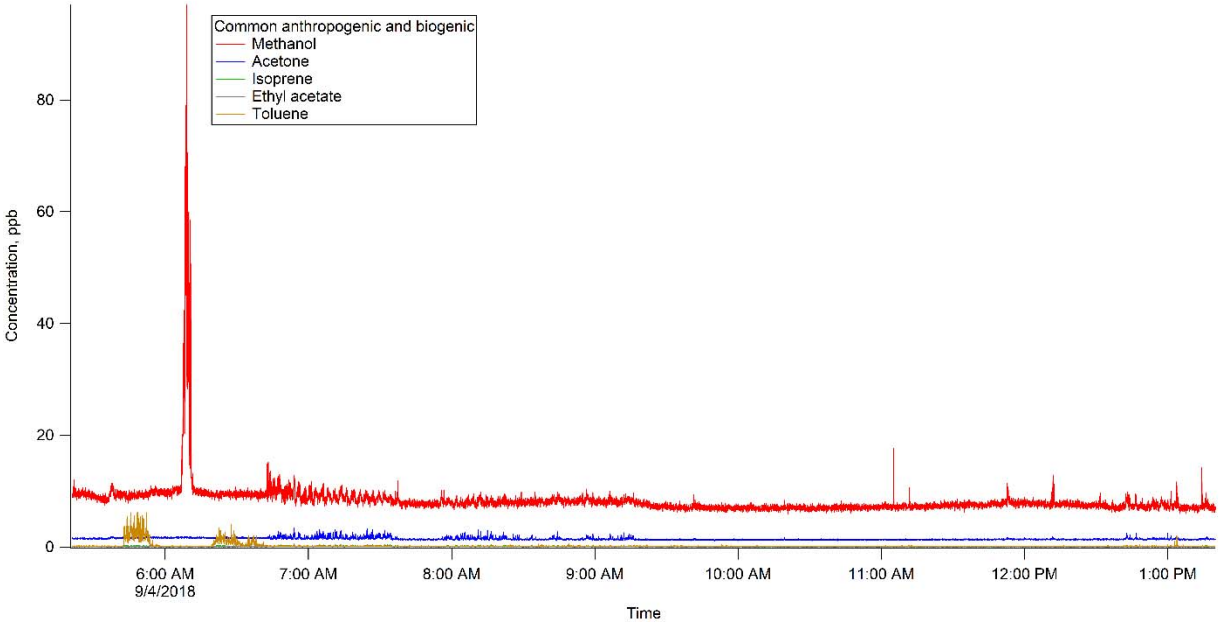

Figure 2-22. Plant and Human Markers.

3.0 SEPTEMBER 5, 2018 – SX PAVING

3.1 Quality Assessment

Data from September 5, 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. DR18-007, "Deficiency Report," was initiated to adequately document the 1 hour and 16 minutes of data loss on the PTR-MS. This instance will be discussed in detail in a subsequent monthly summary report.

3.2 Summary

On September 5, 2018, the ML performed general area monitoring of the Hanford Site in support of the SX Paving Project.

The ML arrived on site and checked in at the CSO at 05:26. A QA/QC zero air/sensitivity check began at 04:09 on the CO_2 monitor prior to arrival. The ML staff began mobile monitoring of SX Farm at 06:00. From 06:00 - 08:23, the ML relocated to numerous locations south/southeast of SX Farm in an attempt to remain downwind of the paving in progress.

At 08:23, the ML staff's radio died prompting a trip to the CSO for a replacement radio. The ML was back mobile monitoring SX at 09:04, during which the ML performed SX Farm surveys until parking south of SX Farm.

From 09:10 - 10:26, an issue with the PTR-MS instrument occurred that caused no data collection during this timeframe. At approximately 13:05, WRPS QA representative Cris Lungu performed a surveillance of the ML and Report no. 66409-RPT-004.

The ML staff checked out with the CSO at 14:00. At 14:00, the QA/QC zero air/sensitivity check of the Picarro Ammonia Analyzer was also initiated. Upon return to the TerraGraphics warehouse in Pasco, WA, the QA/QC zero air/sensitivity check of the PTR-MS was performed beginning at 15:05.

Table 3-1. Mobile Laboratory Sampling Mode Throughout the Monitoring Period.

Time	Location	Sampling Mode
06:00 - 06:13	SX Farm	Mobile Area Sampling
06:13 - 06:48	SX Farm SE corner of SX	Mobile Area Sampling
06:48 - 06:55	SX Farm East of SX	Mobile Area Sampling
06:55 - 07:19	SX Farm South of SX	Mobile Area Sampling
07:19 - 08:23	SX Farm- SE of SX	Mobile Area Sampling
08:23 - 09:04	SX to CSO need new radio	(Mobile)
09:04 - 09:20	SX Farm driving around SX, by parking lot South of Farm	Mobile Area Sampling
09:10 - 10:26	SX Farm South of SX; PTR-MS not collecting data	Mobile Area Sampling
10:26 - 13:38	SX Farms South of SX; PTR-MS collecting data	Mobile Area Sampling

Figure 3-1. Mobile Laboratory Location for the Duration of the Monitoring Period.

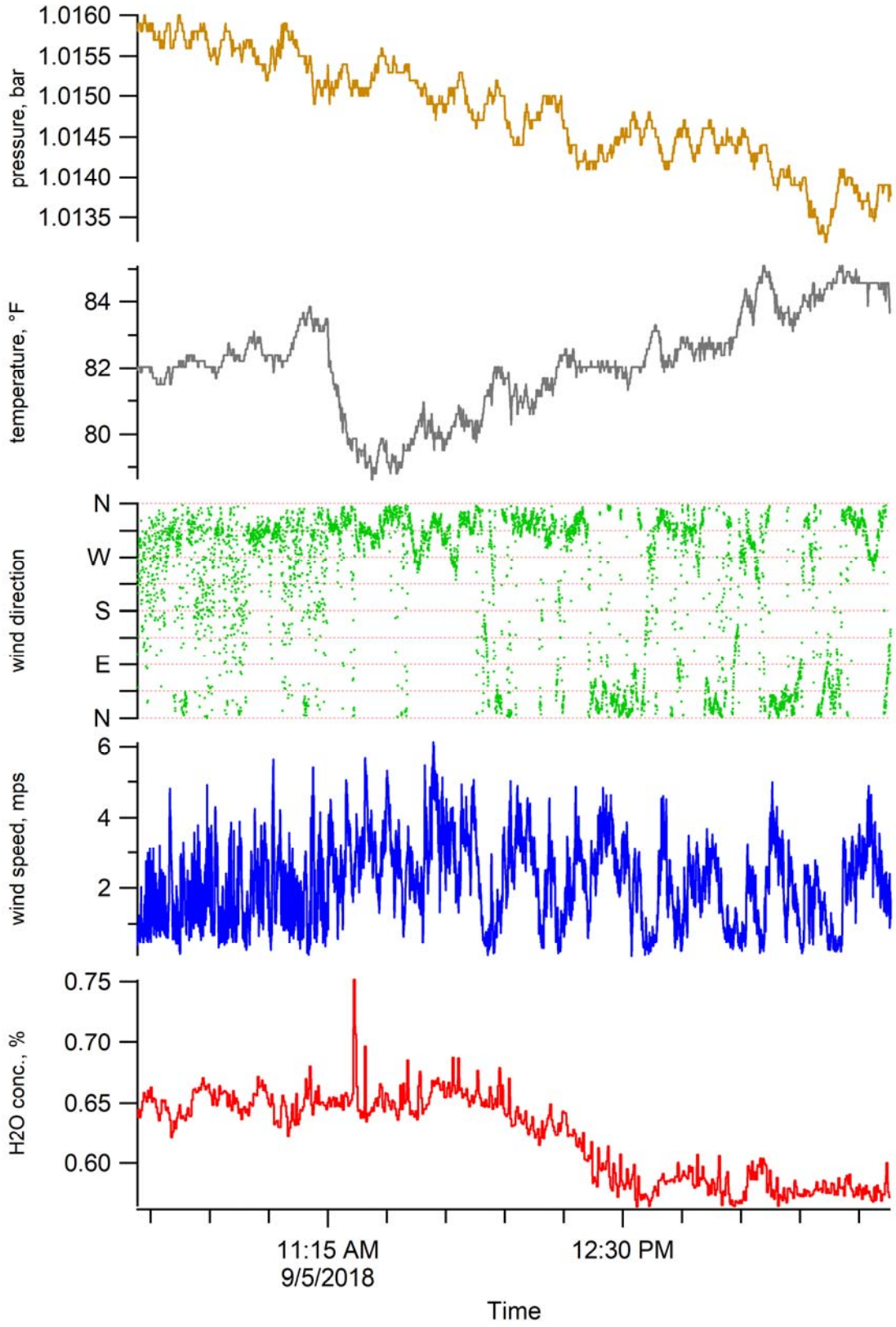

Figure 3-2. Weather Data for the Duration of the Monitoring Period.

3.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-TOF 6000 X2,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were not collected during this period.

Table 3-2. COPC Statistical Information for the Monitoring Period of September 5, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max (ppb)	Median (ppb)
1	ammonia	25000	4.922	0.434	8.815	6.375	4.810
2	formaldehyde	300	1.310	0.326	24.911	6.689	1.250
3	methanol	200000	10.053	0.726	7.220	16.416	10.062
4	acetonitrile	20000	0.337	0.040	11.951	0.493	0.336
5	acetaldehyde	25000	2.278	0.727	31.927	12.373	2.067
6	ethylamine	5000	0.025	0.012	49.418	0.078	0.023
7	1,3-butadiene	1000	0.076	0.100	131.864	1.356	0.050
8	propanenitrile	6000	0.047	0.016	35.038	0.171	0.045
9	2-propenal	100	0.166	0.064	38.375	1.523	0.157
10	1-butanol + butenes	20000	0.190	0.153	80.664	3.400	0.148
11	methyl isocyanate	20	0.034	0.015	44.808	0.123	0.032
12	methyl nitrite	100	0.097	0.048	49.520	1.464	0.091
13	furan	1	0.038	0.016	41.432	0.266	0.035
14	butanenitrile	8000	0.017	0.010	59.791	0.108	0.015
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	100, 1, 1	0.054	0.024	44.264	N/A*	N/A*
16	butanal	25000	0.115	0.022	19.429	0.344	0.113
17	NDMA	0.3	0.025	0.028	112.616	0.185	0.016
18	benzene	500	0.188	0.054	28.458	0.713	0.178
19	2,4-pentadienenitrile + pyridine	300, 1000	0.039	0.012	30.433	0.090	0.037
20	2-methylene butanenitrile	30	0.012	0.007	58.587	0.076	0.009
21	2-methylfuran	1	0.031	0.014	43.214	0.183	0.030

Table 3-2. COPC Statistical Information for the Monitoring Period of September 5, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max (ppb)	Median (ppb)
22	pentanenitrile	6000	0.015	0.009	62.584	0.094	0.013
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.031	0.015	46.313	0.206	0.029
24	NEMA	0.3	0.014	0.018	130.159	0.105	0.005
25	2,5-dimethylfuran	1	0.028	0.013	47.833	0.110	0.027
26	hexanenitrile	6000	0.022	0.011	49.488	0.124	0.021
27	2-hexanone (MBK)	5000	0.025	0.015	57.186	0.172	0.023
28	NDEA	0.1	0.072	0.038	52.836	0.188	0.072
29	butyl nitrite + 2-nitro-2-methylpropane	100, 30	0.272	0.030	10.894	0.390	0.271
30	2,4-dimethylpyridine	500	0.079	0.022	27.464	0.348	0.077
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.057	0.019	33.830	0.139	0.055
32	heptanenitrile	6000	0.078	0.017	22.389	0.151	0.077
33	4-methyl-2-hexanone	500	0.070	0.018	25.179	0.141	0.069
34	NMOR	0.6	0.012	0.019	156.747	0.109	0.000
35	butyl nitrate	2500	0.041	0.016	39.906	0.110	0.040
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.065	0.017	25.909	0.135	0.063
37	6-methyl-2-heptanone	8000	0.062	0.015	24.231	0.123	0.061
38	2-pentylfuran	1	0.068	0.017	25.585	0.141	0.067
39	biphenyl	200	0.051	0.020	38.432	0.122	0.051
40	2-heptylfuran	1	0.218	0.028	12.658	0.356	0.217
41	1,4-butanediol dinitrate	50	0.070	0.018	25.250	0.147	0.069
42	2-octylfuran	1	0.003	0.011	330.393	0.121	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.003	0.012	383.451	0.124	0.000
44	PCB	1000	0.082	0.016	19.040	0.158	0.081
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.039	0.013	32.981	0.111	0.038
46	furfural acetophenone	1	0.190	0.024	12.748	0.281	0.190

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.394 ppb and the median value was 0.049 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 also suspect due to interferants identified during the background study.

The following figures display a selection of COPC signals, overlaid with the same signal smoothed using a one-minute moving average, and CO_2, for the monitoring period of September 5, 2018.

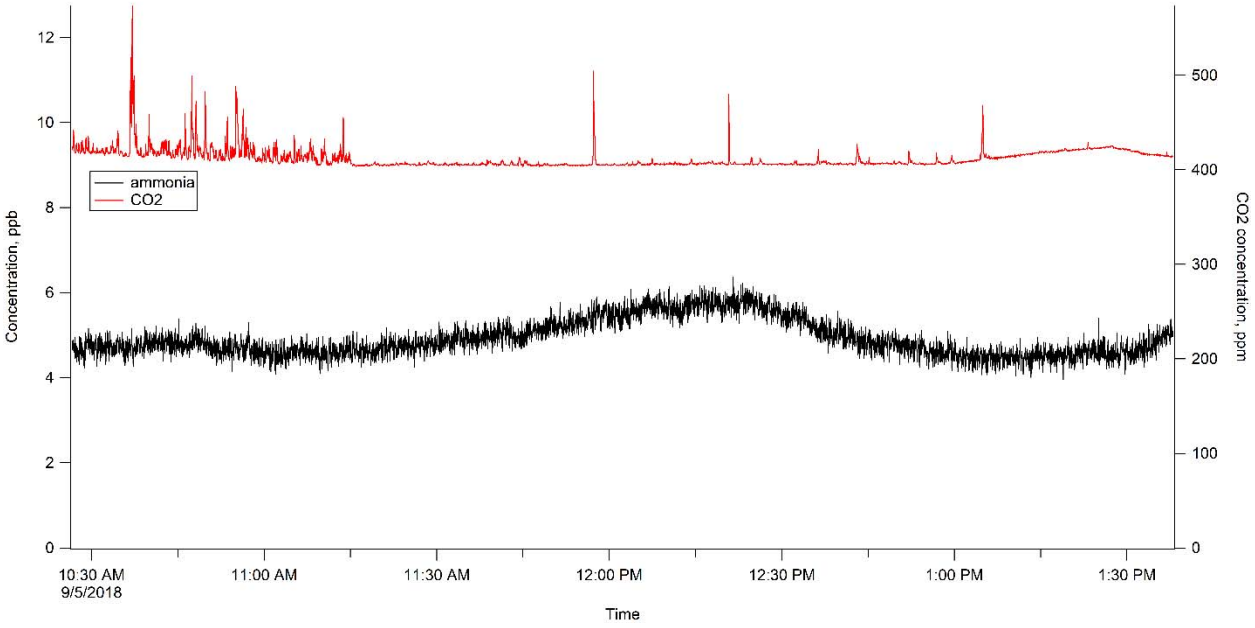

Figure 3-3. Ammonia.

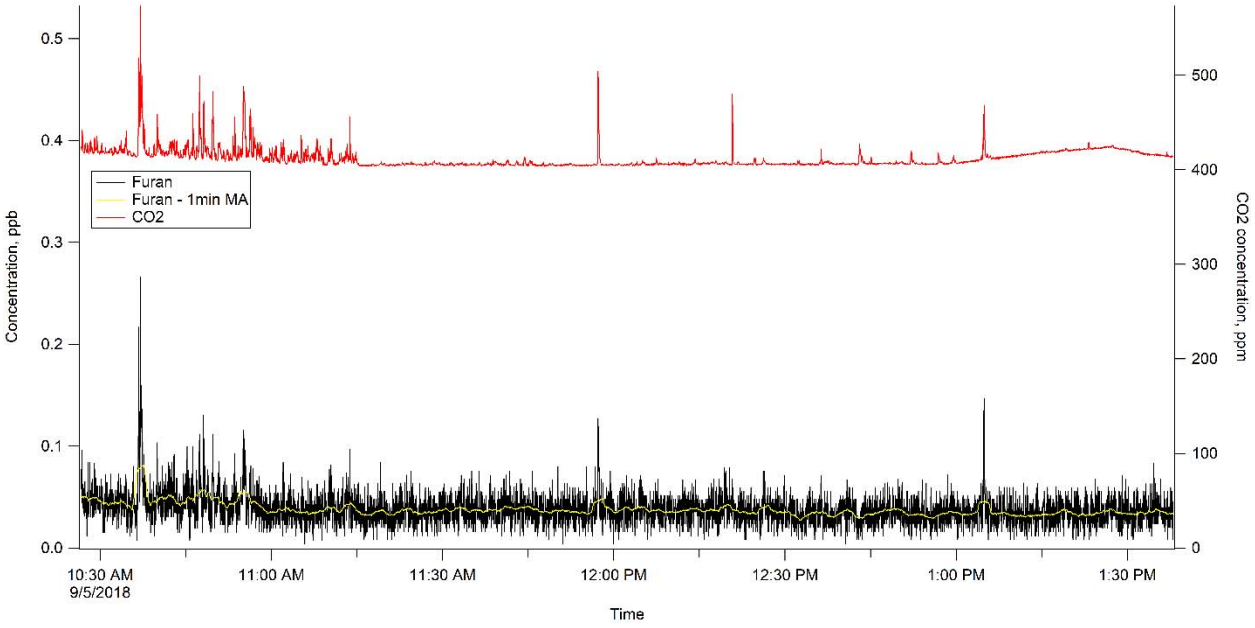

Figure 3-4. Furan.

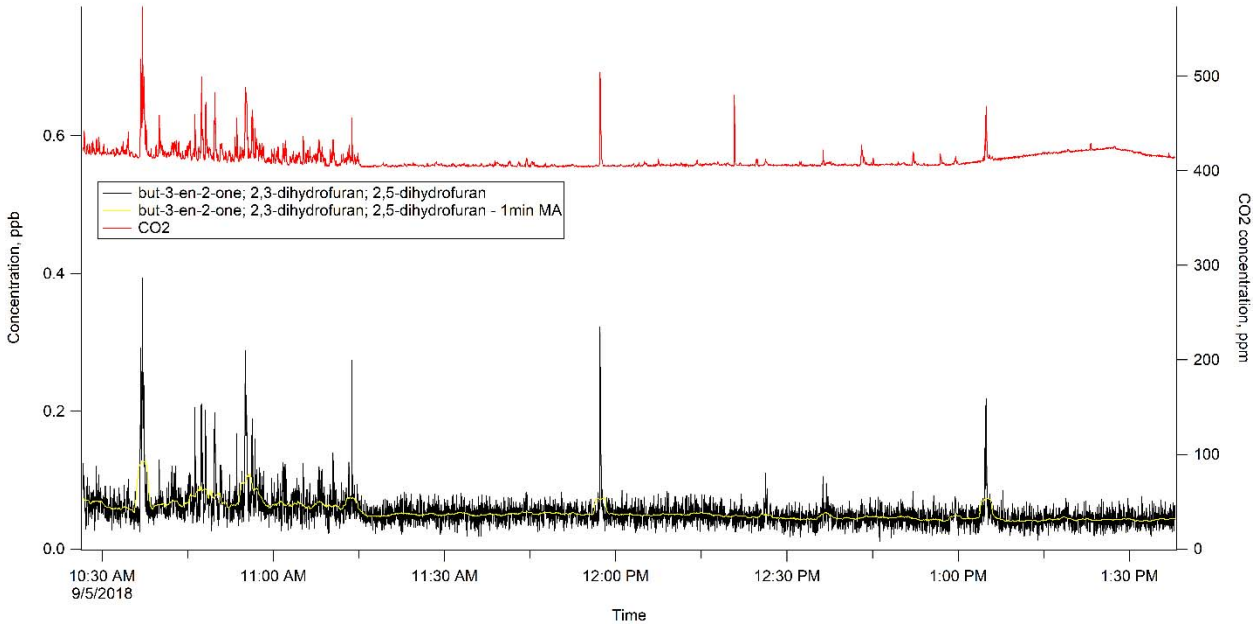

Figure 3-5. but-3-en-2-one; 2,3-dihydrofuran; 2,5-dihydrofuran.

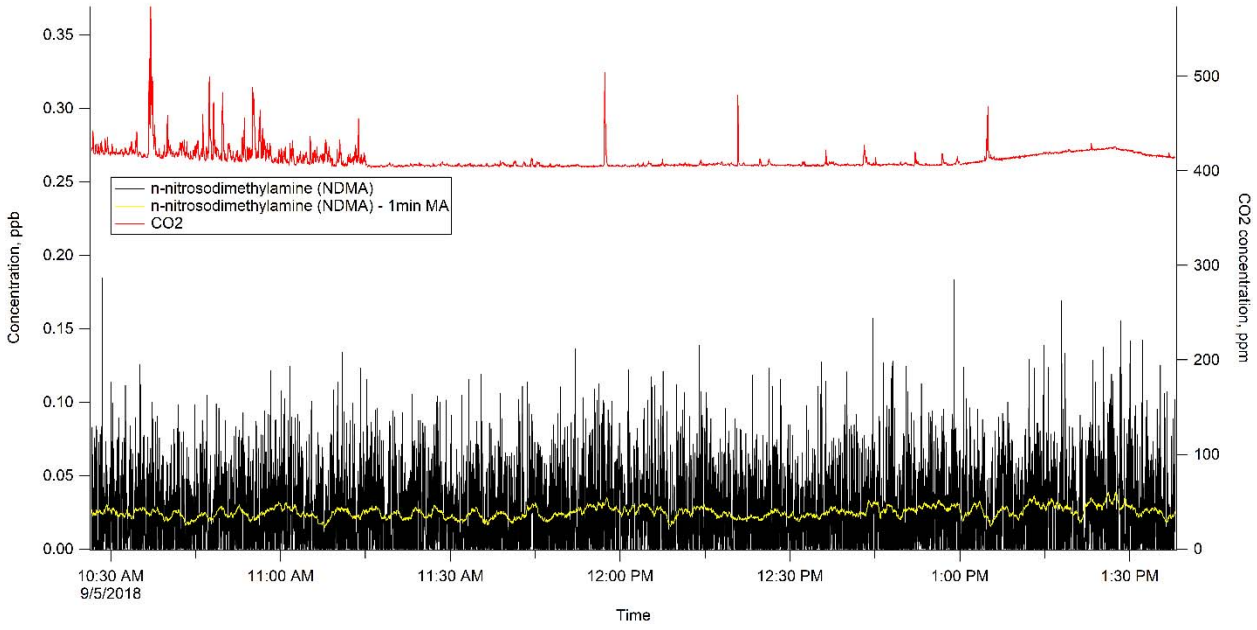

Figure 3-6. N-nitrosodimethylamine (NDMA).

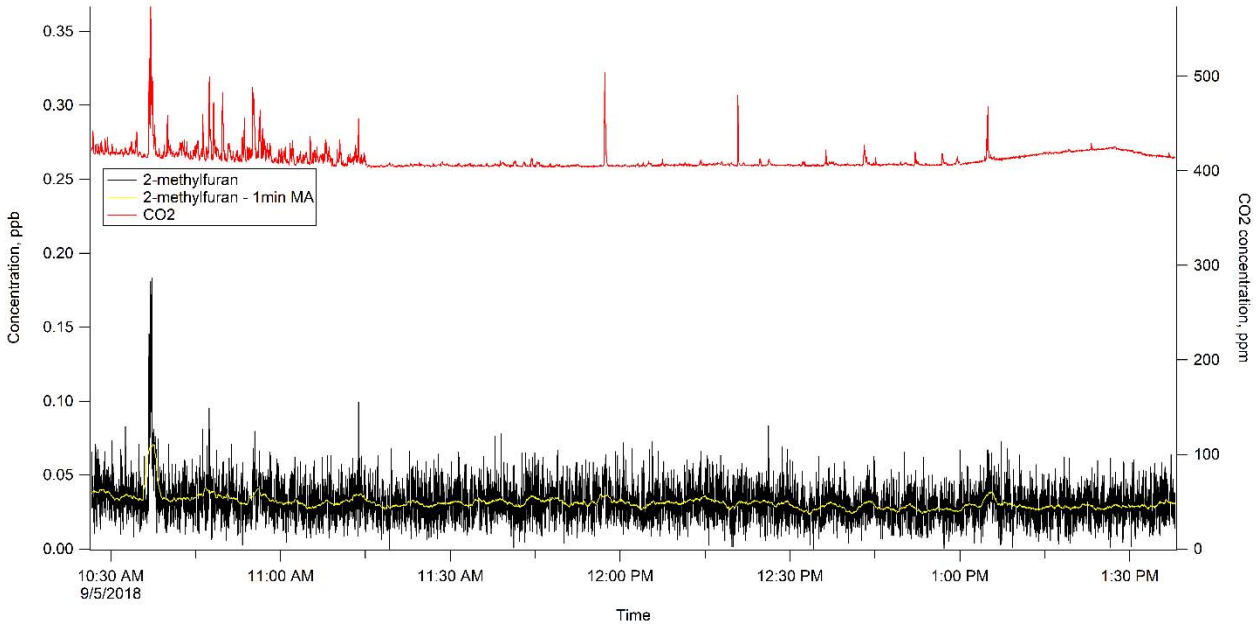

Figure 3-7. 2-methylfuran.

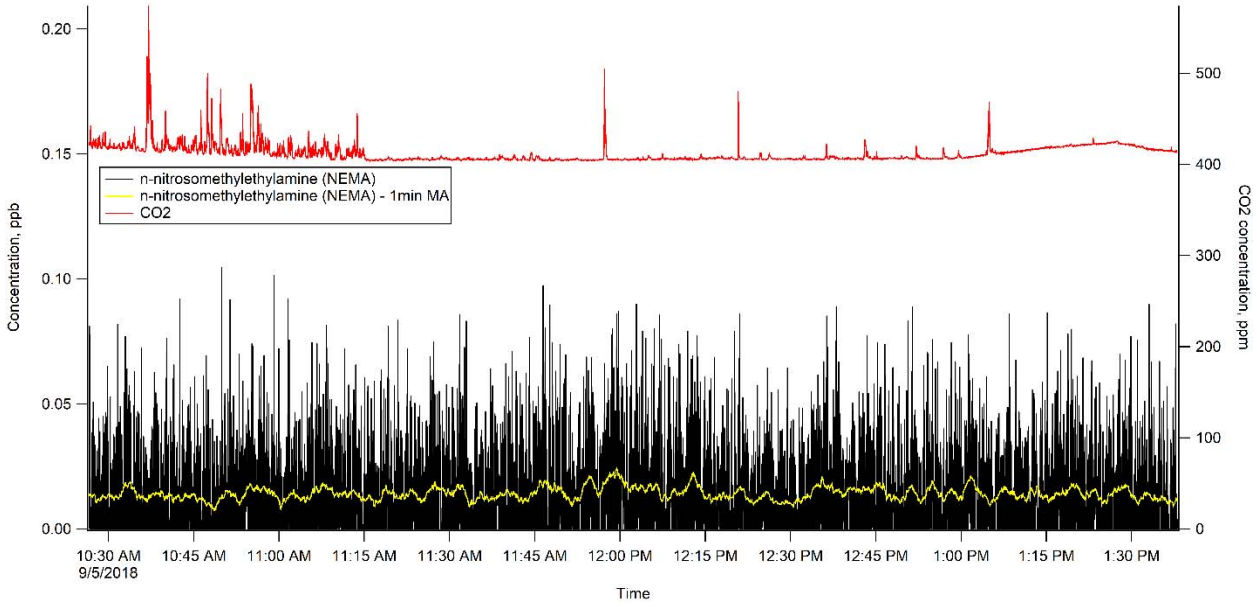

Figure 3-8. N-nitrosomethylethylamine (NEMA).

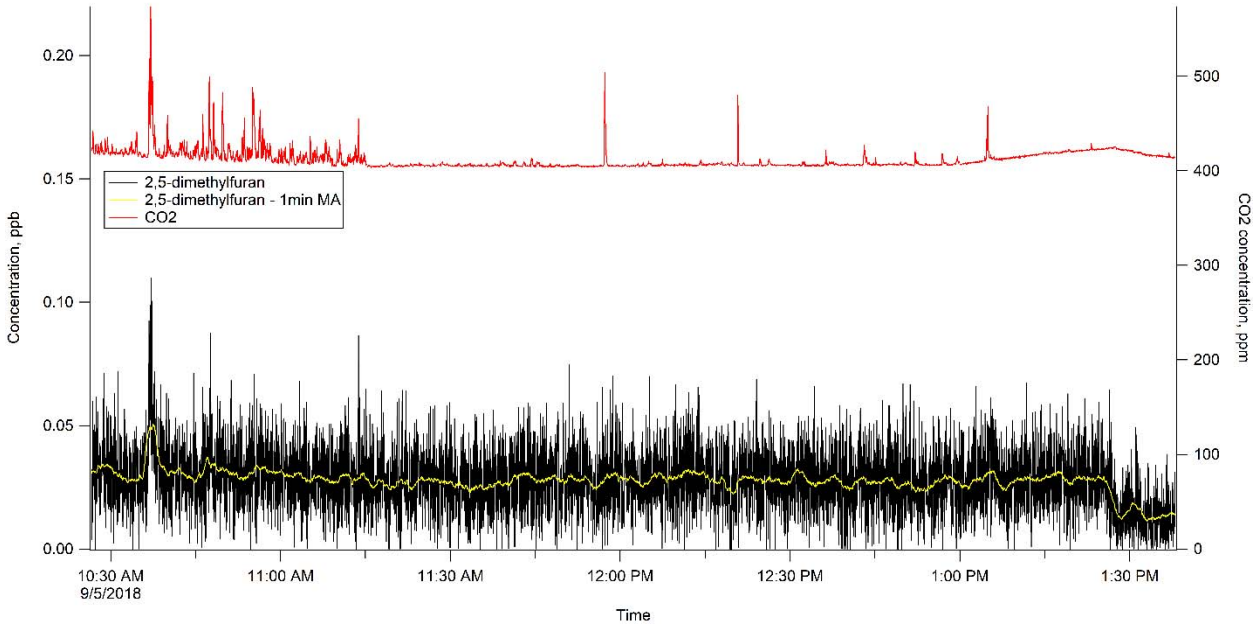

Figure 3-9. 2, 5-dimethylfuran.

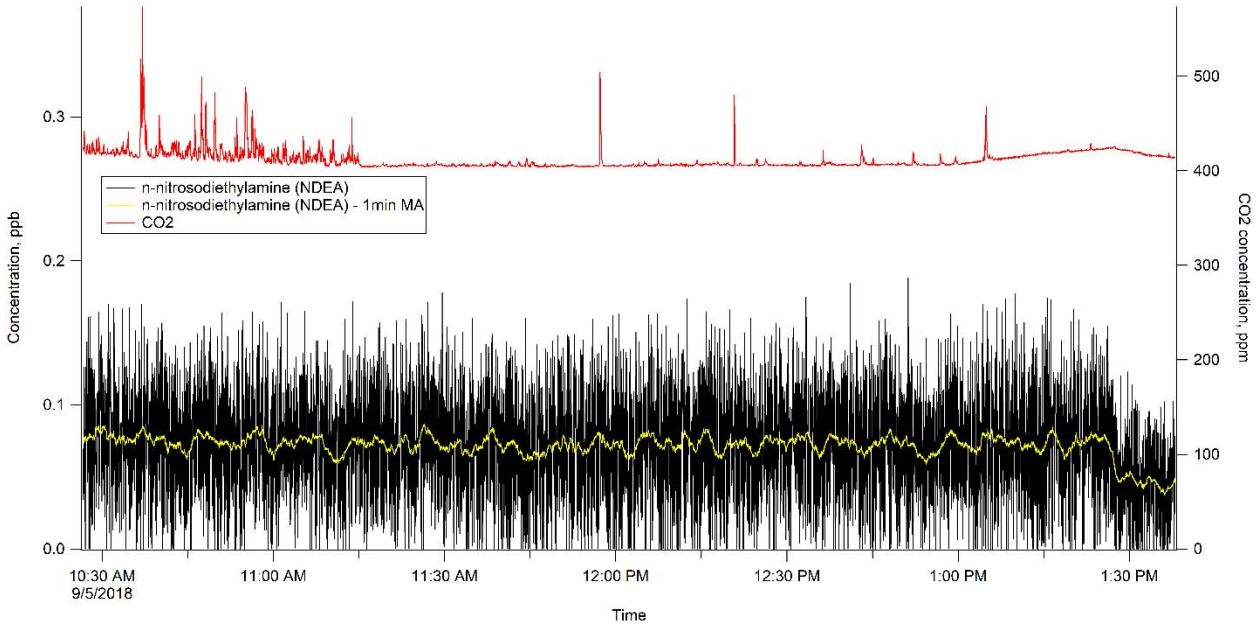

Figure 3-10. N-nitrosodiethylamine (NDEA).

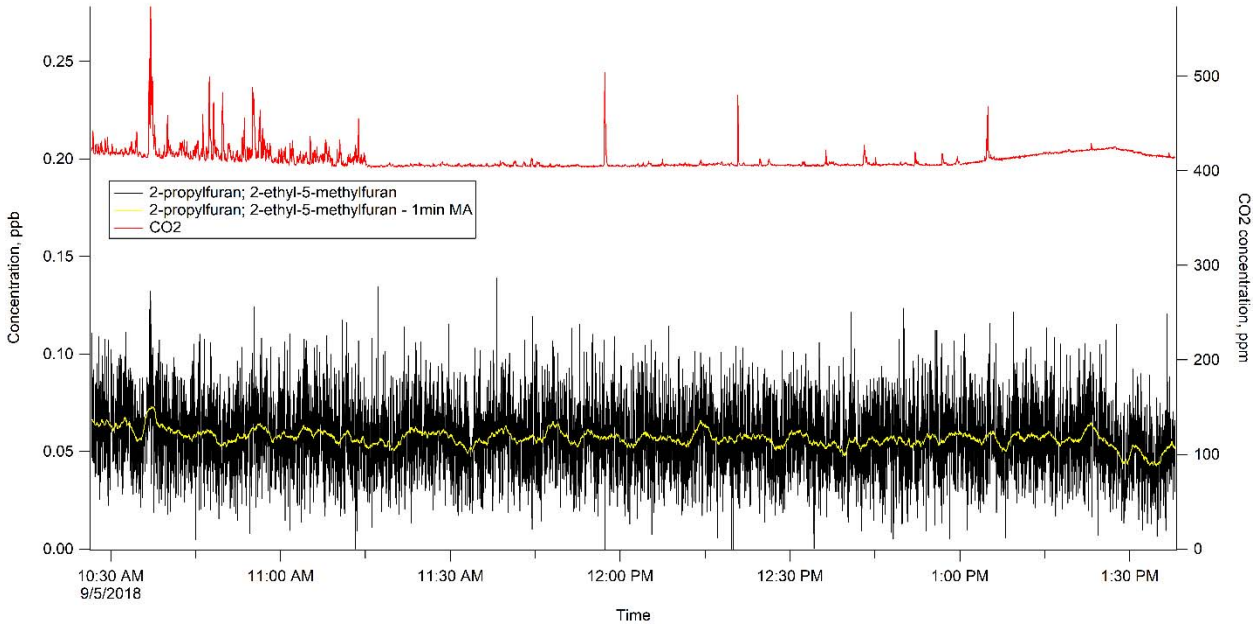

Figure 3-11. 2-propylfuran; 2-ethyl-5-methylfuran.

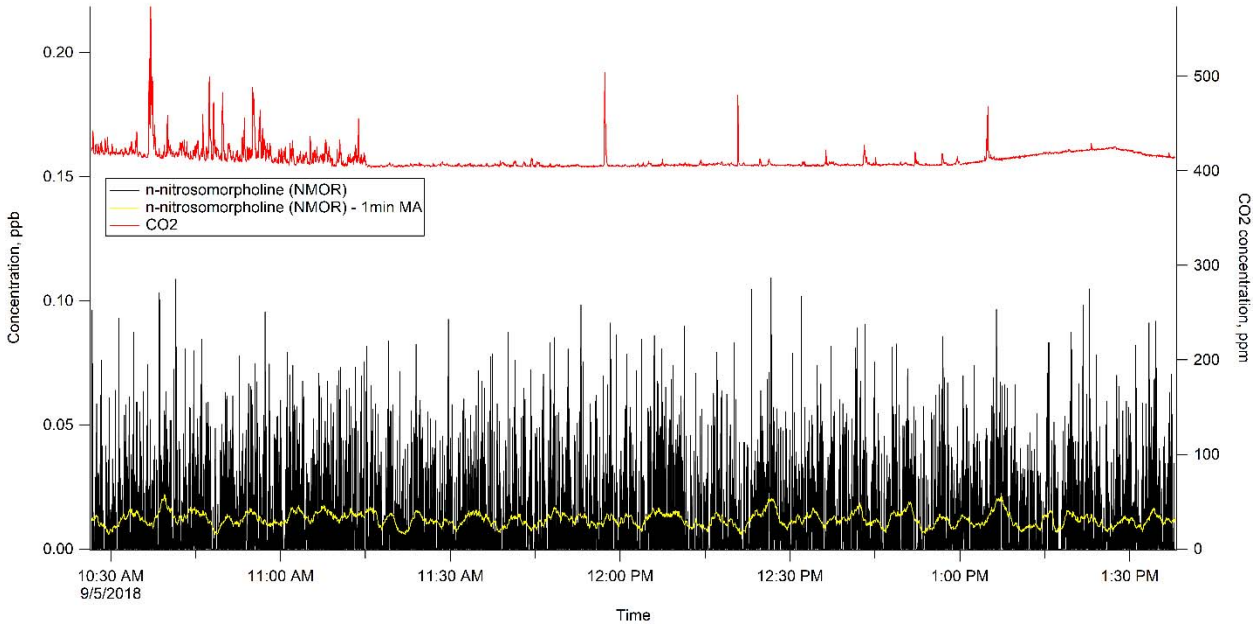

Figure 3-12. N-nitrosomorpholine (NMOR).

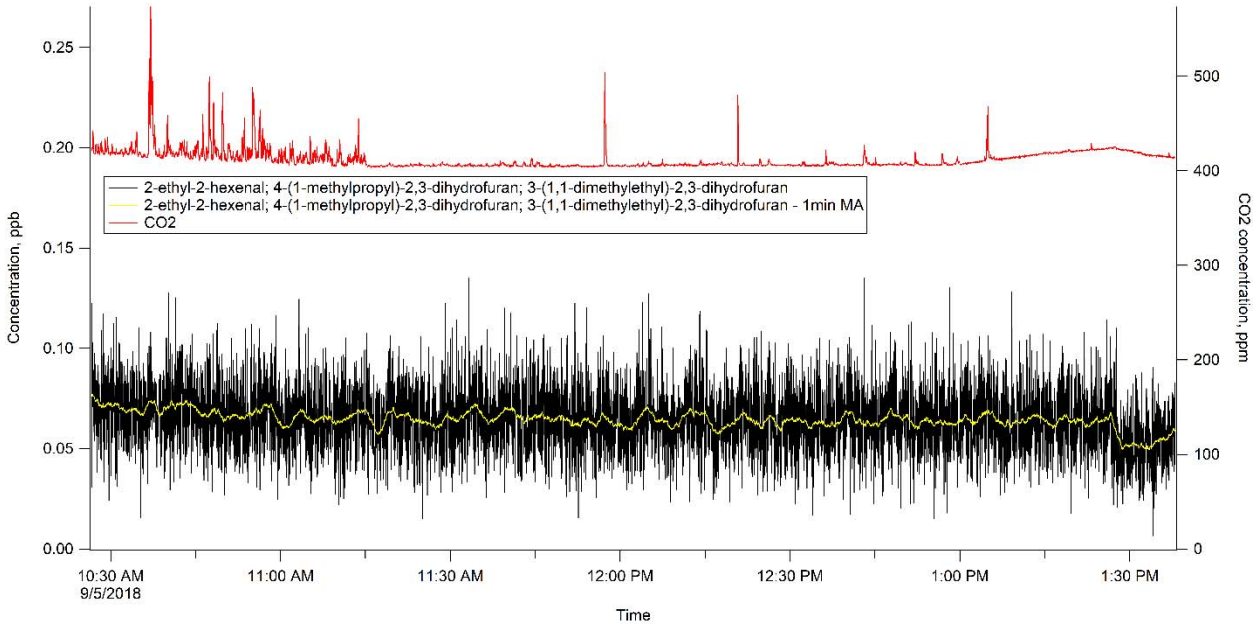

Figure 3-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran.

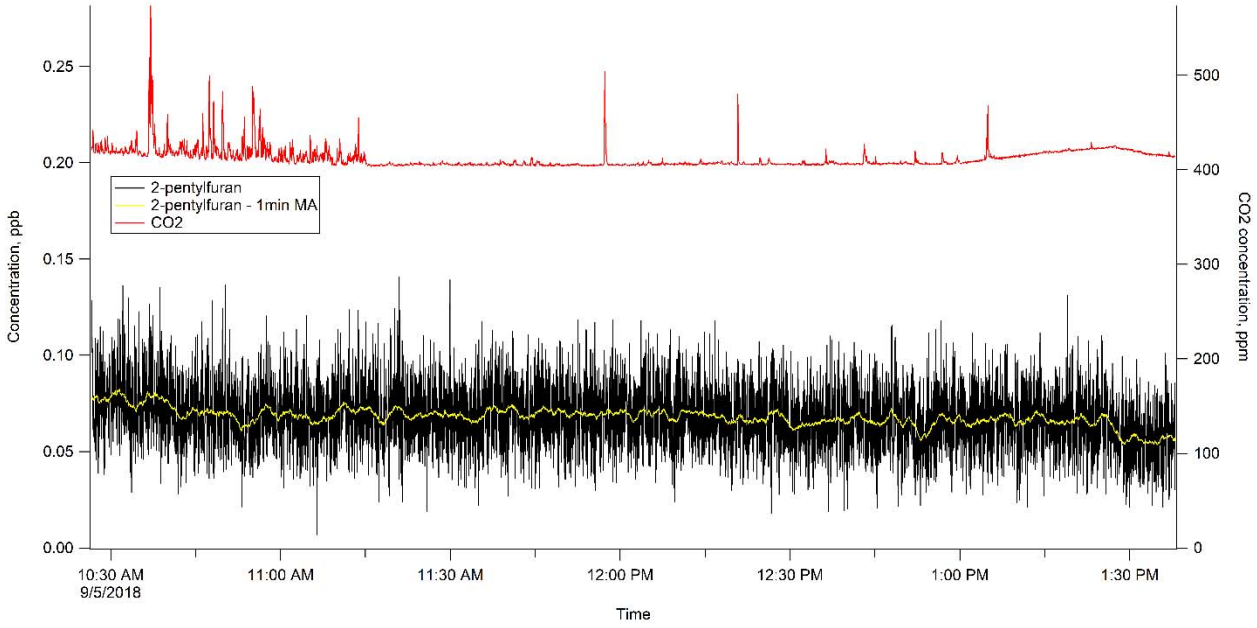

Figure 3-14. 2-pentylfuran.

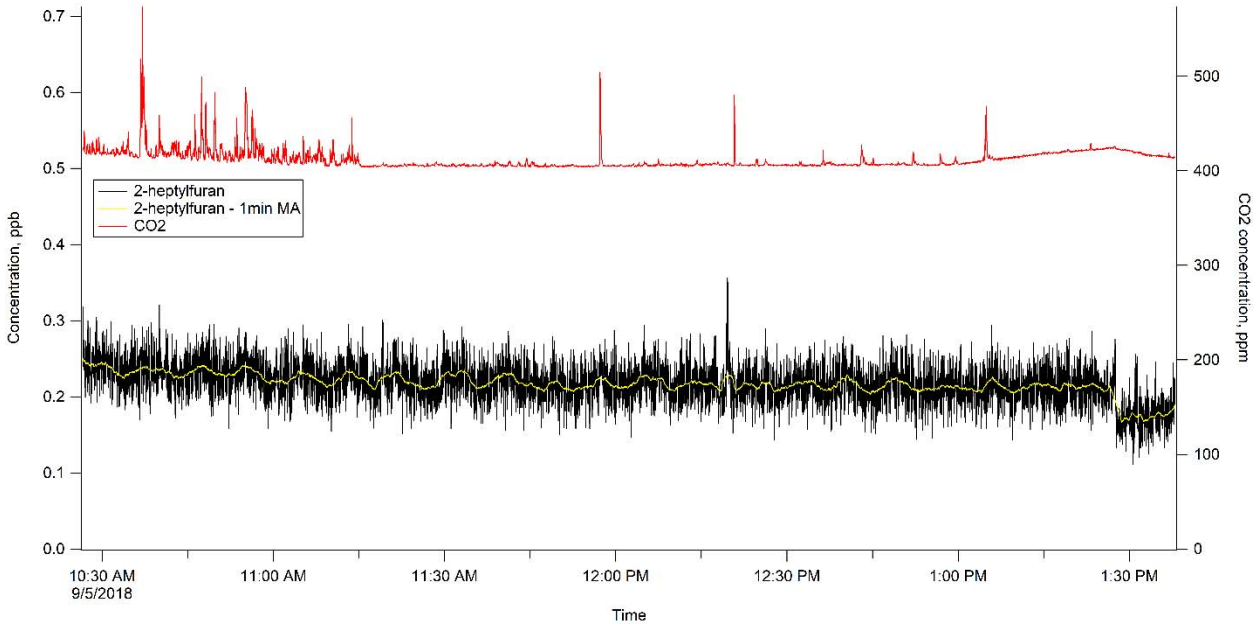

Figure 3-15. 2-heptylfuran.

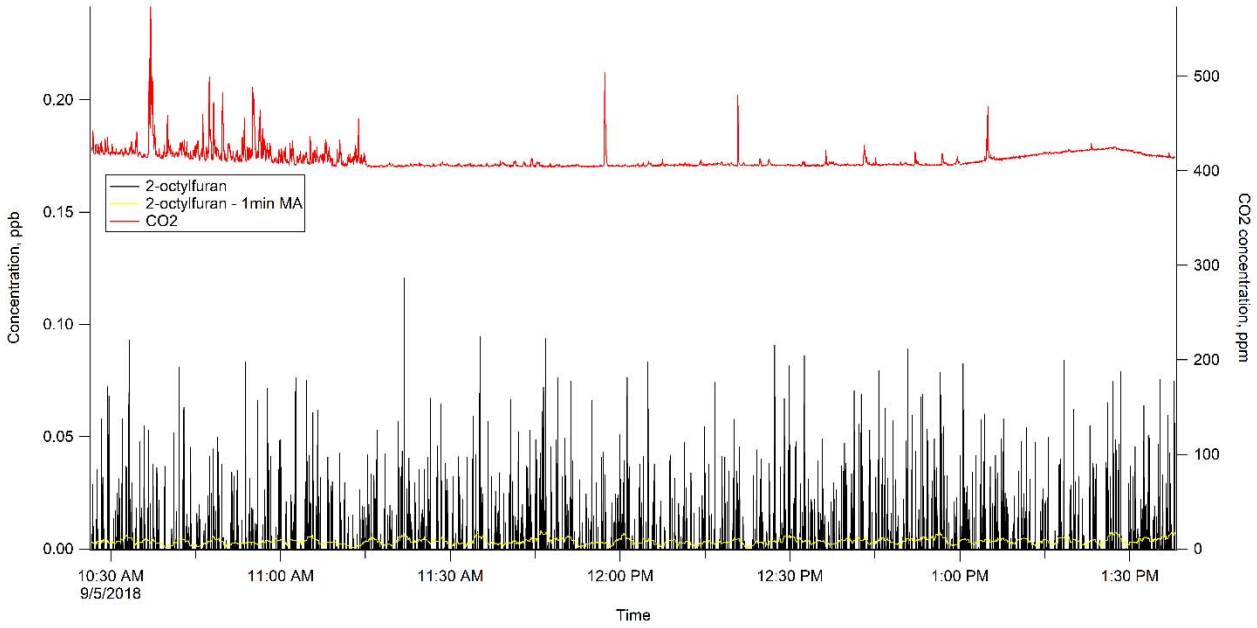

Figure 3-16. 2-octylfuran.

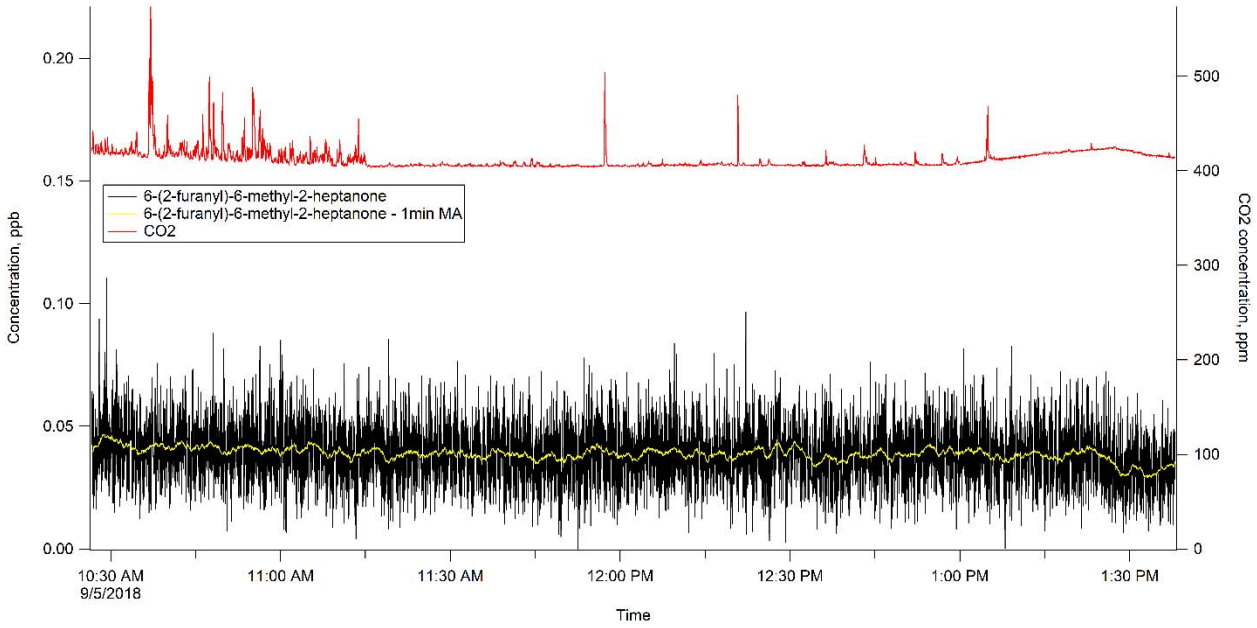

Figure 3-17. 6-(2-furanyl)-6-methyl-2-heptanone.

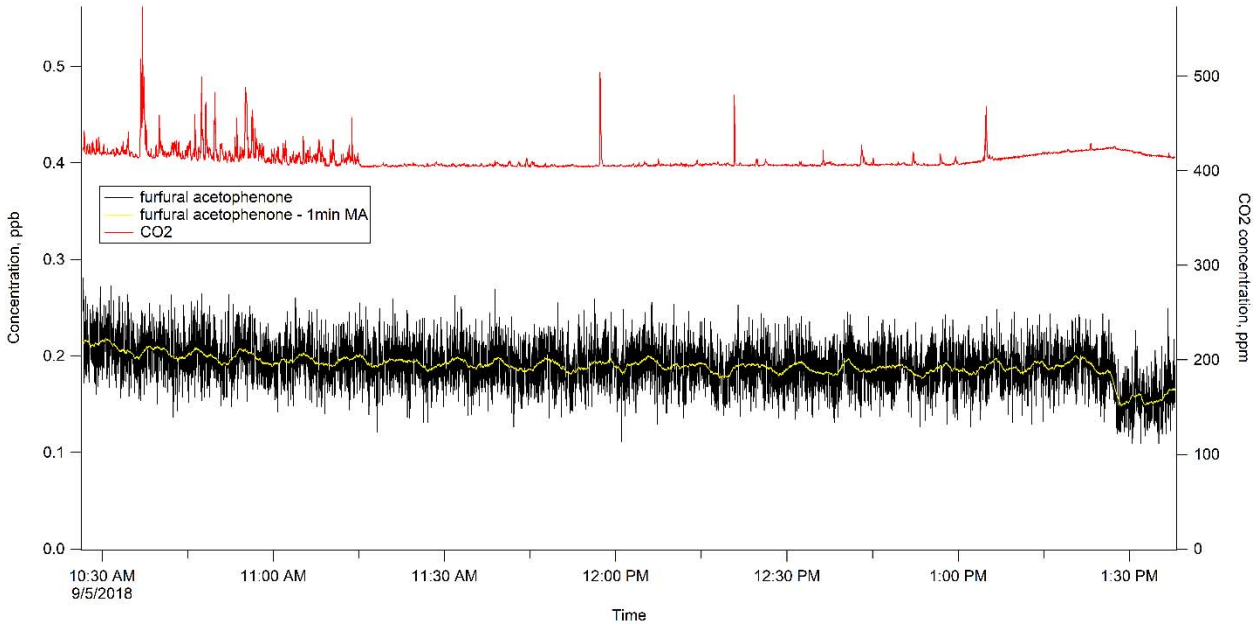

Figure 3-18. Furfural Acetophenone.

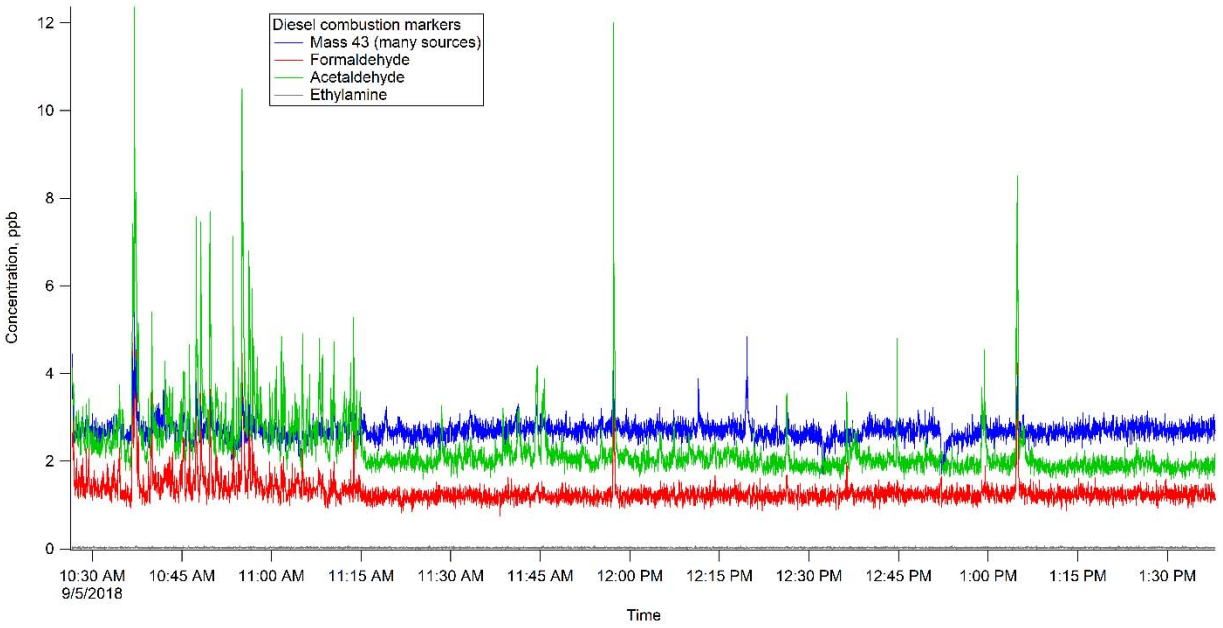

Figure 3-19. Diesel Combustion Markers.

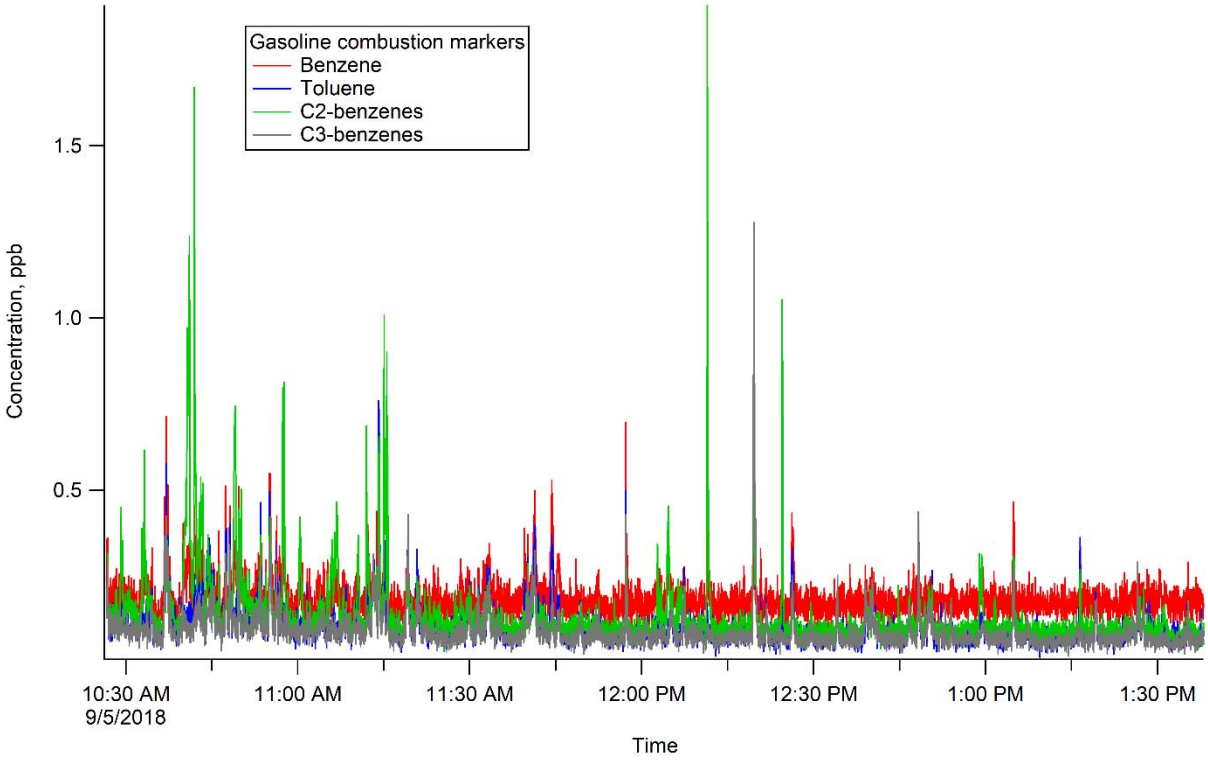

Figure 3-20. Gasoline Combustion Markers.

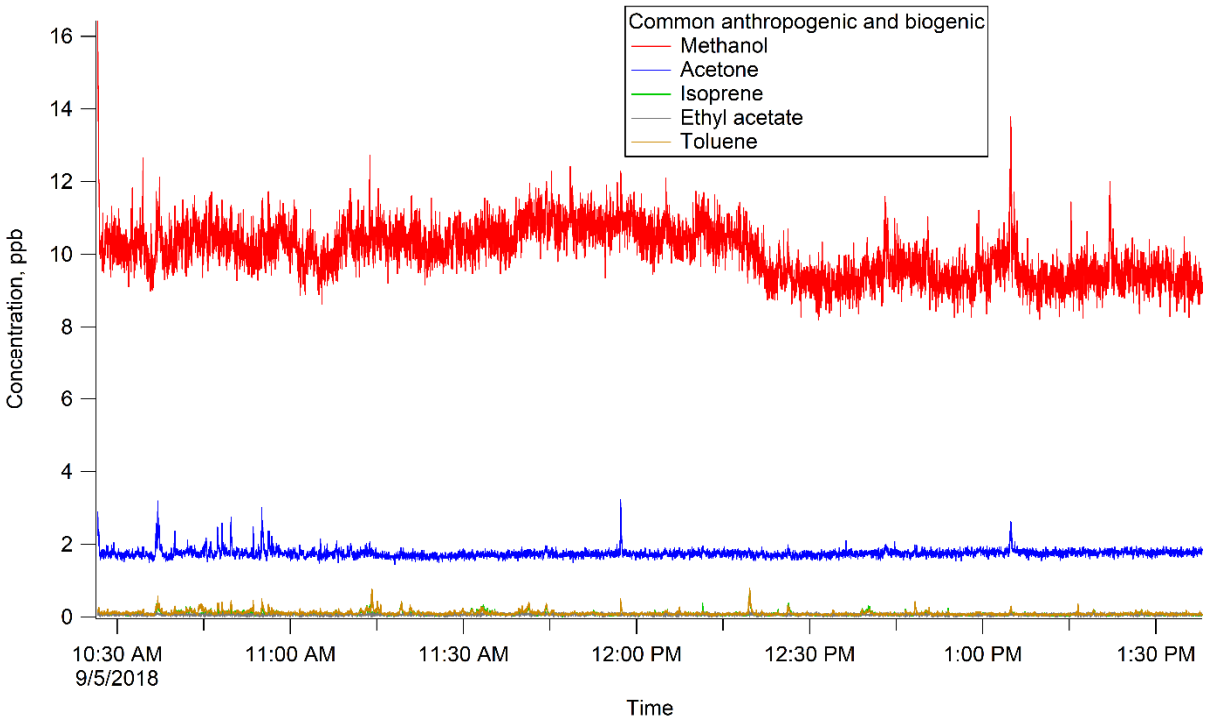

Figure 3-21. Plant and Human Markers.

4.0 SEPTEMBER 6, 2018 – SX PAVING

4.1 Quality Assessment

Data from September 6, 2018, was 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

On September 6, 2018, the ML performed general area monitoring of the Hanford Site in support of the SX Paving Project.

The ML checked in at the CSO at 05:34. A QA/QC zero air/sensitivity check began on the CO_2 monitor and the PTR-MS prior to arrival at 04:03. The ML staff began mobile monitoring of SX farm at 05:58. The ML staff parked on the SE corner of SX farm for 5 minutes. At 06:15, the ML parked the west side of SX Farm for about 15 minutes. From 06:31 - 12:21, the ML monitored in various locations around SX Farm, in an attempt to stay downwind of the paving activities.

The QA/QC zero air/sensitivity check of the Picarro Ammonia Analyzer was initiated at 12:52. The ML staff left SX Farm at 13:42 to check out with the CSO. The ML arrived at the warehouse in Pasco, WA, at 15:37.

Table 4-1. Mobile Laboratory Sampling Mode Throughout the Monitoring Period.

Time	Location	Sampling Mode
05:58 - 06:13	SX Farm SE corner of farm.	Mobile Area Sampling
06:13 - 06:15	SX Farm Relocating to new location.	Mobile Area Sampling
06:15 - 06:25	SX Farm West side of farm.	Mobile Area Sampling
06:25 - 06:31	SX Farm parked in flat area on West side of farm.	Mobile Area Sampling
06:31 - 07:06	SX Farm parked on the NW side of farm.	Mobile Area Sampling
07:06 - 08:18	SX Farm parked near east entrance of farm.	Mobile Area Sampling
08:18 - 12:21	SX Farm West of entrance to farm.	Mobile Area Sampling
12:21 - 12:35	SX Farm moving around farm.	Mobile Area Sampling
12:35 - 13:30	SX Farm SW entrance to farm.	Mobile Area Sampling

Figure 4-1. Mobile Laboratory Location for the Duration of the Monitoring Period.

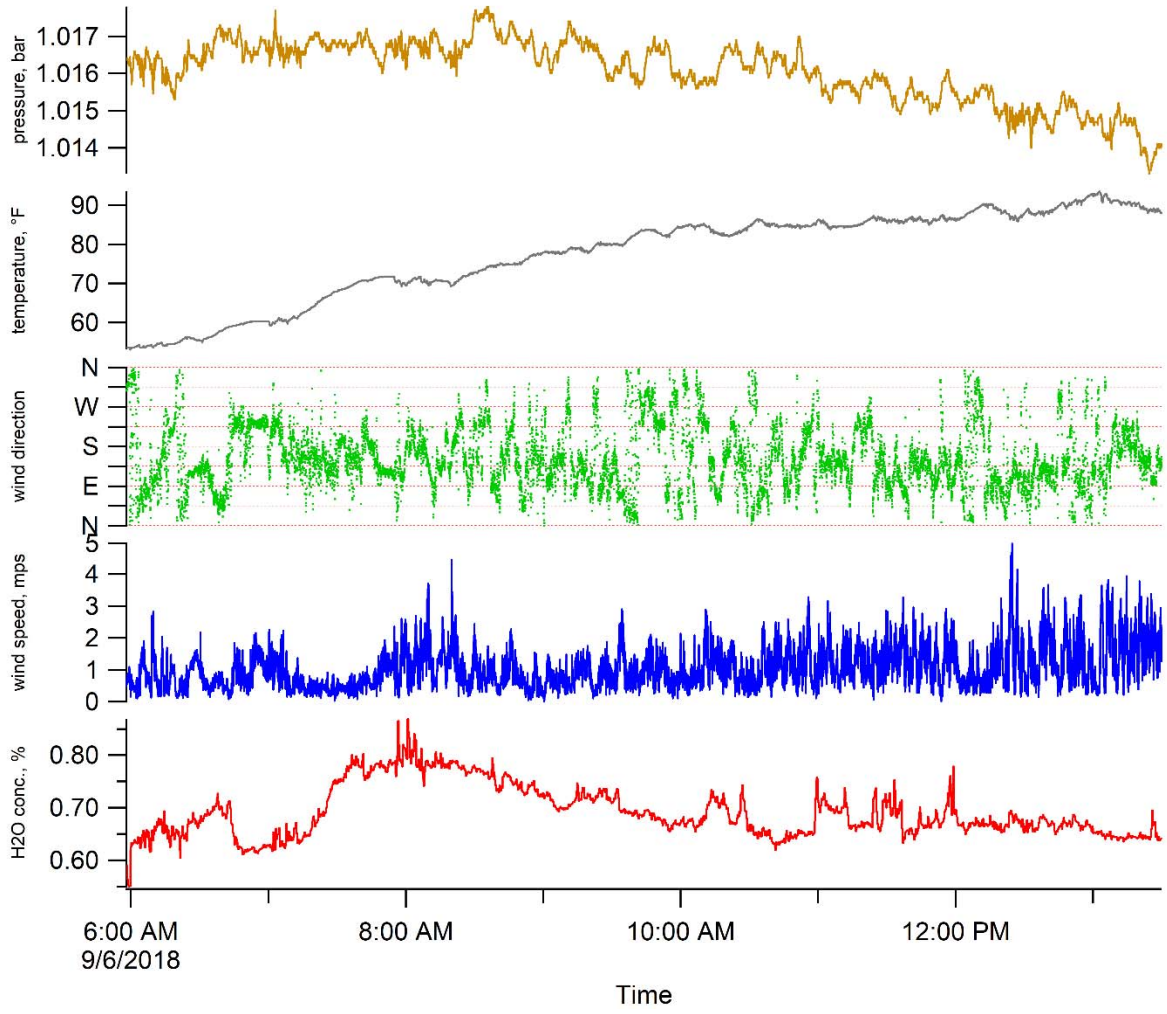

Figure 4-2. Weather Data for the Duration of the Monitoring Period.

4.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-TOF 6000 X2,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were not collected during this period.

Table 4-2. COPC Statistical Information for the Monitoring Period of September 6, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max (ppb)	Median (ppb)
1	ammonia	25000	7.855	2.294	29.206	13.434	6.954
2	formaldehyde	300	1.540	0.515	33.471	11.134	1.440
3	methanol	200000	14.741	1.928	13.077	40.001	14.411
4	acetonitrile	20000	0.351	0.040	11.403	0.599	0.349
5	acetaldehyde	25000	3.747	2.030	54.171	33.318	3.217
6	ethylamine	5000	0.025	0.012	48.170	0.085	0.022
7	1,3-butadiene	1000	0.099	0.157	158.383	2.509	0.059
8	propanenitrile	6000	0.054	0.028	51.843	0.616	0.049
9	2-propenal	100	0.205	0.093	45.290	1.439	0.187
10	1-butanol + butenes	20000	0.238	0.234	98.442	3.829	0.174
11	methyl isocyanate	20	0.040	0.016	40.065	0.138	0.039
12	methyl nitrite	100	0.196	0.226	115.466	4.114	0.143
13	furan	1	0.037	0.018	50.116	0.327	0.033
14	butanenitrile	8000	0.021	0.014	66.070	0.176	0.019
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	100, 1, 1	0.069	0.043	61.950	N/A*	N/A*
16	butanal	25000	0.183	0.040	21.989	0.704	0.178
17	NDMA	0.3	0.029	0.031	108.519	0.196	0.020
18	benzene	500	0.223	0.116	51.802	1.579	0.193
19	2,4-pentadienenitrile + pyridine	300, 1000	0.042	0.014	34.179	0.197	0.040
20	2-methylene butanenitrile	30	0.013	0.008	62.156	0.097	0.012
21	2-methylfuran	1	0.037	0.016	42.079	0.163	0.035
22	pentanenitrile	6000	0.017	0.012	69.757	0.189	0.015
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.042	0.021	48.867	0.334	0.039
24	NEMA	0.3	0.017	0.023	130.698	0.160	0.006
25	2,5-dimethylfuran	1	0.024	0.015	60.593	0.124	0.022
26	hexanenitrile	6000	0.017	0.013	77.725	0.138	0.014
27	2-hexanone (MBK)	5000	0.046	0.031	67.658	0.171	0.036
28	NDEA	0.1	0.057	0.044	78.227	0.237	0.053
29	butyl nitrite + 2-nitro-2-methylpropane	100, 30	0.238	0.104	43.669	0.476	0.273
30	2,4-dimethylpyridine	500	0.069	0.035	51.535	0.350	0.073
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.050	0.028	55.783	0.161	0.052

Table 4-2. COPC Statistical Information for the Monitoring Period of September 6, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max (ppb)	Median (ppb)
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33	4-methyl-2-hexanone	500	0.060	0.031	51.146	0.188	0.064
34	NMOR	0.6	0.011	0.017	159.346	0.105	0.000
35	butyl nitrate	2500	0.034	0.022	63.013	0.132	0.035
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.056	0.028	50.291	0.154	0.059
37	6-methyl-2-heptanone	8000	0.054	0.027	50.401	0.155	0.057
38	2-pentylfuran	1	0.056	0.025	45.308	0.138	0.059
39	biphenyl	200	0.044	0.026	58.925	0.145	0.046
40	2-heptylfuran	1	0.184	0.088	47.560	0.423	0.205
41	1,4-butanediol dinitrate	50	0.060	0.031	51.684	0.165	0.064
42	2-octylfuran	1	0.003	0.010	343.092	0.160	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.003	0.011	388.376	0.129	0.000
44	PCB	1000	0.071	0.032	45.410	0.187	0.077
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.033	0.020	61.461	0.112	0.034
46	furfural acetophenone	1	0.161	0.079	49.402	0.375	0.181

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.780 ppb and the median value was 0.061 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 also suspect due to interferants identified during the background study.

The following figures display a selection of COPC signals, overlaid with the same signal smoothed using a one-minute moving average, and CO_2, for the monitoring period of September 6, 2018.

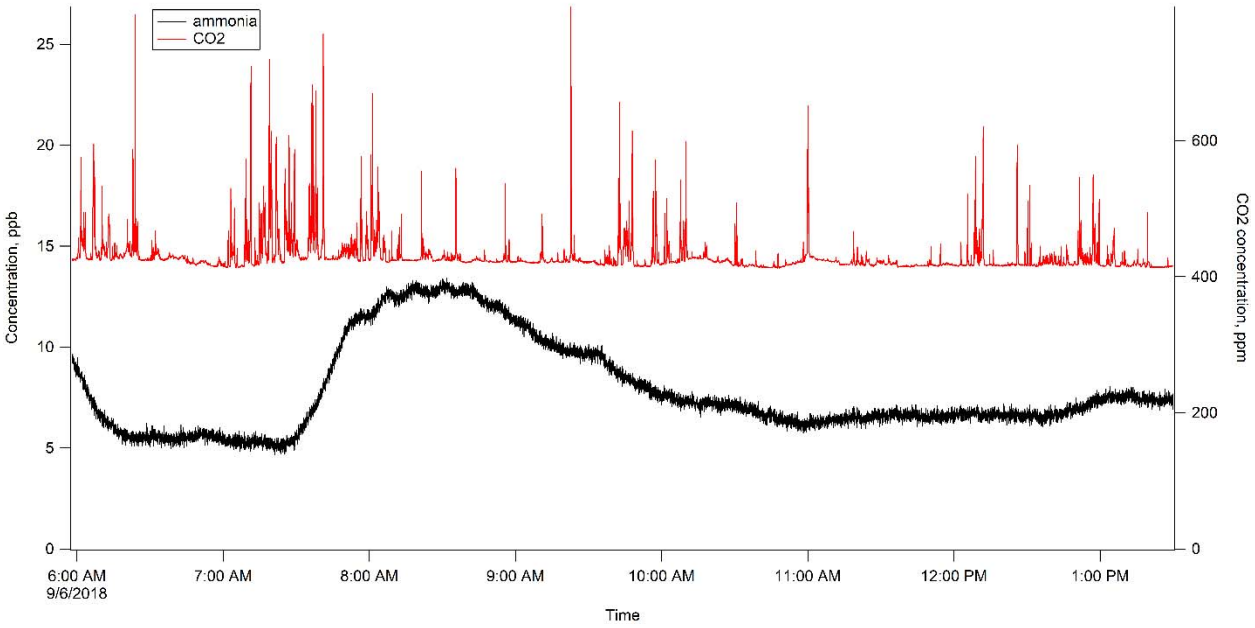

Figure 4-3. Ammonia.

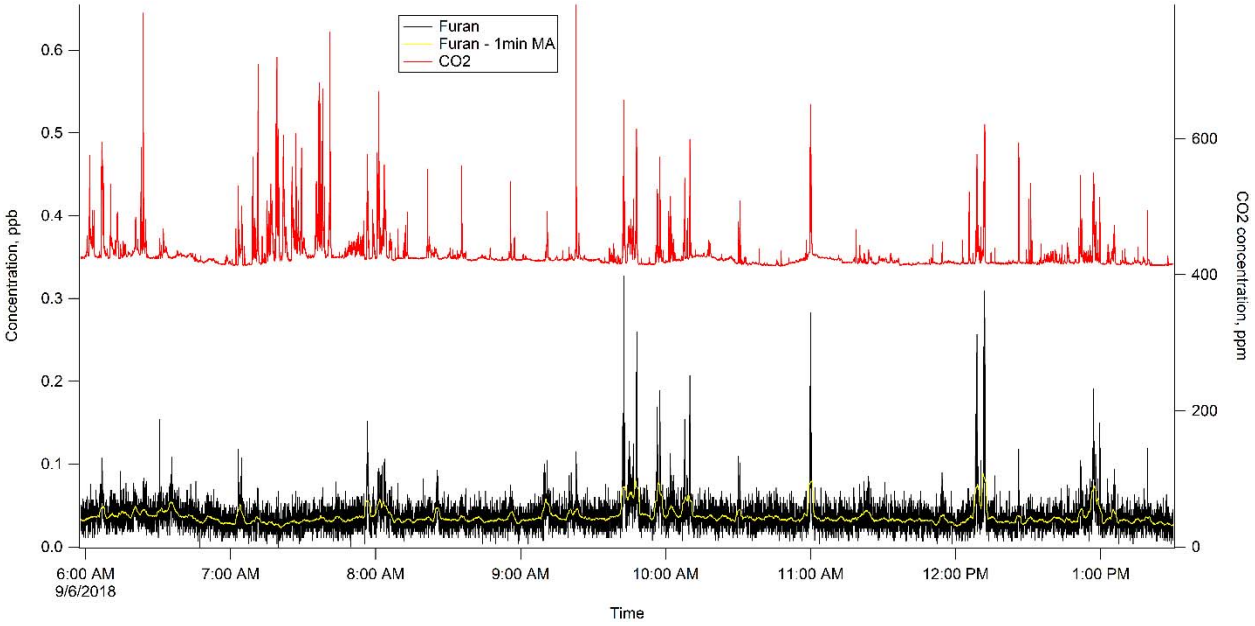

Figure 4-4. Furan.

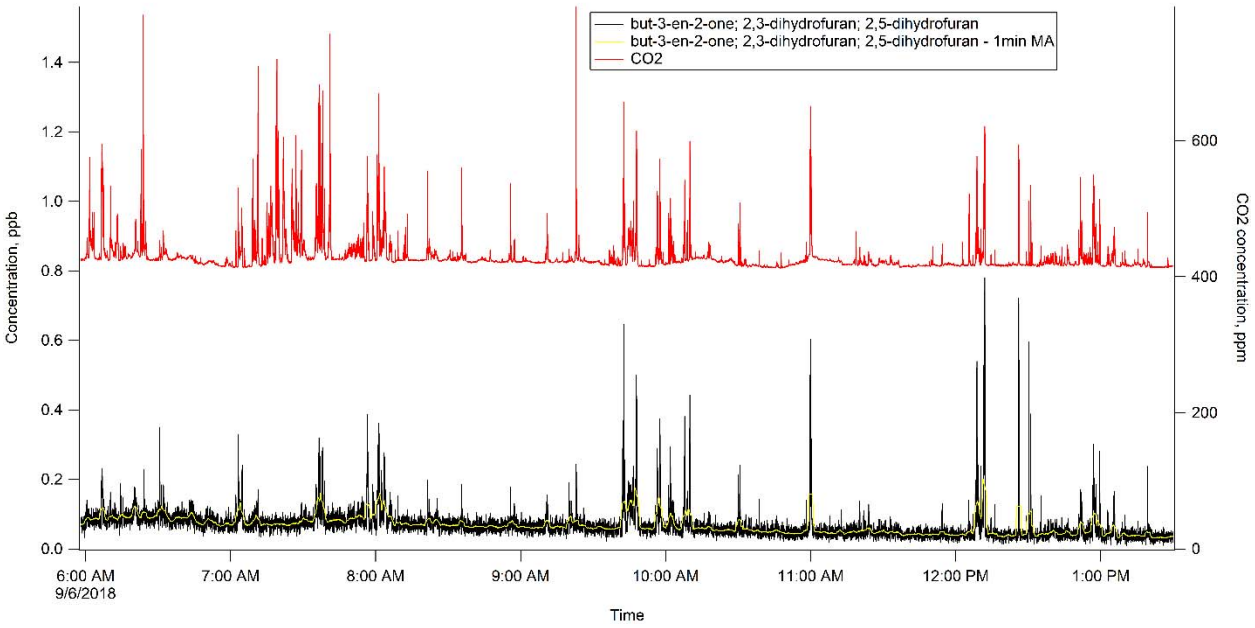

Figure 4-5. but-3-en-2-one; 2,3-dihydrofuran; 2,5-dihydrofuran.

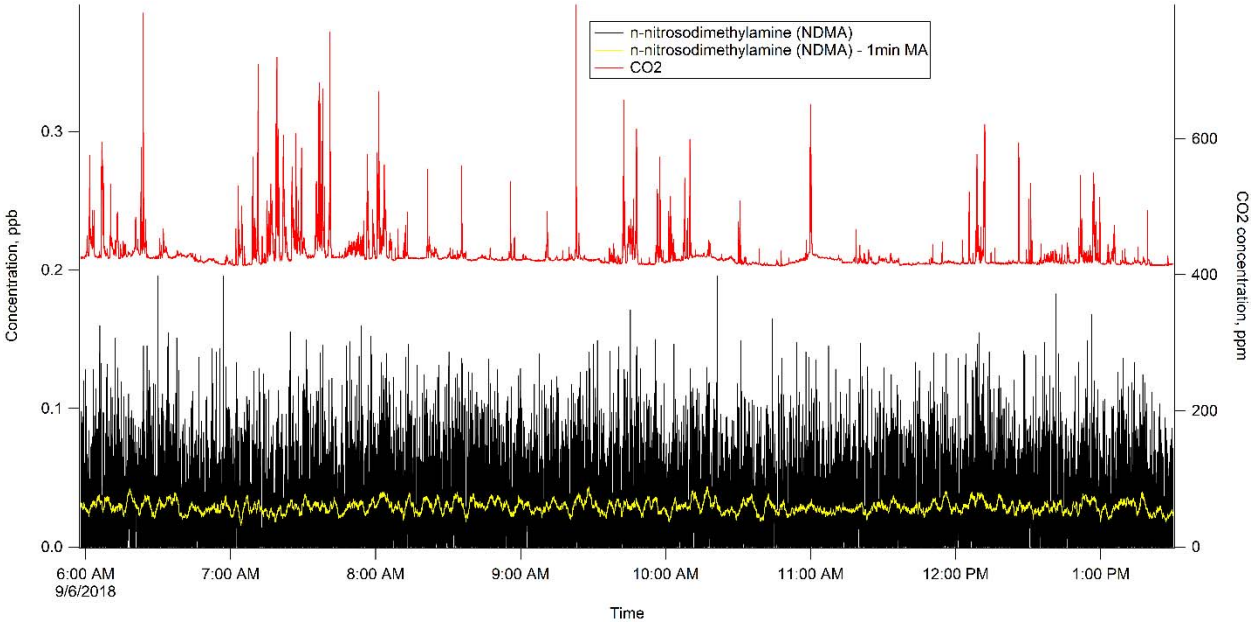

Figure 4-6. N-nitrosodimethylamine (NDMA).

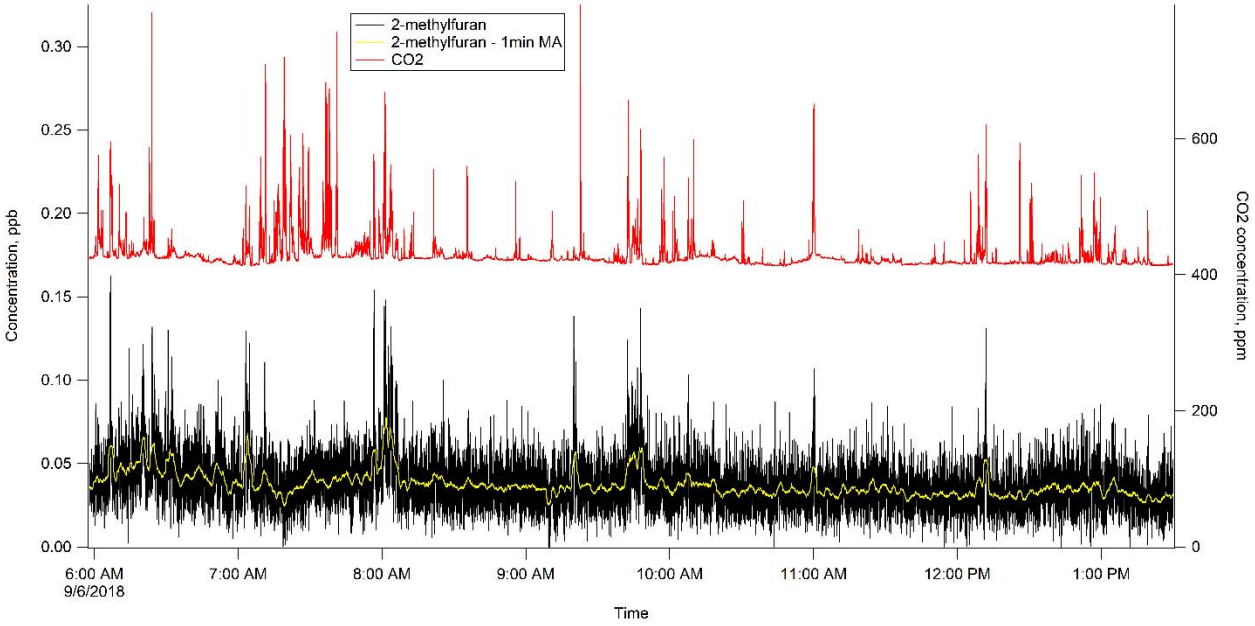

Figure 4-7. 2-methylfuran.

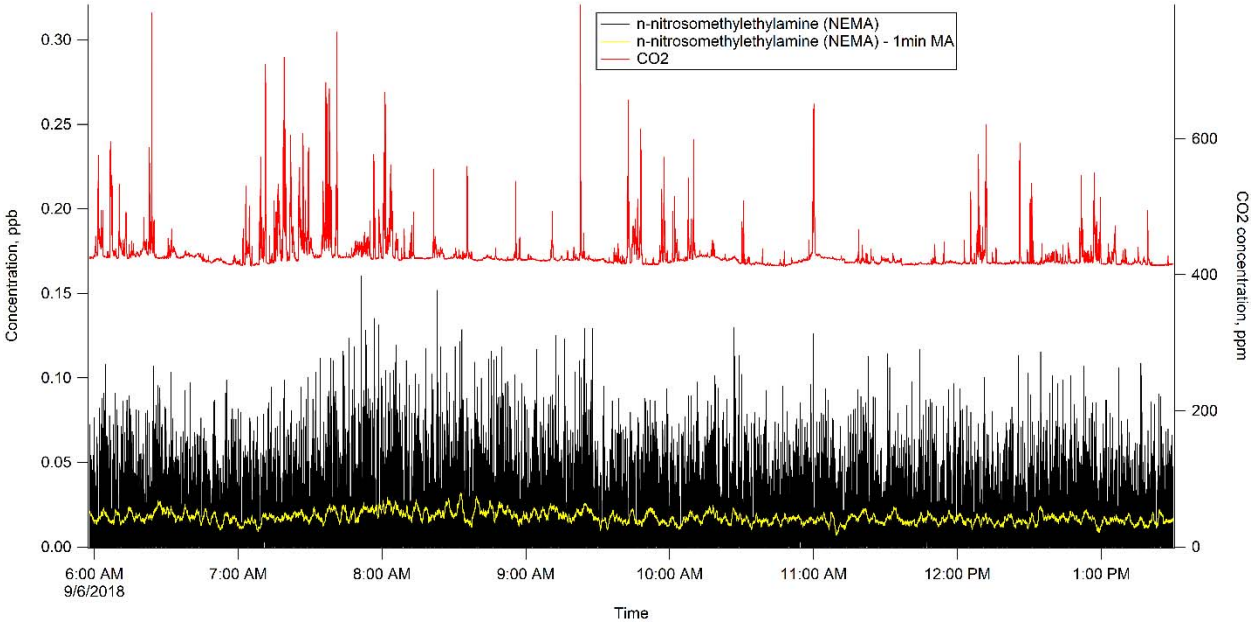

Figure 4-8. N-nitrosomethylethylamine (NEMA).

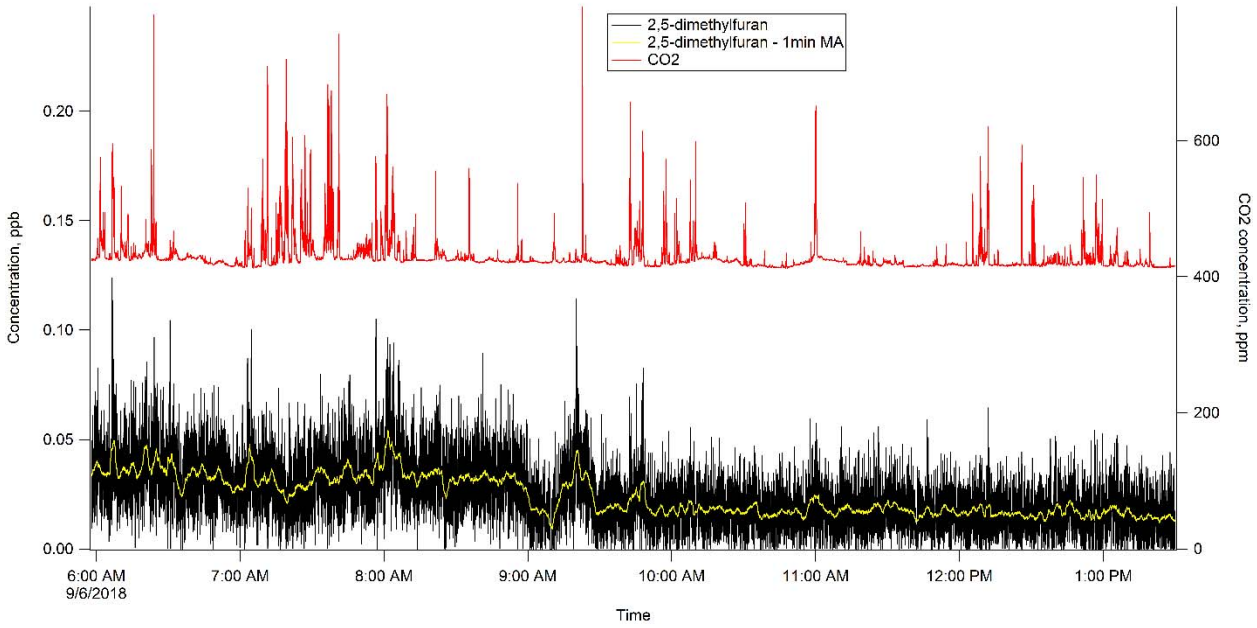

Figure 4-9. 2, 5-dimethylfuran.

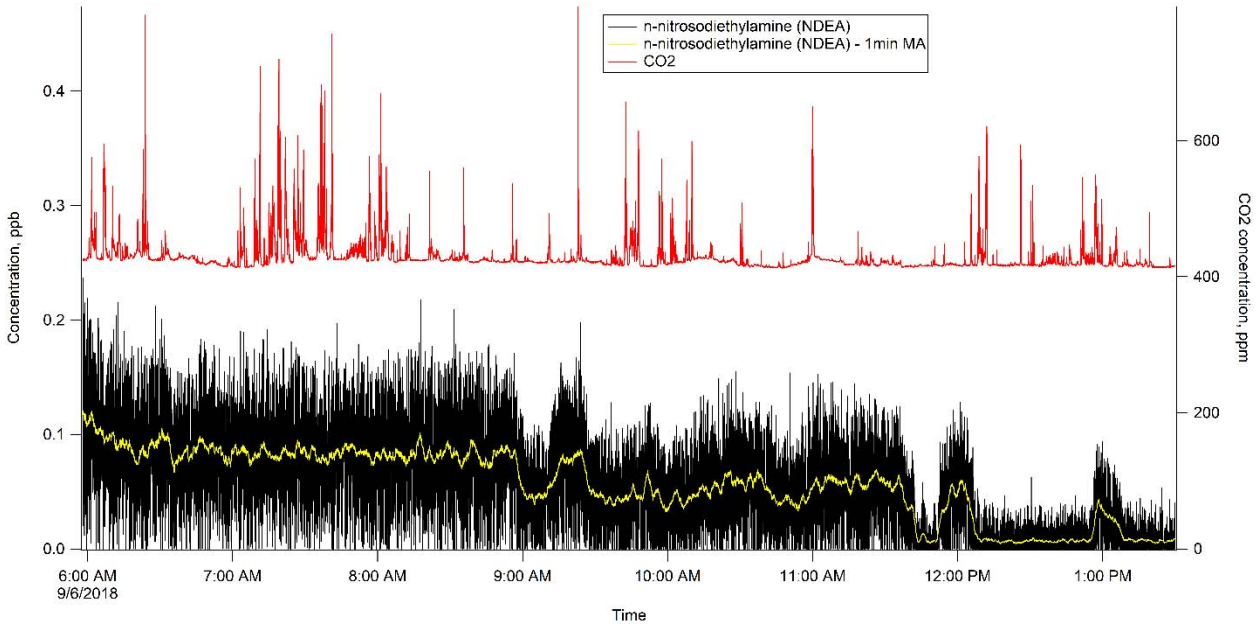

Figure 4-10. N-nitrosodiethylamine (NDEA).

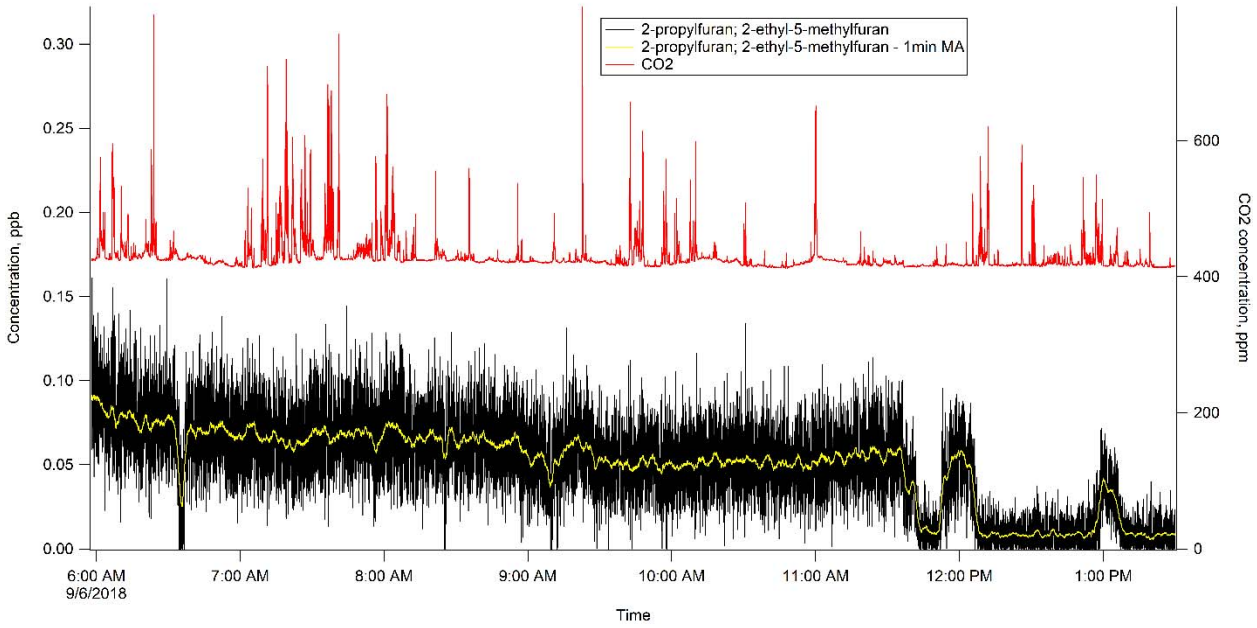

Figure 4-11. 2-propylfuran; 2-ethyl-5-methylfuran.

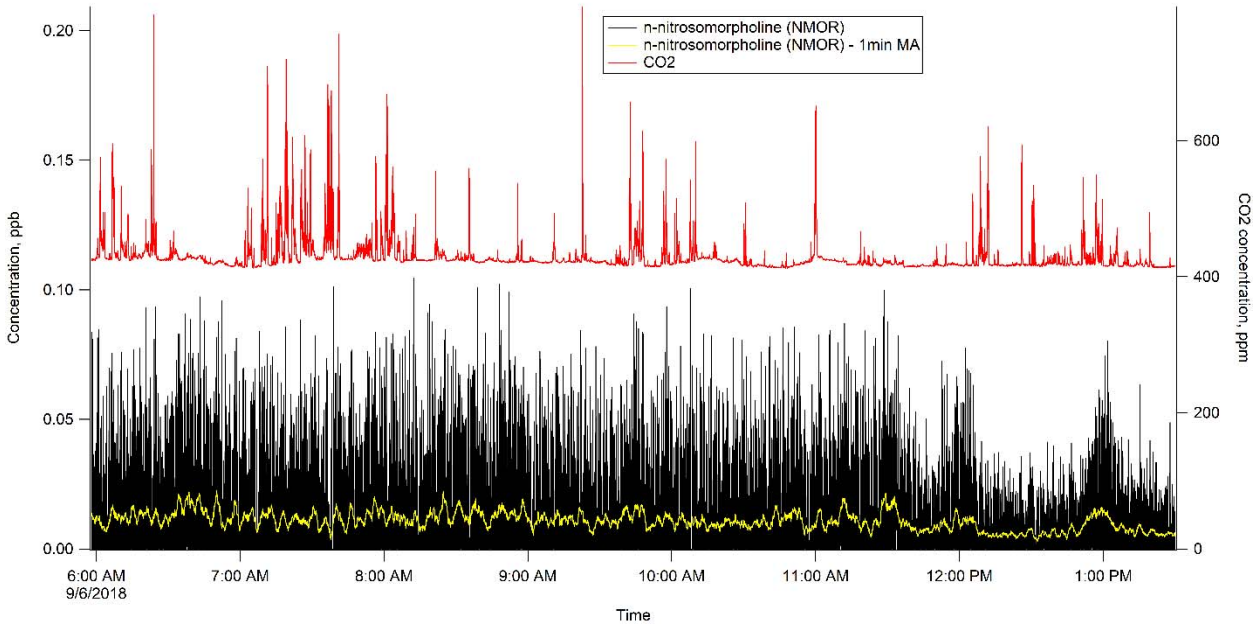

Figure 4-12. N-nitrosomorpholine (NMOR).

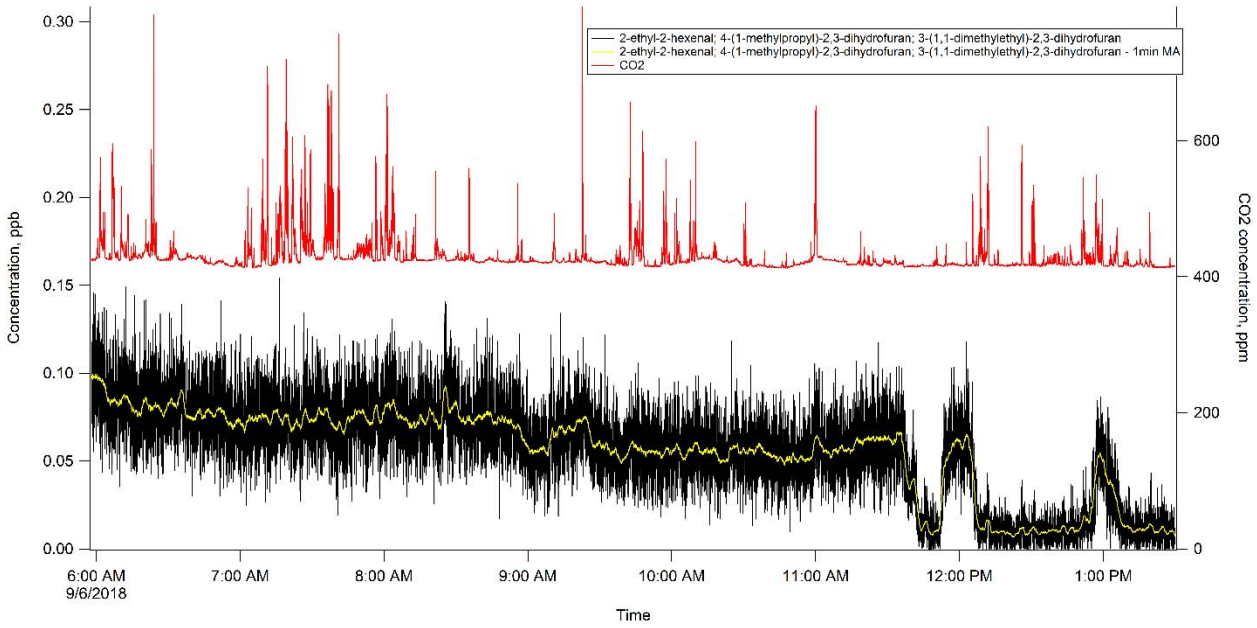

Figure 4-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran.

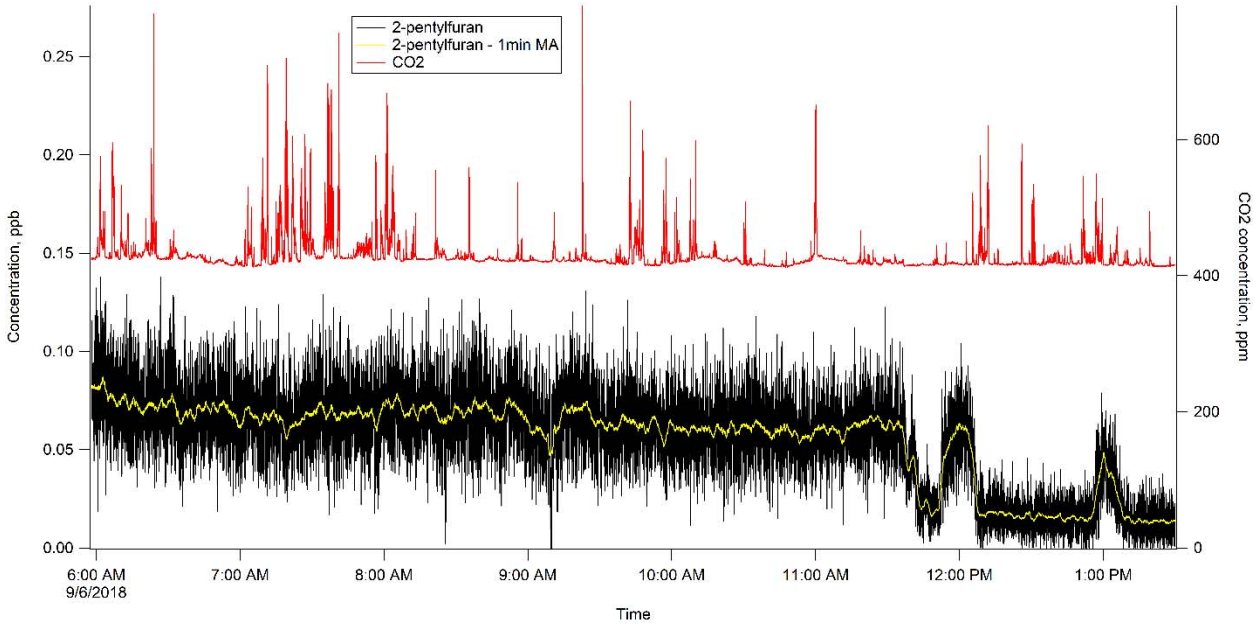

Figure 4-14. 2-pentylfuran.

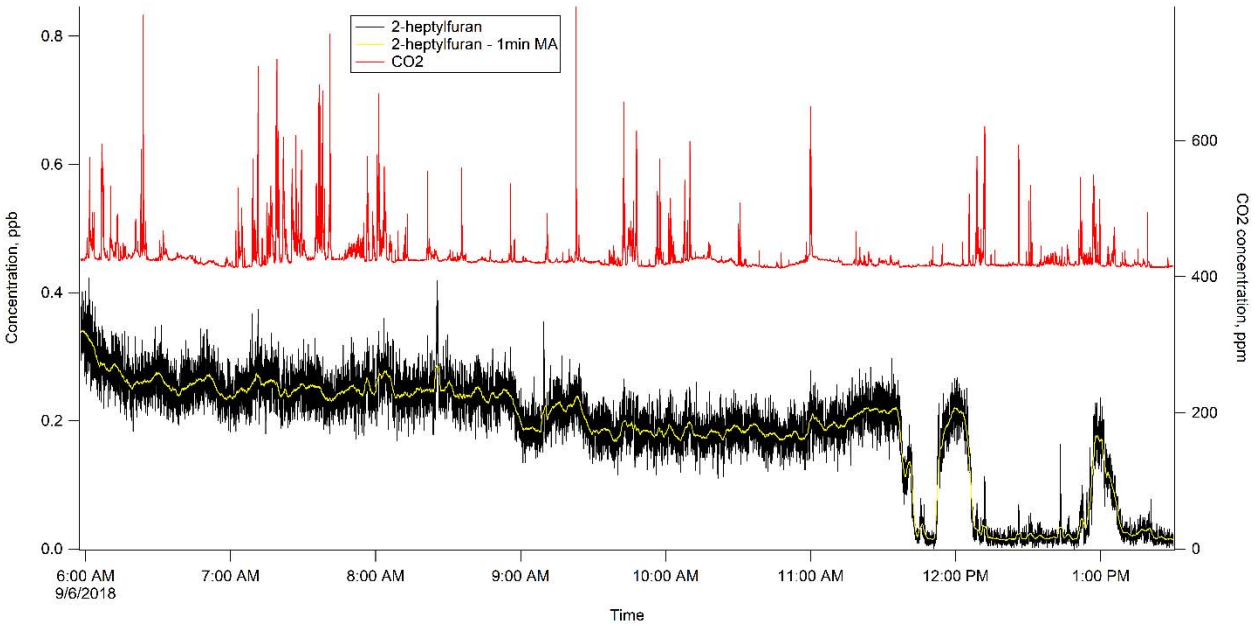

Figure 4-15. 2-heptylfuran.

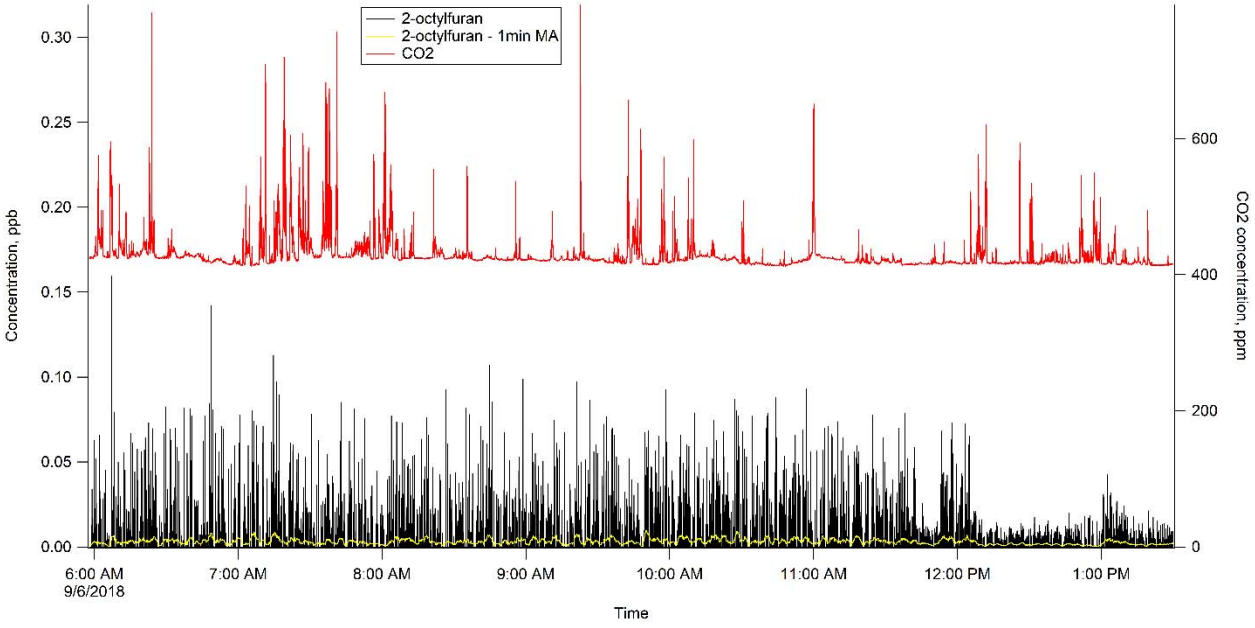

Figure 4-16. 2-octylfuran.

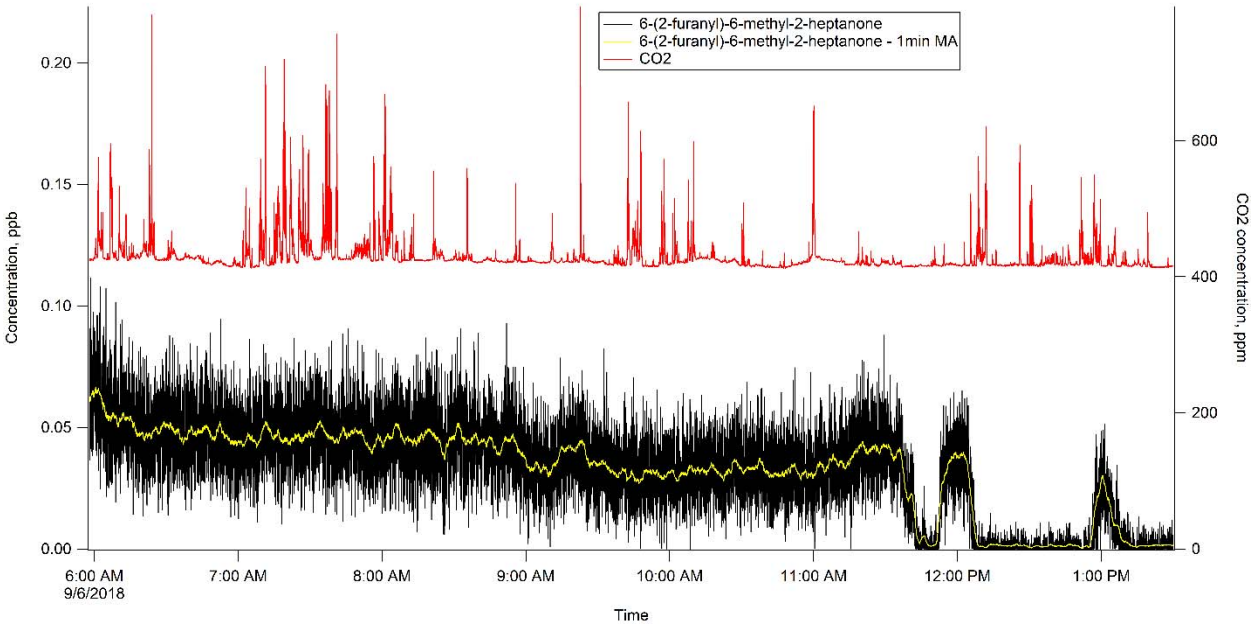

Figure 4-17. 6-(2-furanyl)-6-methyl-2-heptanone.

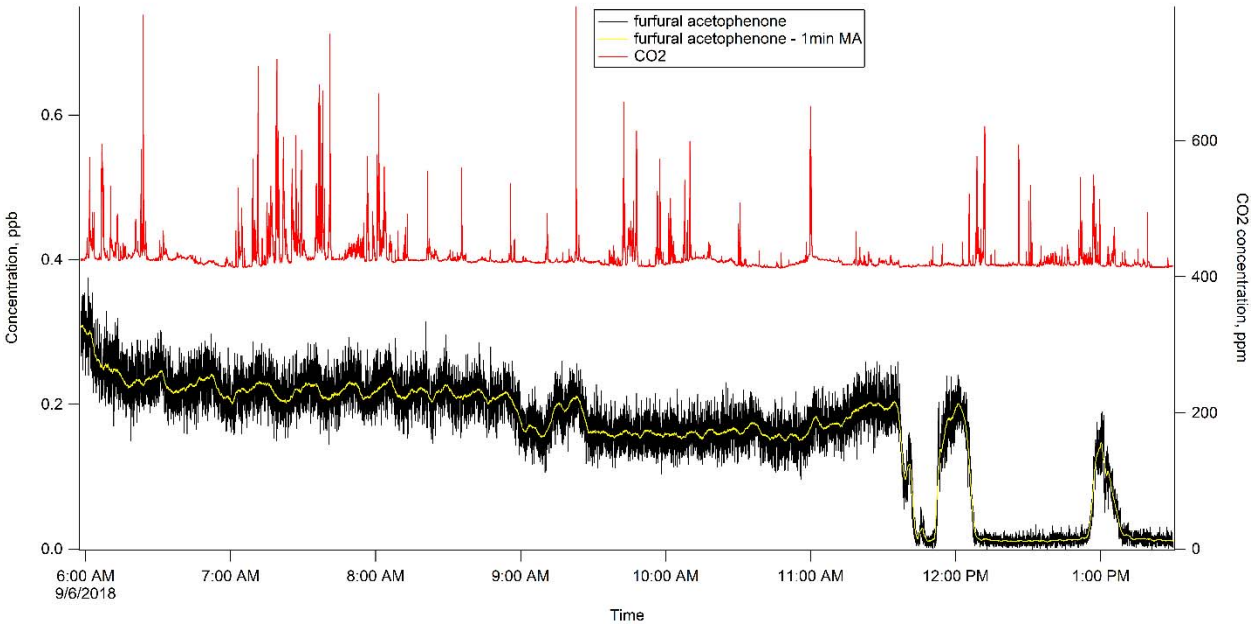

Figure 4-18. Furfural Acetophenone.

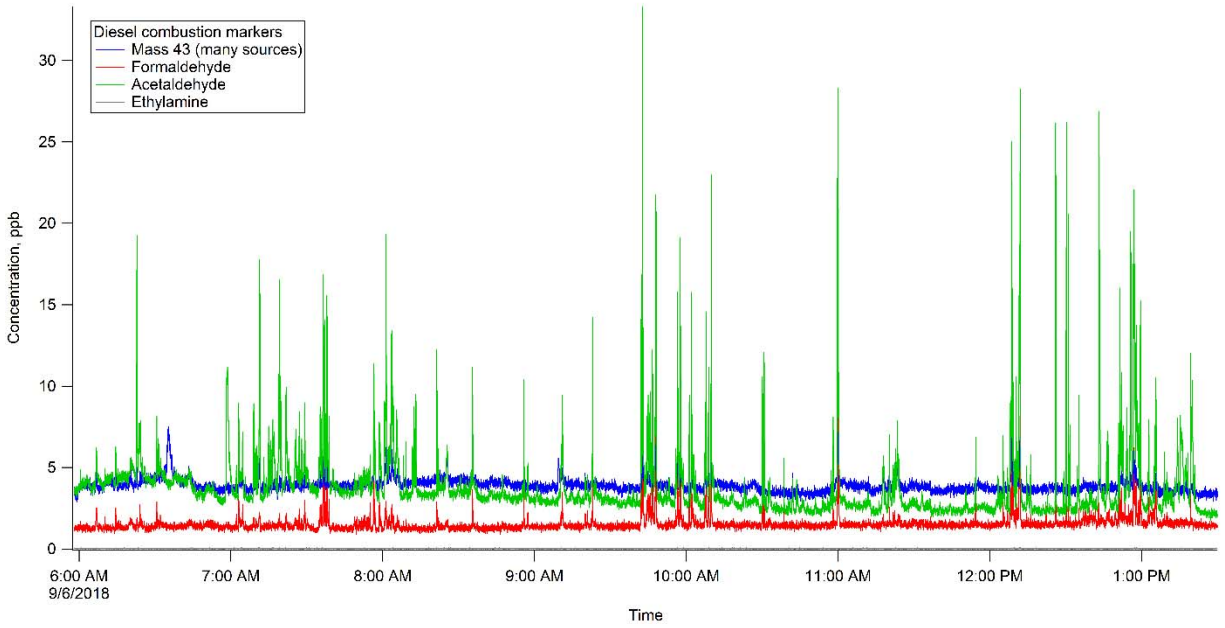

Figure 4-19. Diesel Combustion Markers.

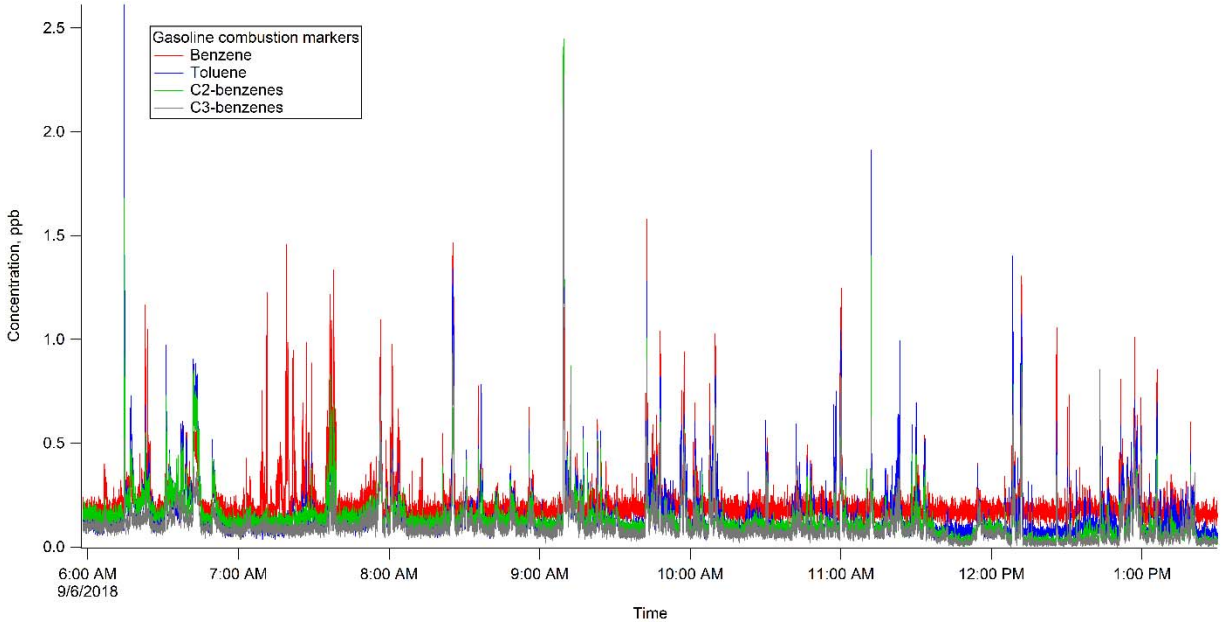

Figure 4-20. Gasoline Combustion Markers.

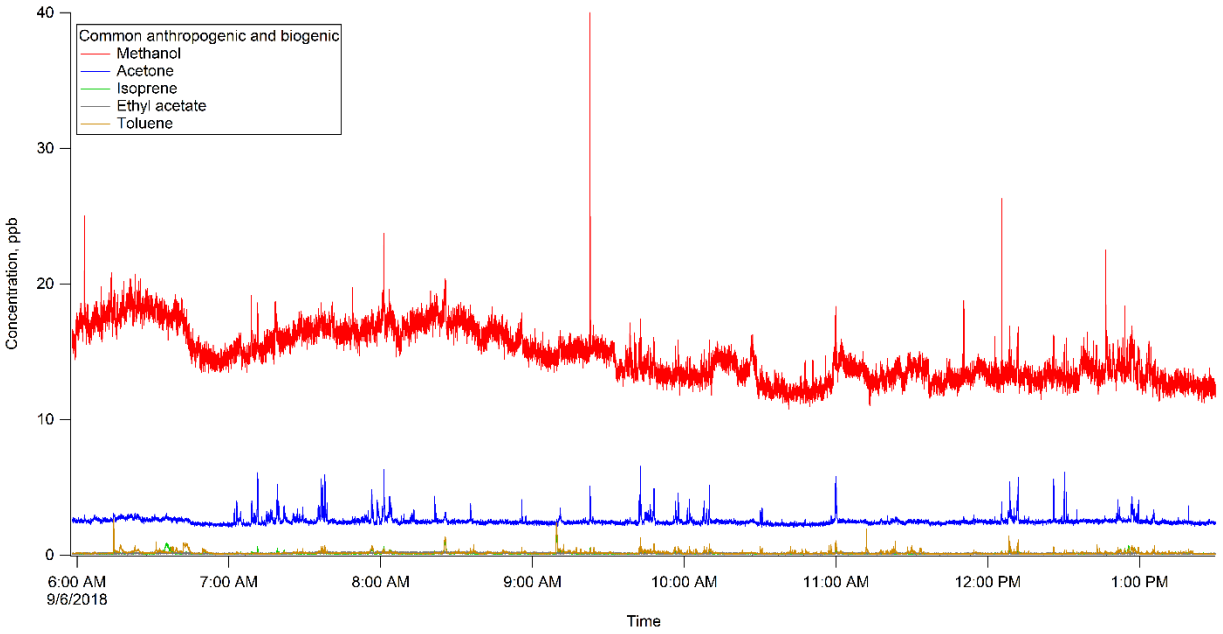

Figure 4-21. Plant and Human Markers.

5.0 SEPTEMBER 7, 2018 – AY 102 RINSE

5.1 Quality Assessment

Data from September 7, 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

On September 7, 2018, the ML performed general area monitoring of the Hanford Site in support of the AY-102 Rinse.

The ML arrived on-site and checked in at the CSO at 06:35. A QA/QC zero air/sensitivity check began at 05:21 on the CO_2 monitor and PTR-MS prior to arrival. The ML staff began mobile monitoring of A Farms before parking west of the AY Farm at 07:14. At 08:22, ML staff observed the connection of the caustic soda, which will be utilized in the rinsing. At 14:58, the ML began performing A Farm survey loops.

The ML staff checked out with the CSO at 15:22. During transport back to the TerraGraphics warehouse in Pasco, WA, the QA/QC zero air/sensitivity check of the Picarro Ammonia Analyzer was initiated at 15:38.

Table 5-1. Mobile Laboratory Sampling Mode Throughout the Monitoring Period.

Time	Location	Sampling Mode
07:14 - 14:58	A Farm west side of AY Farm	Mobile Monitoring (mast)
14:58 - 15:22	A Farm survey loop	Mobile Monitoring (mast)

Figure 5-1. Mobile Laboratory Location for the Duration of the Monitoring Period.
Blue location marker indicates site of AY-102 Rinse monitoring.

Figure 5-2. (Inset) Mobile Laboratory Location for the Duration of the AY-102 Rinse Monitoring.

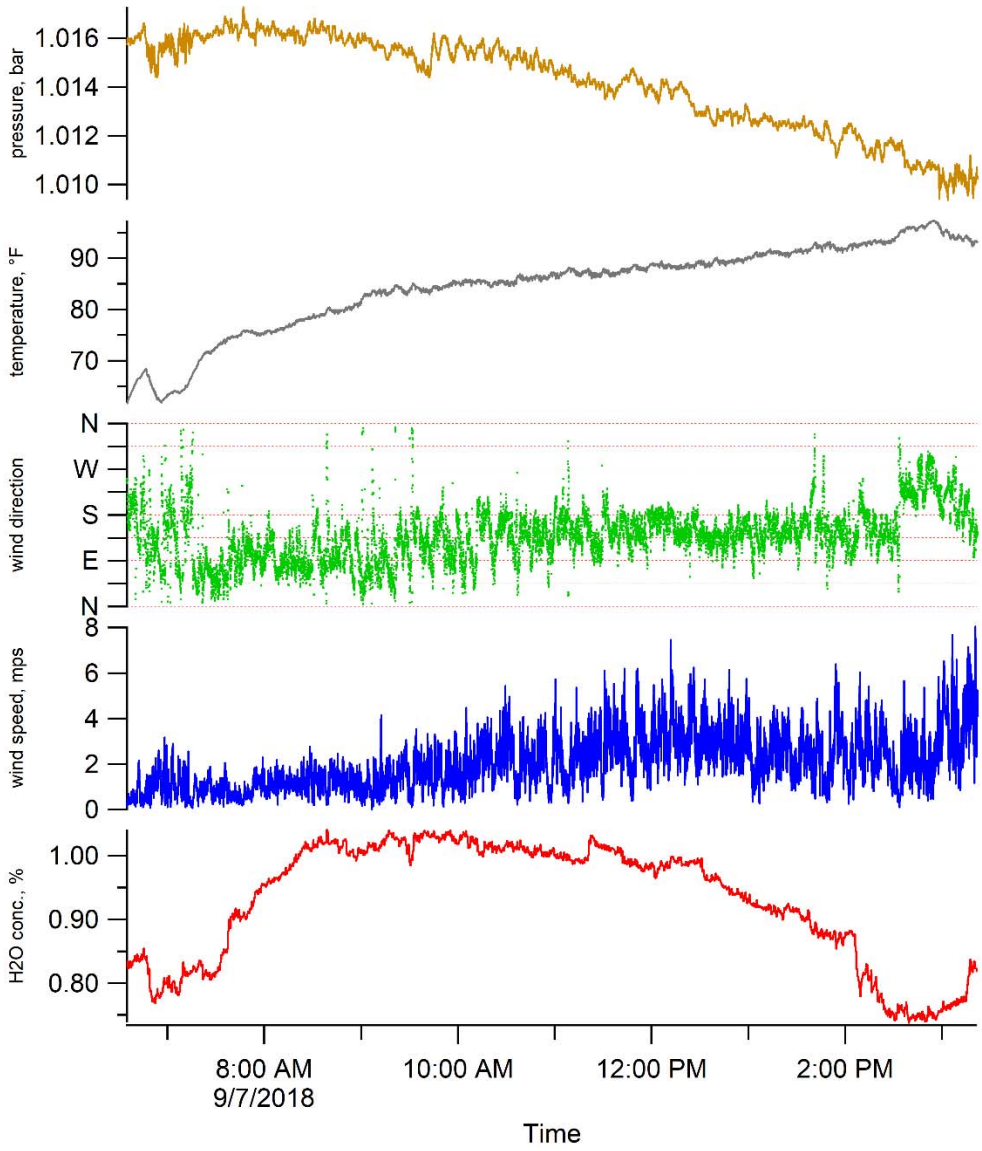

Figure 5-3. Weather Data for the Duration of the Monitoring Period.

5.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-TOF 6000 X2,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were not collected during this period.

Table 5-2. COPC Statistical Information for the Monitoring Period of September 7, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	ammonia	25000	8.210	2.273	27.688	13.751	7.462
2	formaldehyde	300	1.167	0.297	25.431	6.061	1.098
3	methanol	200000	13.399	4.751	35.460	61.242	12.002
4	acetonitrile	20000	0.266	0.057	21.496	1.781	0.268
5	acetaldehyde	25000	2.992	1.860	62.148	113.556	2.455
6	ethylamine	5000	0.023	0.012	49.928	0.082	0.022
7	1,3-butadiene	1000	0.022	0.059	268.531	0.879	0.000
8	propanenitrile	6000	0.050	0.017	33.601	0.228	0.049
9	2-propenal	100	0.180	0.097	54.075	1.430	0.158
10	1-butanol + butenes	20000	0.150	0.079	52.754	2.118	0.136
11	methyl isocyanate	20	0.047	0.019	39.459	0.149	0.045
12	methyl nitrite	100	0.153	0.096	62.775	2.624	0.133
13	furan	1	0.035	0.019	52.673	0.449	0.033
14	butanenitrile	8000	0.016	0.010	60.037	0.089	0.014
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	100, 1, 1	0.076	0.042	55.541	N/A*	N/A*
16	butanal	25000	0.209	0.084	40.312	0.657	0.202
17	NDMA	0.3	0.033	0.035	106.846	0.221	0.023
18	benzene	500	0.136	0.066	48.528	2.663	0.133
19	2,4-pentadienenitrile + pyridine	300, 1000	0.032	0.013	38.987	0.182	0.031
20	2-methylene butanenitrile	30	0.011	0.006	56.355	0.058	0.009
21	2-methylfuran	1	0.043	0.021	48.573	0.290	0.039
22	pentanenitrile	6000	0.012	0.008	65.734	0.066	0.010
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.041	0.020	48.424	0.256	0.038
24	NEMA	0.3	0.019	0.025	130.266	0.194	0.008
25	2,5-dimethylfuran	1	0.039	0.015	38.872	0.165	0.037
26	hexanenitrile	6000	0.024	0.010	40.866	0.082	0.023
27	2-hexanone (MBK)	5000	0.031	0.014	44.553	0.129	0.029
28	NDEA	0.1	0.088	0.041	47.001	0.266	0.087
29	butyl nitrite + 2-nitro-2-methylpropane	100, 30	0.316	0.040	12.649	0.574	0.311
30	2,4-dimethylpyridine	500	0.092	0.022	24.260	0.432	0.089
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.071	0.022	31.085	0.241	0.069

Table 5-2. COPC Statistical Information for the Monitoring Period of September 7, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
32	heptanenitrile	6000	0.092	0.020	21.616	0.197	0.090
33	4-methyl-2-hexanone	500	0.086	0.021	24.145	0.230	0.084
34	NMOR	0.6	0.012	0.020	158.297	0.147	0.000
35	butyl nitrate	2500	0.050	0.018	35.981	0.141	0.048
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.078	0.019	24.913	0.199	0.076
37	6-methyl-2-heptanone	8000	0.076	0.018	23.611	0.173	0.074
38	2-pentylfuran	1	0.072	0.019	26.983	0.187	0.071
39	biphenyl	200	0.064	0.022	34.636	0.166	0.063
40	2-heptylfuran	1	0.263	0.040	15.112	0.527	0.257
41	1,4-butanediol dinitrate	50	0.086	0.020	23.809	0.213	0.084
42	2-octylfuran	1	0.003	0.011	367.419	0.136	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.003	0.012	407.656	0.142	0.000
44	PCB	1000	0.101	0.019	18.791	0.210	0.099
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.050	0.015	30.530	0.143	0.048
46	furfural acetophenone	1	0.238	0.036	15.345	0.481	0.233

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.595 ppb and the median value was 0.065 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 also suspect due to interferants identified during the background study.

The following figures display a selection of COPC signals, overlaid with the same signal smoothed using a one-minute moving average, and CO_2, for the monitoring period of September 7, 2018.

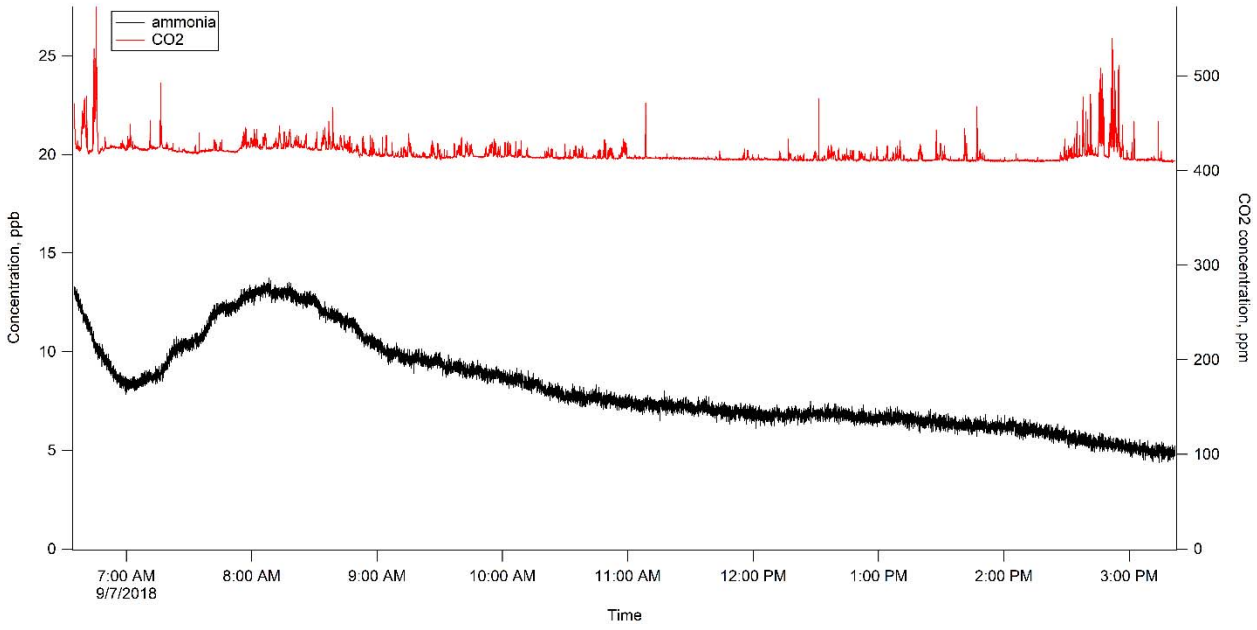

Figure 5-4. Ammonia.

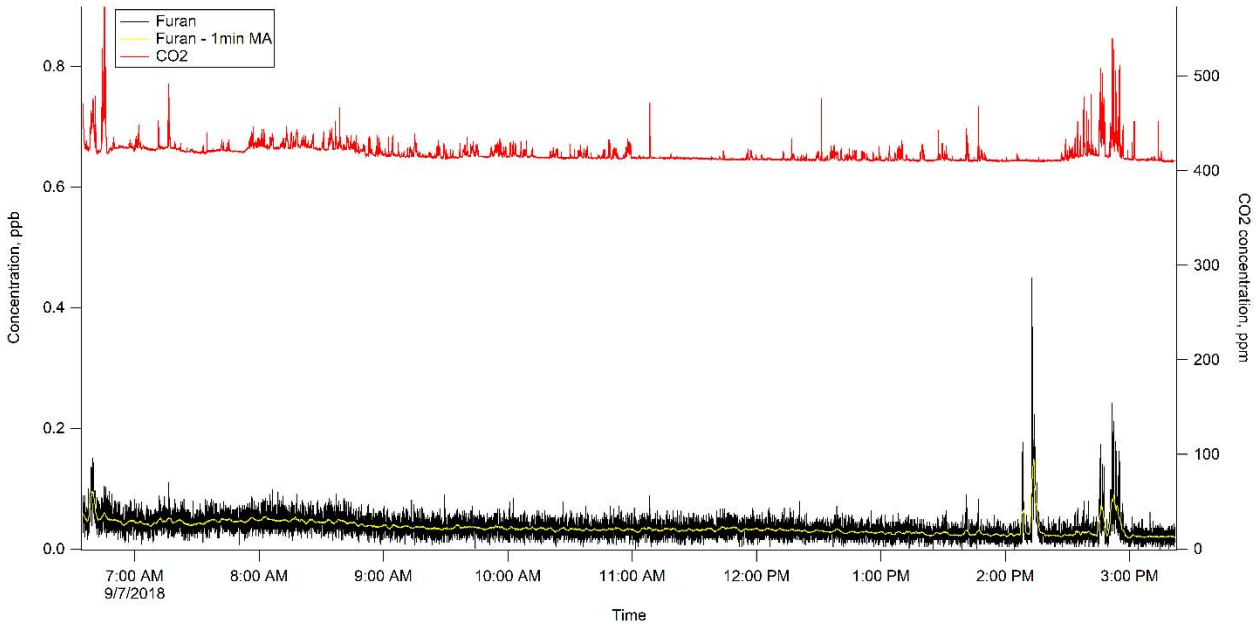

Figure 5-5. Furan.

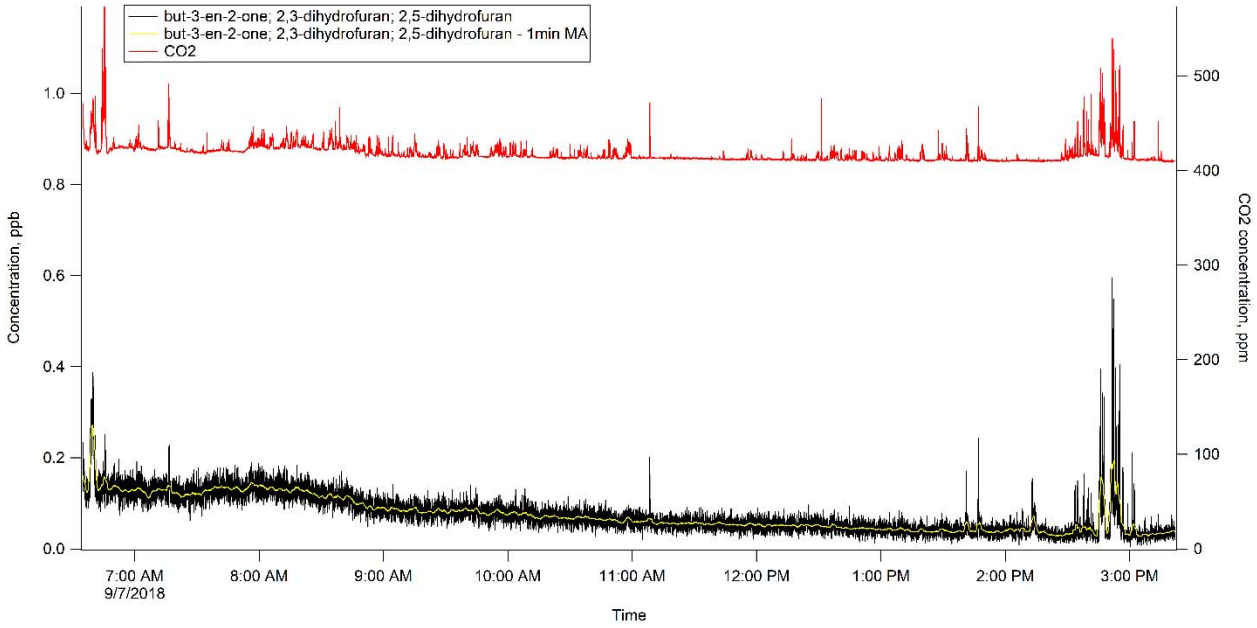

Figure 5-6. but-3-en-2-one; 2,3-dihydrofuran; 2,5-dihydrofuran.

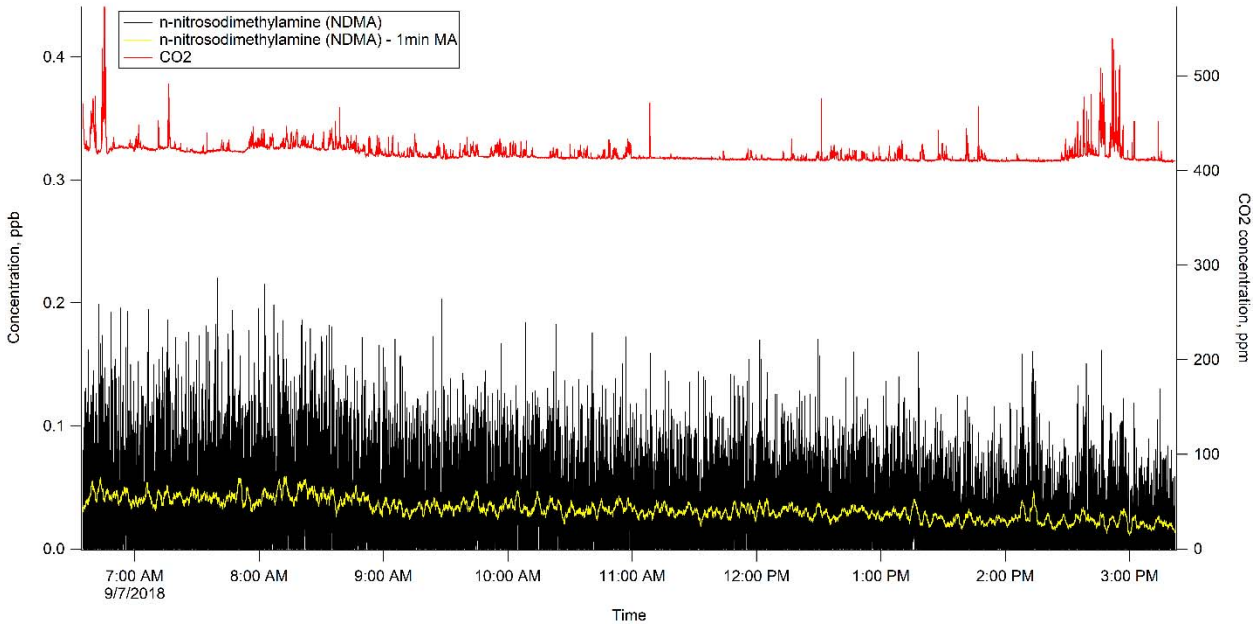

Figure 5-7. N-nitrosodimethylamine (NDMA).

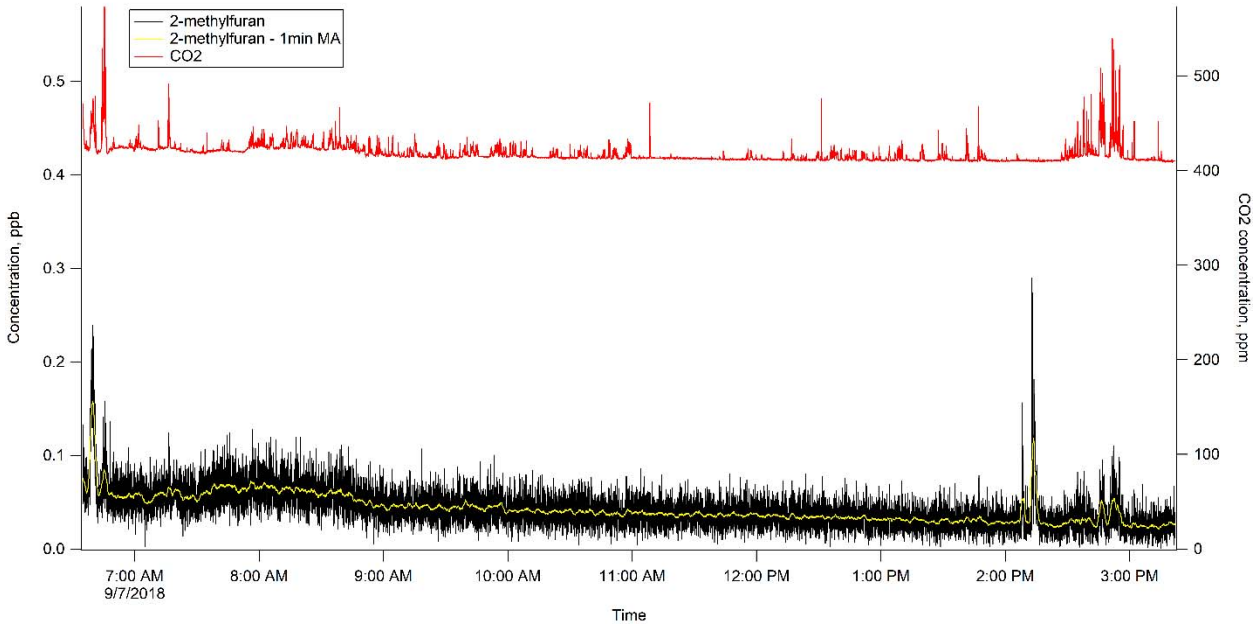

Figure 5-8. 2-methylfuran.

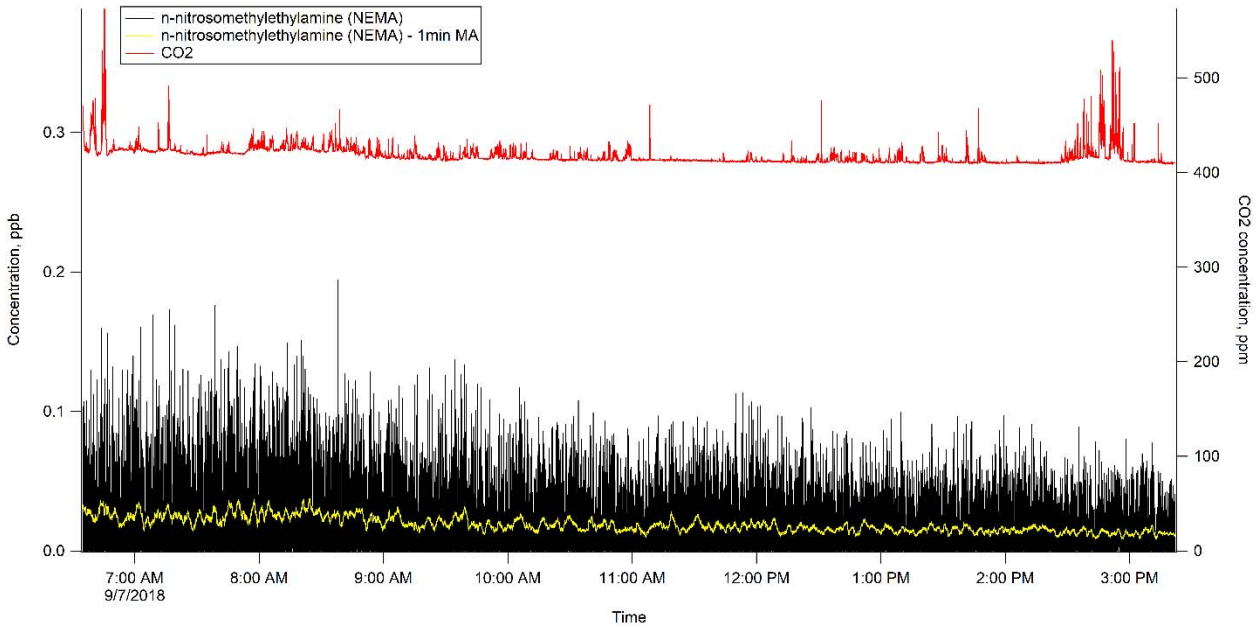

Figure 5-9. N-nitrosomethylethylamine (NEMA).

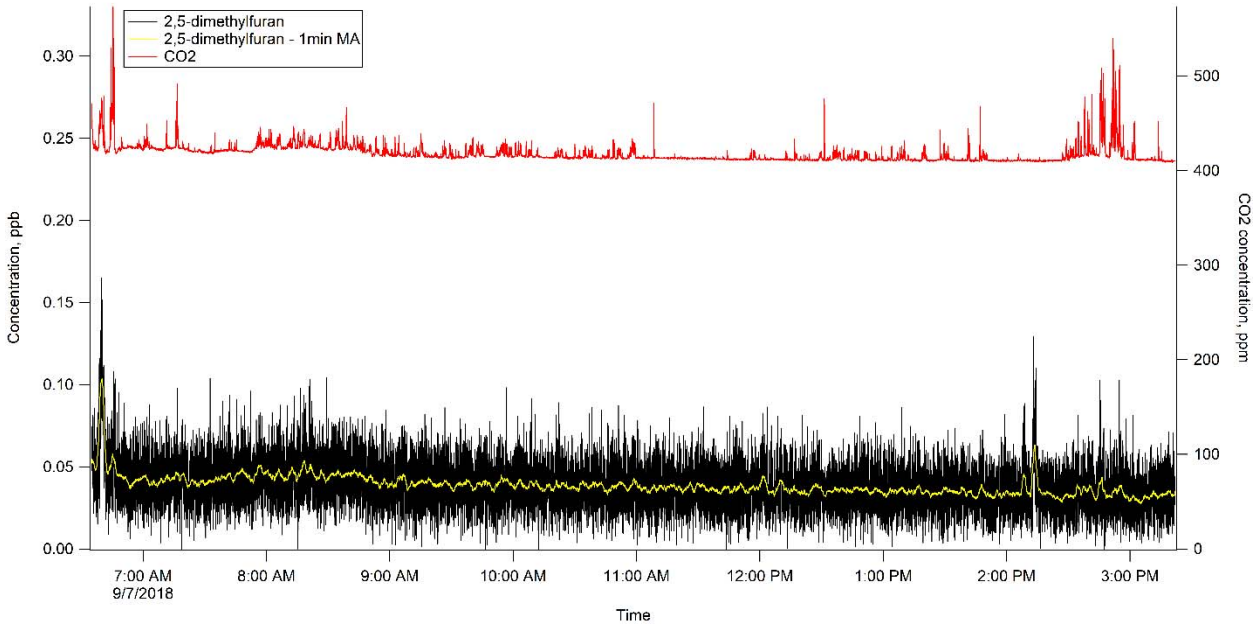

Figure 5-10. 2, 5-dimethylfuran.

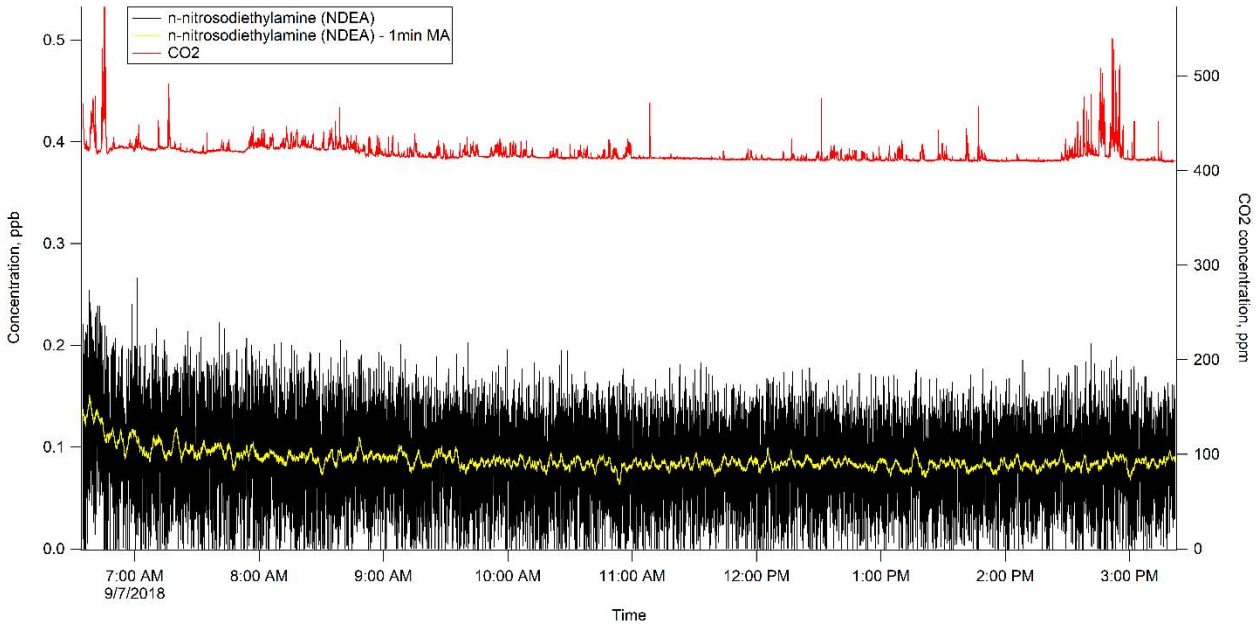

Figure 5-11. N-nitrosodiethylamine (NDEA).

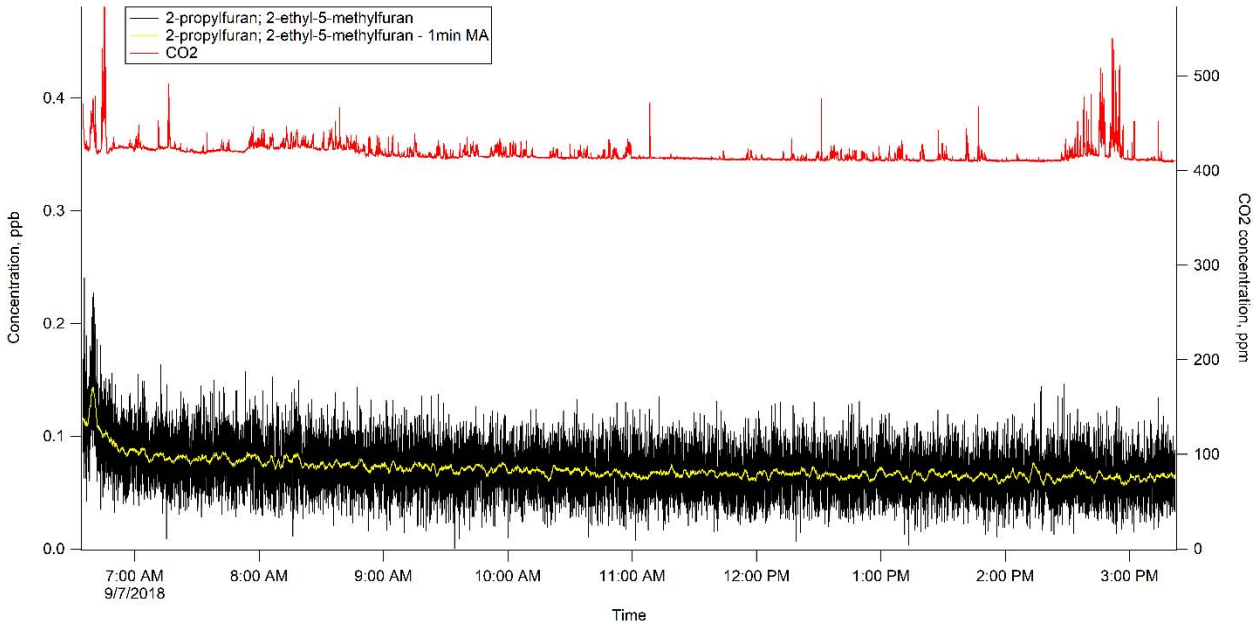

Figure 5-12. 2-propylfuran; 2-ethyl-5-methylfuran.

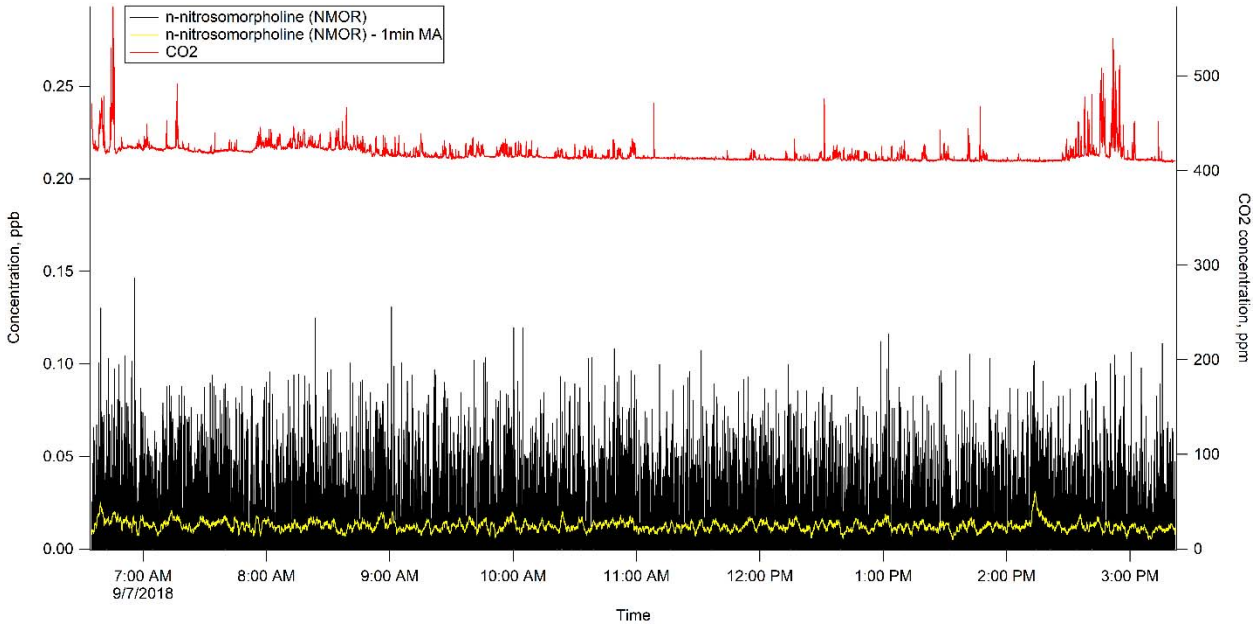

Figure 5-13. N-nitrosomorpholine (NMOR).

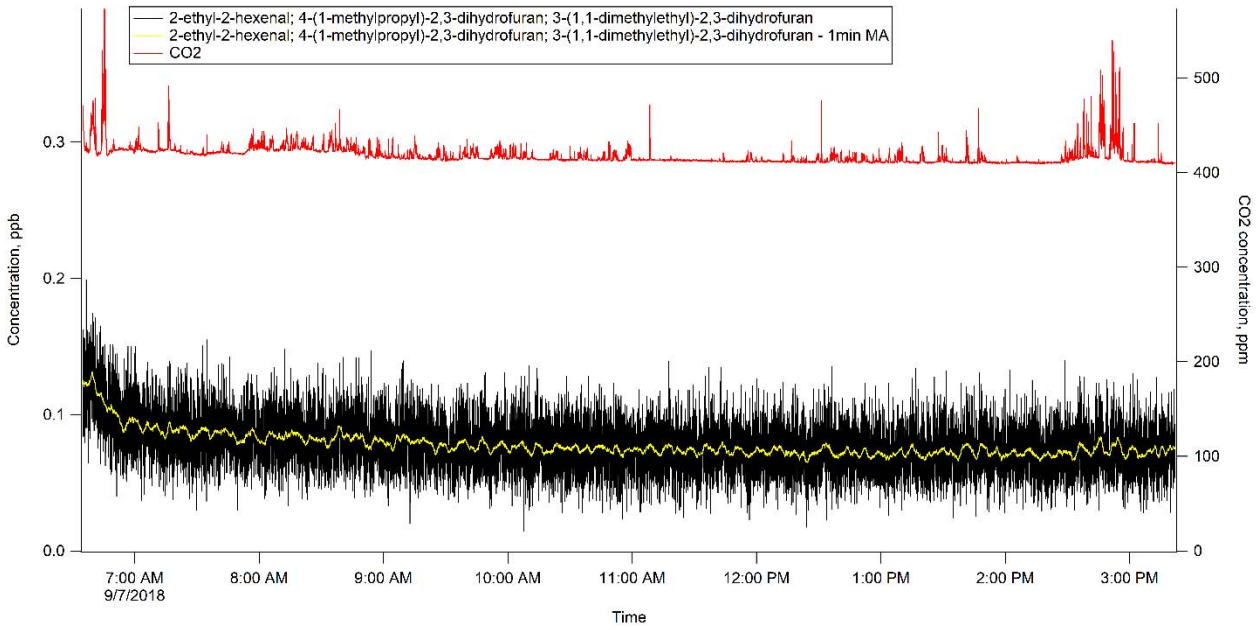

Figure 5-14. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran.

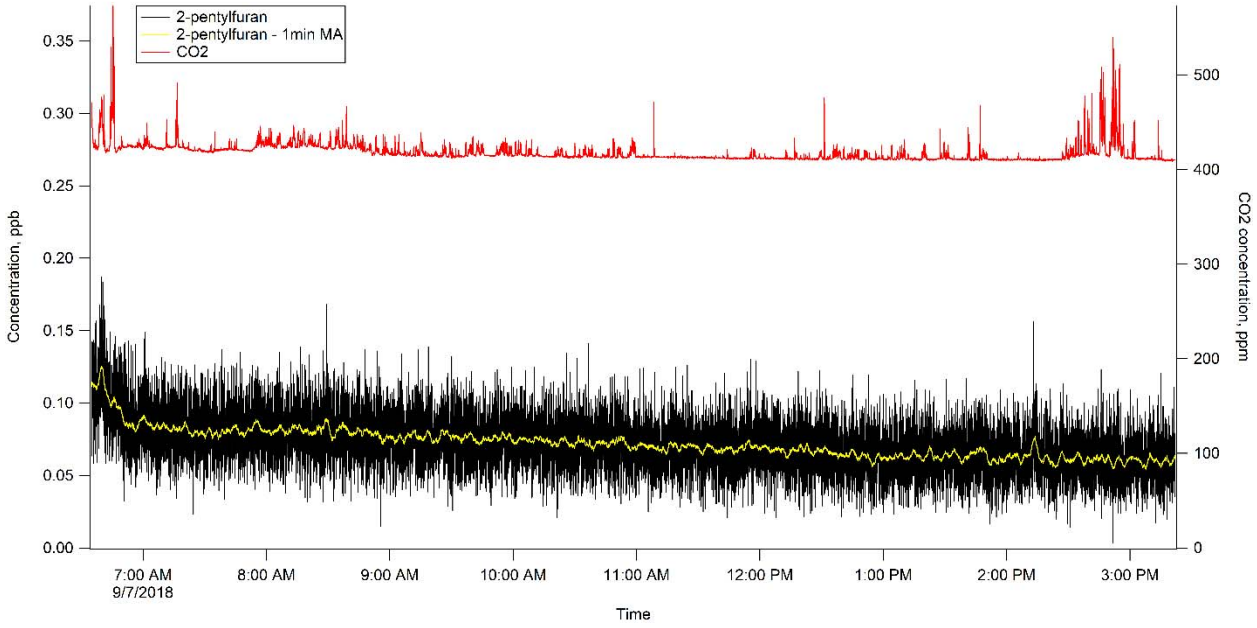

Figure 5-15. 2-pentylfuran.

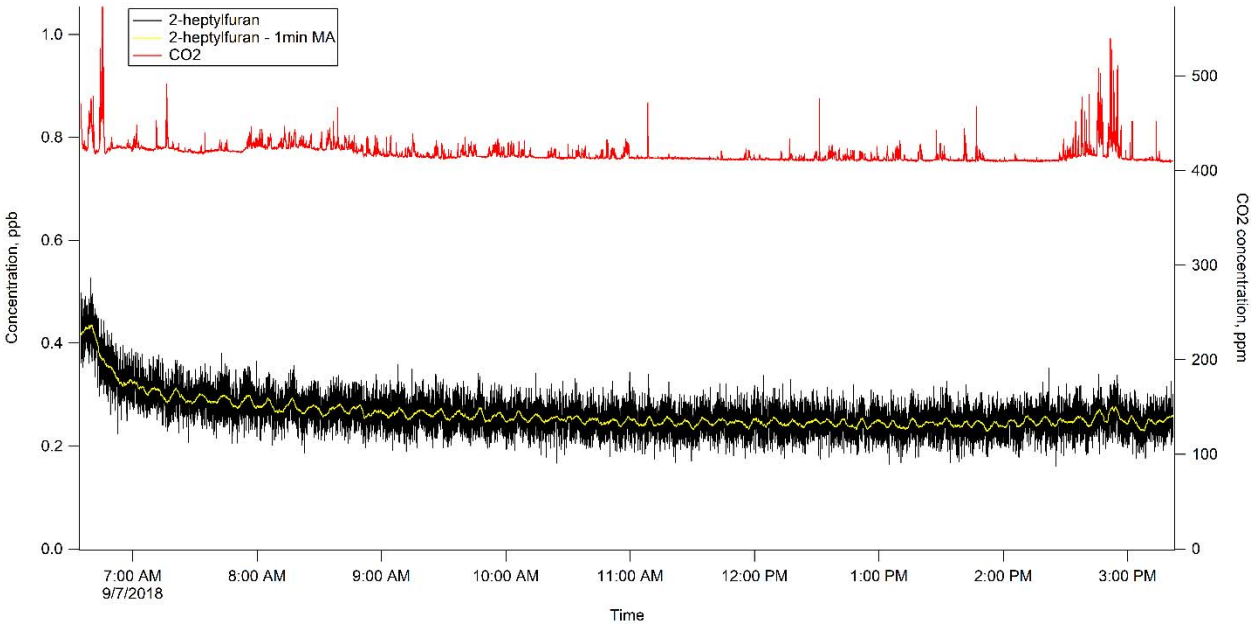

Figure 5-16. 2-heptylfuran.

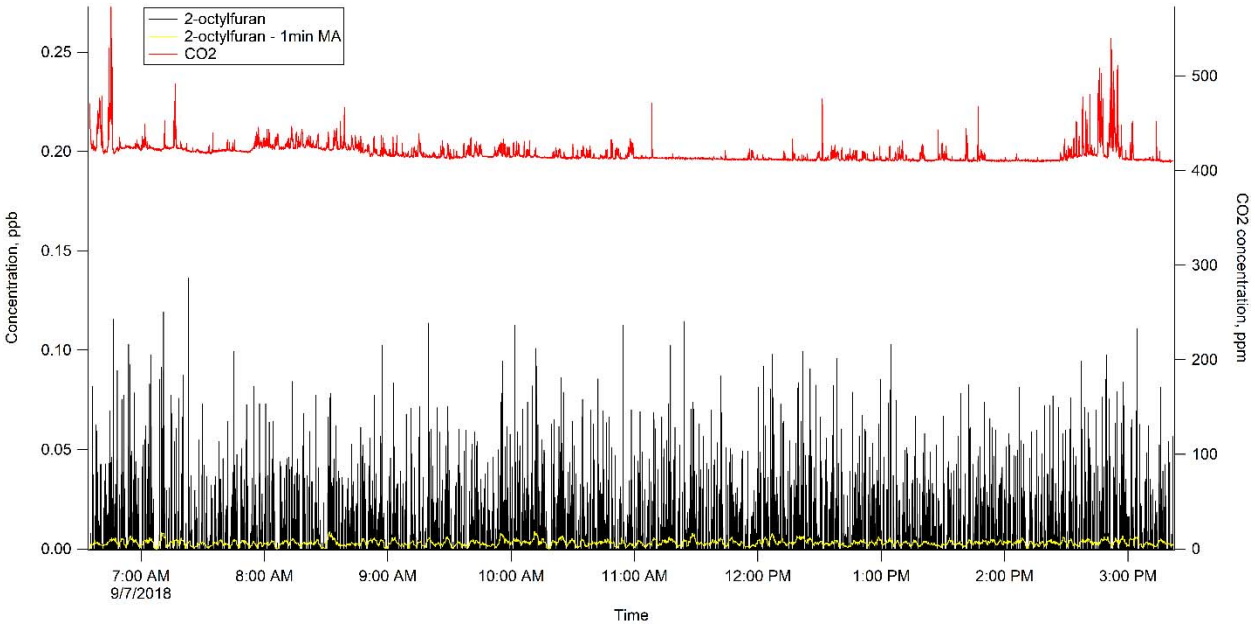

Figure 5-17. 2-octylfuran.

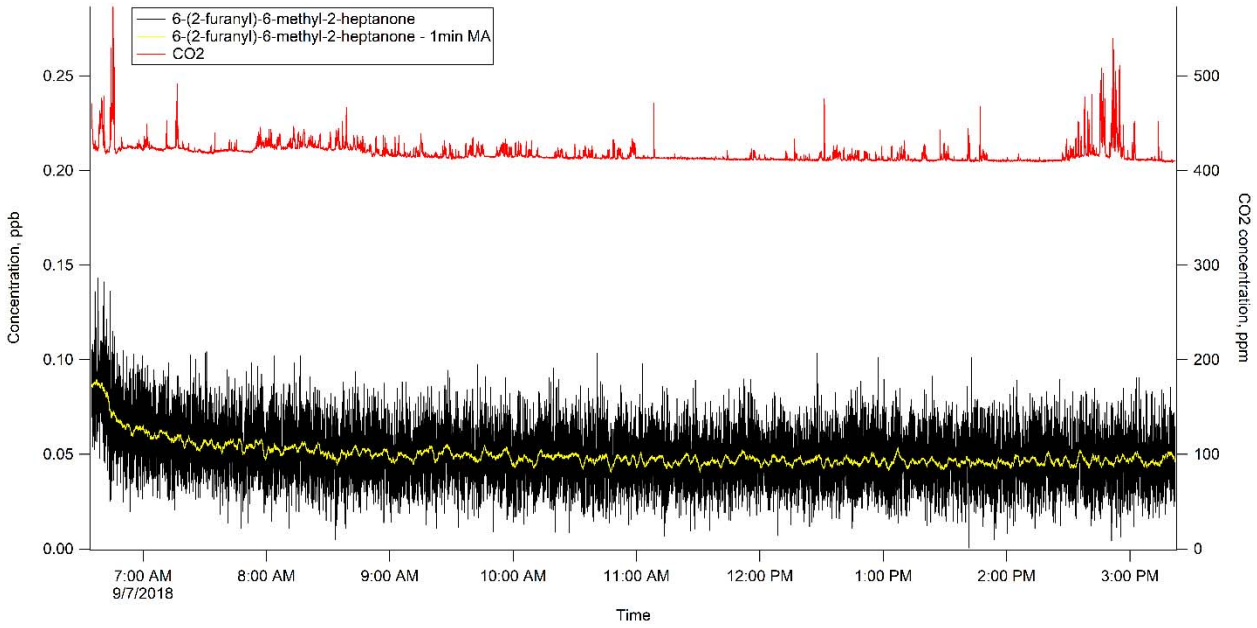

Figure 5-18. 6-(2-furanyl)-6-methyl-2-heptanone.

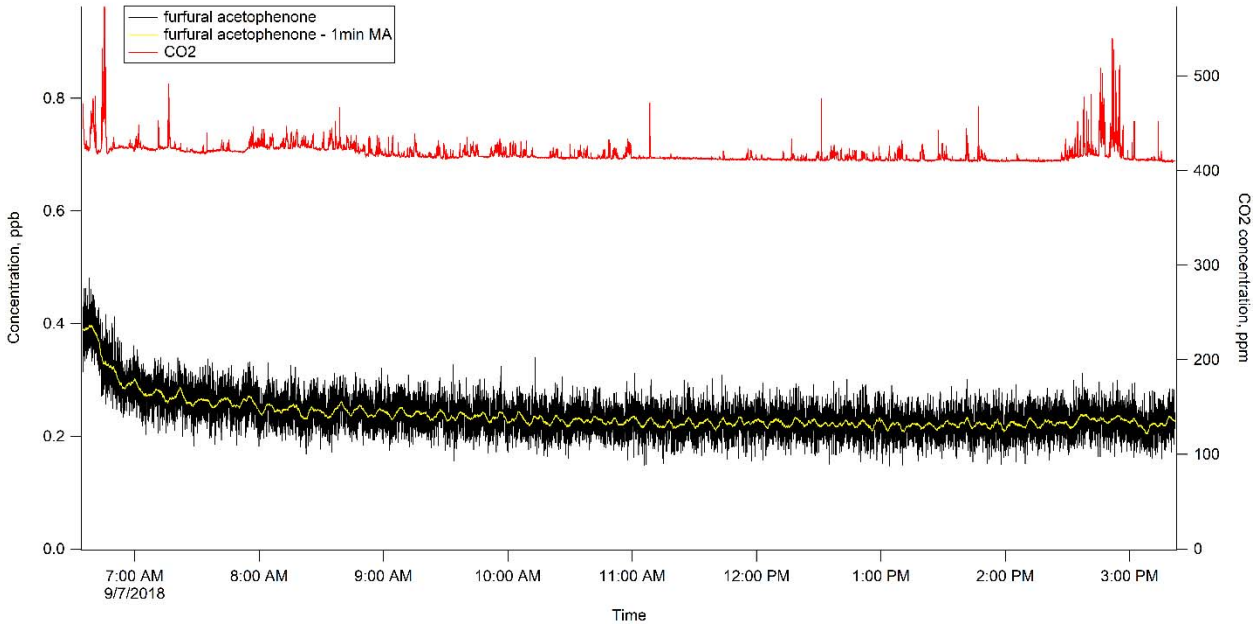

Figure 5-19. Furfural Acetophenone.

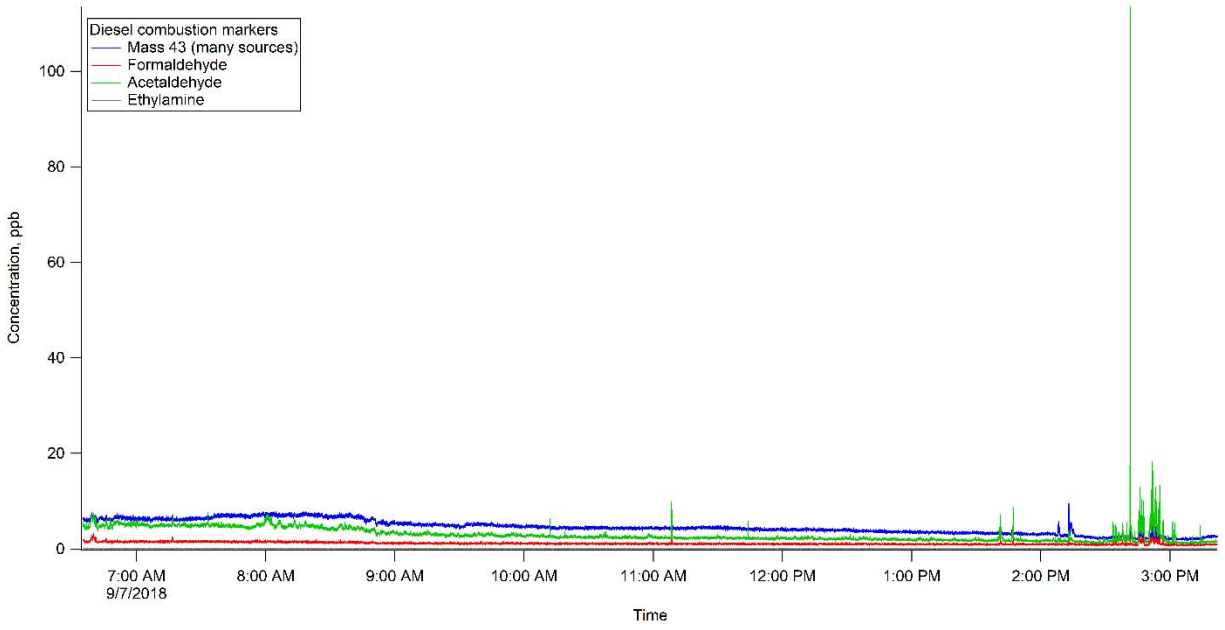

Figure 5-20. Diesel Combustion Markers.

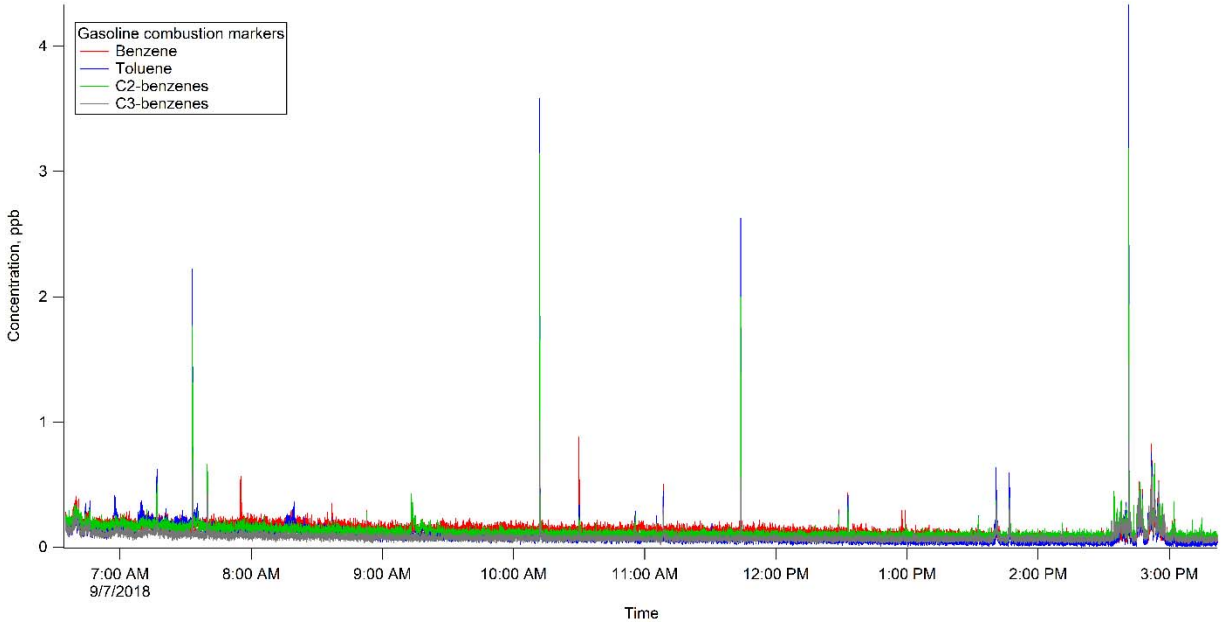

Figure 5-21. Gasoline Combustion Markers.

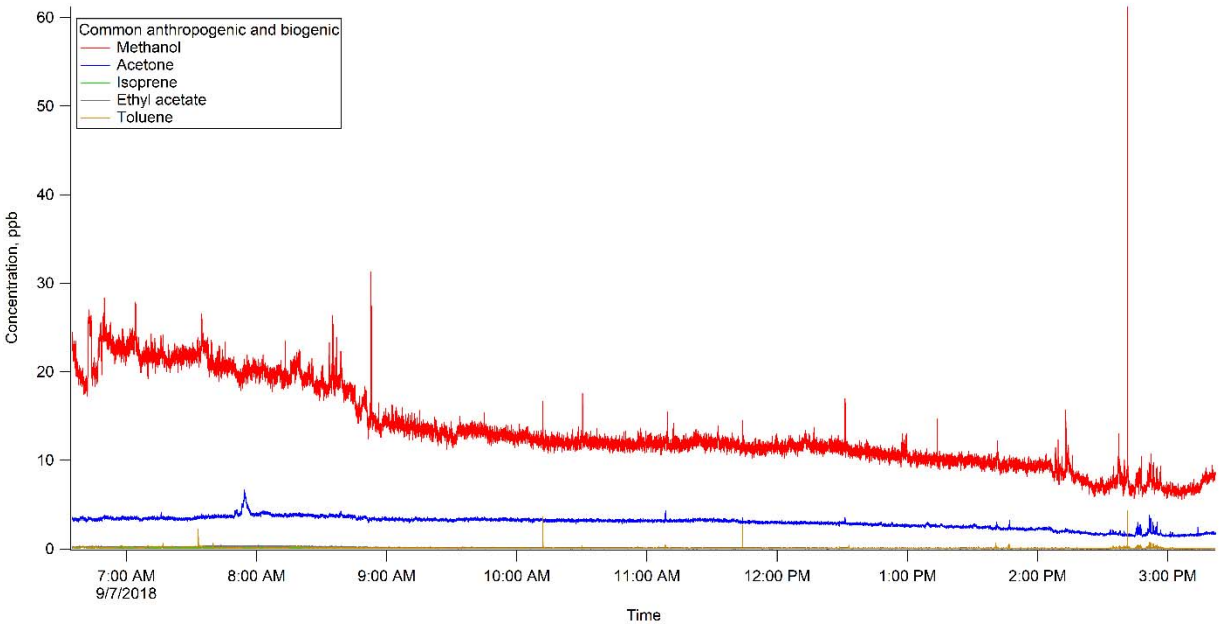

Figure 5-22. Plant and Human Markers.

6.0 SEPTEMBER 8, 2018 – SX PAVING

6.1 Quality Assessment

Data from September 8, 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

On September 8, 2018, the ML performed general area monitoring of the Hanford Site in support of the SX Paving Project.

The ML arrived on-site and checked in at the CSO at 05:34. At 04:25, the QA/QC zero air/sensitivity checks began at on the CO_2 monitor and PTR-MS prior to arrival on-site. The ML staff began mobile monitoring of SX Farms at 05:48 until parking east of the farm. At 10:22, the ML relocated to the north edge of SX Farm and remained in that location until 12:56.

The QA/QC zero air/sensitivity check of the Picarro ammonia analyzer was initiated at 13:11. The ML staff checked out with the CSO at 13:22 and returned to the TerraGraphics warehouse in Pasco, WA, at 14:12.

Table 6-1. Mobile Laboratory Sampling Mode Throughout the Monitoring Period.

Time	Location	Sampling Mode
05:48 - 06:04	SX Farm	Mobile Monitoring (mast)
06:04 - 10:22	SX Farm east of farm	Mobile Monitoring (mast)
10:22 - 12:56	SX Farm north edge of farm	Mobile Monitoring (mast)

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

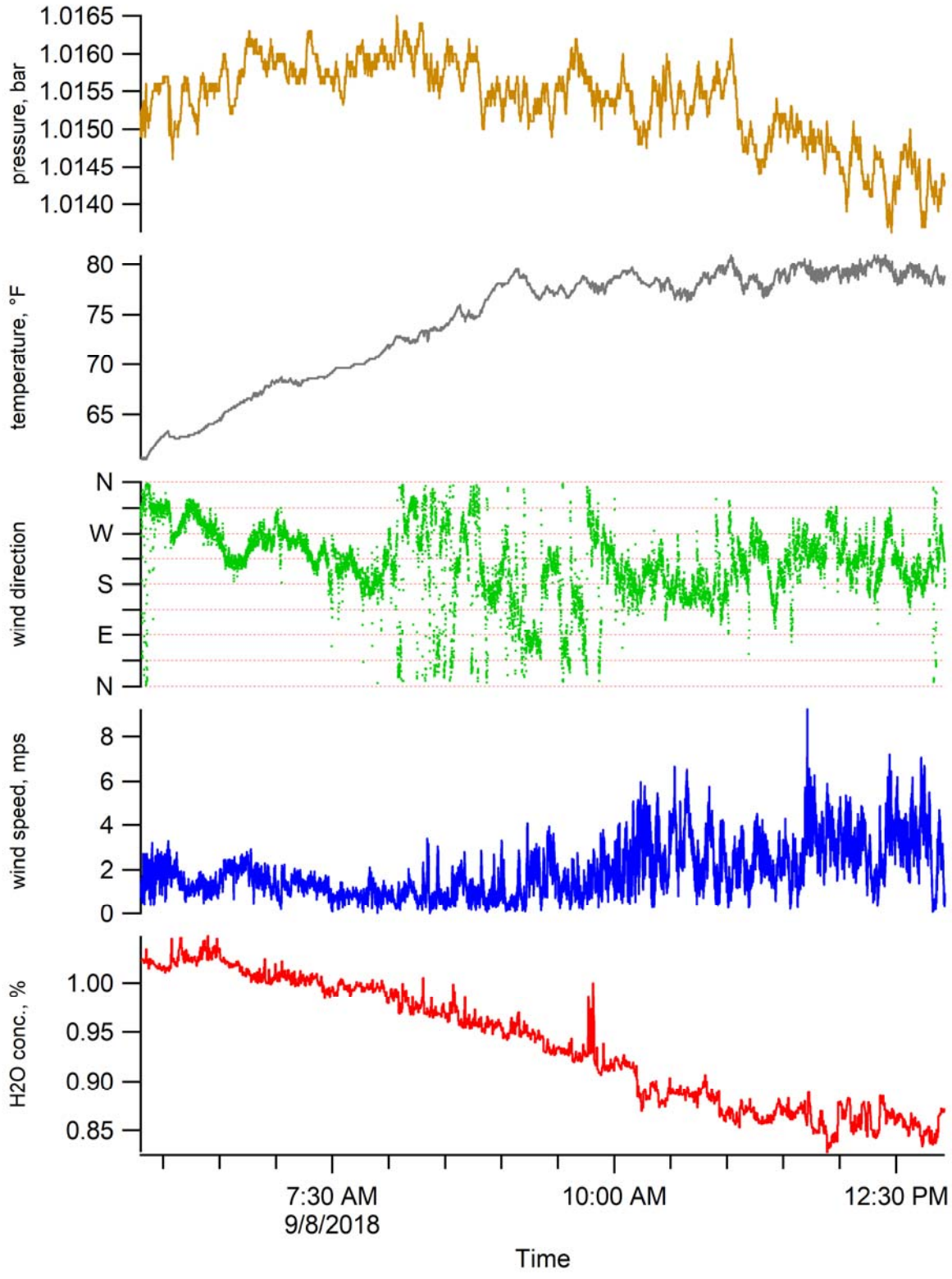

Figure 6-2. Weather Data for the Duration of the Monitoring Period.

6.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-TOF 6000 X2,
- LI-COR CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were not collected during this period.

Table 6-2. COPC Statistical information for the Monitoring Period of September 8, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	ammonia	25000	5.279	1.450	27.473	9.738	4.692
2	formaldehyde	300	0.671	0.152	22.691	7.924	0.658
3	methanol	200000	6.348	0.777	12.244	15.661	6.144
4	acetonitrile	20000	0.176	0.025	14.020	0.281	0.175
5	acetaldehyde	25000	1.635	0.589	36.053	25.469	1.447
6	ethylamine	5000	0.021	0.011	51.174	0.074	0.021
7	1,3-butadiene	1000	0.012	0.040	330.814	0.729	0.000
8	propanenitrile	6000	0.042	0.015	35.160	0.121	0.039
9	2-propenal	100	0.120	0.063	52.491	0.771	0.107
10	1-butanol + butenes	20000	0.111	0.061	54.577	1.510	0.099
11	methyl isocyanate	20	0.031	0.014	45.180	0.094	0.029
12	methyl nitrite	100	0.097	0.062	63.842	3.474	0.087
13	furan	1	0.033	0.018	52.827	0.343	0.028
14	butanenitrile	8000	0.013	0.008	63.125	0.064	0.011
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	100, 1, 1	0.042	0.023	55.801	N/A*	N/A*
16	butanal	25000	0.088	0.035	39.695	0.467	0.078
17	NDMA	0.3	0.021	0.025	117.359	0.220	0.013
18	benzene	500	0.080	0.112	140.963	2.825	0.058
19	2,4-pentadienenitrile + pyridine	300, 1000	0.025	0.012	49.824	0.193	0.023
20	2-methylene butanenitrile	30	0.011	0.006	55.314	0.045	0.011
21	2-methylfuran	1	0.032	0.017	54.042	0.130	0.028

Table 6-2. COPC Statistical information for the Monitoring Period of September 8, 2018. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
22	pentanenitrile	6000	0.009	0.007	70.864	0.051	0.008
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.033	0.019	56.687	0.234	0.029
24	NEMA	0.3	0.013	0.016	124.978	0.112	0.006
25	2,5-dimethylfuran	1	0.037	0.015	40.207	0.108	0.035
26	hexanenitrile	6000	0.024	0.010	40.194	0.069	0.023
27	2-hexanone (MBK)	5000	0.026	0.012	45.235	0.087	0.025
28	NDEA	0.1	0.090	0.040	45.021	0.262	0.089
29	butyl nitrite + 2-nitro-2-methylpropane	100, 30	0.314	0.040	12.828	0.557	0.310
30	2,4-dimethylpyridine	500	0.092	0.024	25.674	0.316	0.089
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.071	0.022	30.464	0.169	0.069
32	heptanenitrile	6000	0.094	0.020	21.299	0.210	0.092
33	4-methyl-2-hexanone	500	0.085	0.020	23.813	0.193	0.083
34	NMOR	0.6	0.012	0.019	159.699	0.181	0.000
35	butyl nitrate	2500	0.051	0.018	35.089	0.146	0.049
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.078	0.019	24.832	0.184	0.076
37	6-methyl-2-heptanone	8000	0.076	0.018	23.678	0.168	0.075
38	2-pentylfuran	1	0.069	0.019	26.878	0.152	0.068
39	biphenyl	200	0.064	0.022	33.810	0.162	0.063
40	2-heptylfuran	1	0.271	0.040	14.677	0.531	0.266
41	1,4-butanediol dinitrate	50	0.088	0.020	23.198	0.210	0.086
42	2-octylfuran	1	0.003	0.010	382.773	0.114	0.000
43	1,2,3-propanetriol 1,3-dinitrate	50	0.003	0.012	411.750	0.129	0.000
44	PCB	1000	0.102	0.019	18.958	0.218	0.100
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.052	0.015	28.867	0.129	0.051
46	furfural acetophenone	1	0.245	0.038	15.309	0.474	0.240

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.588 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 also suspect due to interferants identified during the background study.

The following figures display a selection of COPC signals, overlaid with the same signal smoothed using a one-minute moving average, and CO_2, for the monitoring period of September 8, 2018.

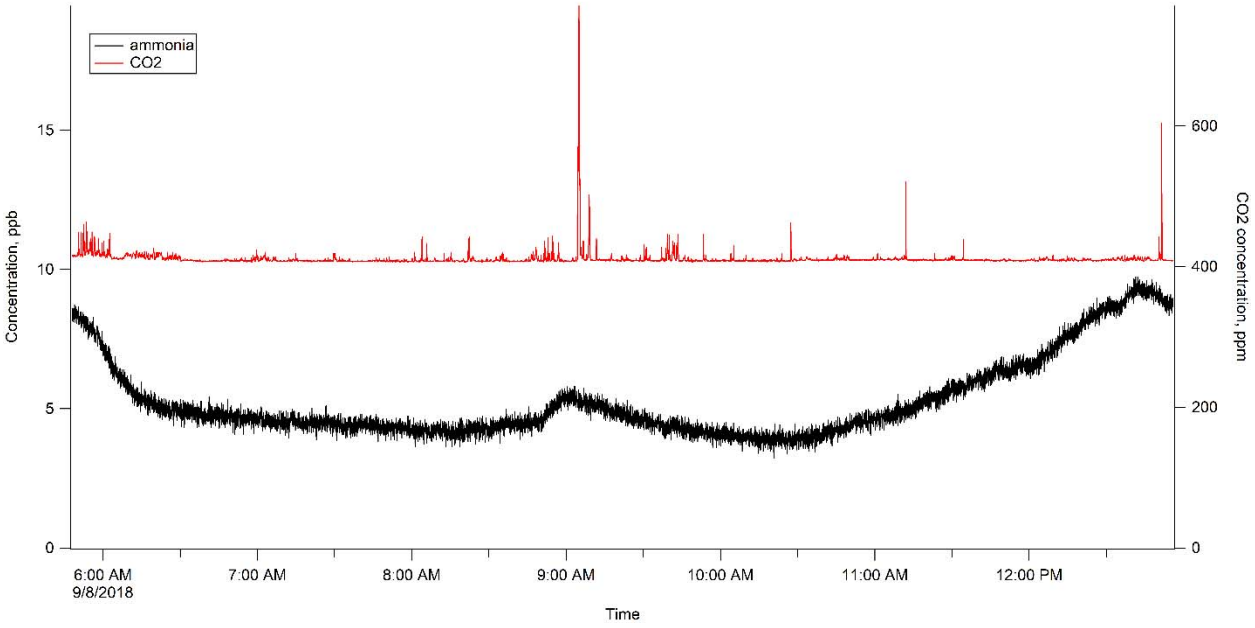

Figure 6-3. Ammonia.

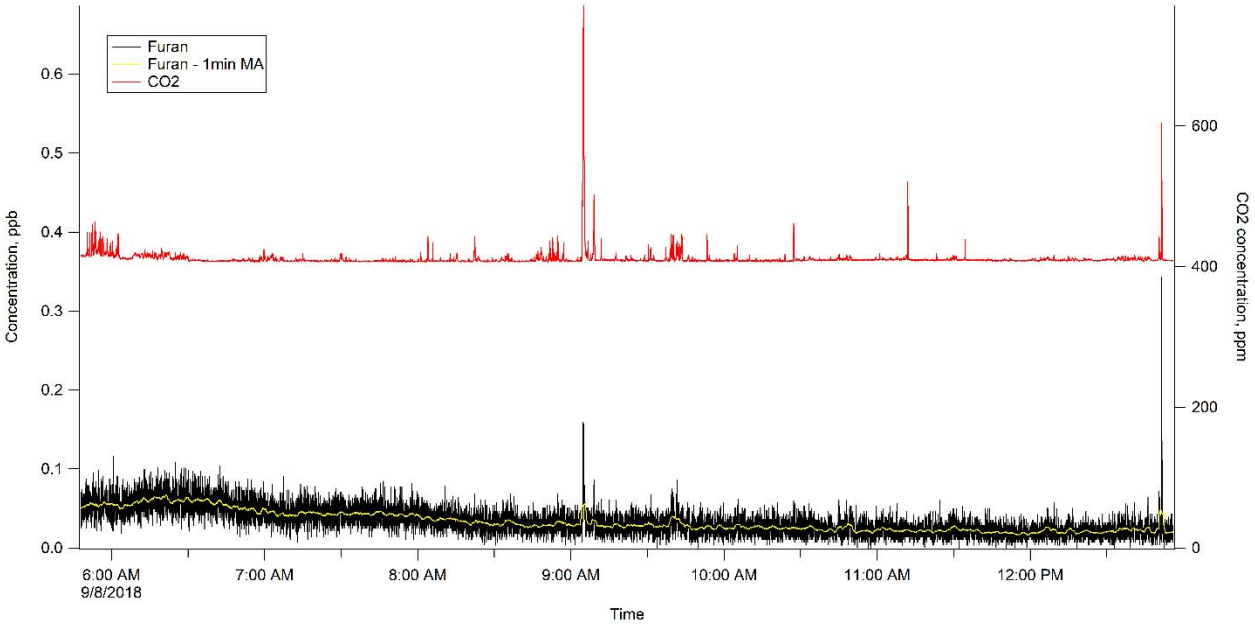

Figure 6-4. Furan.

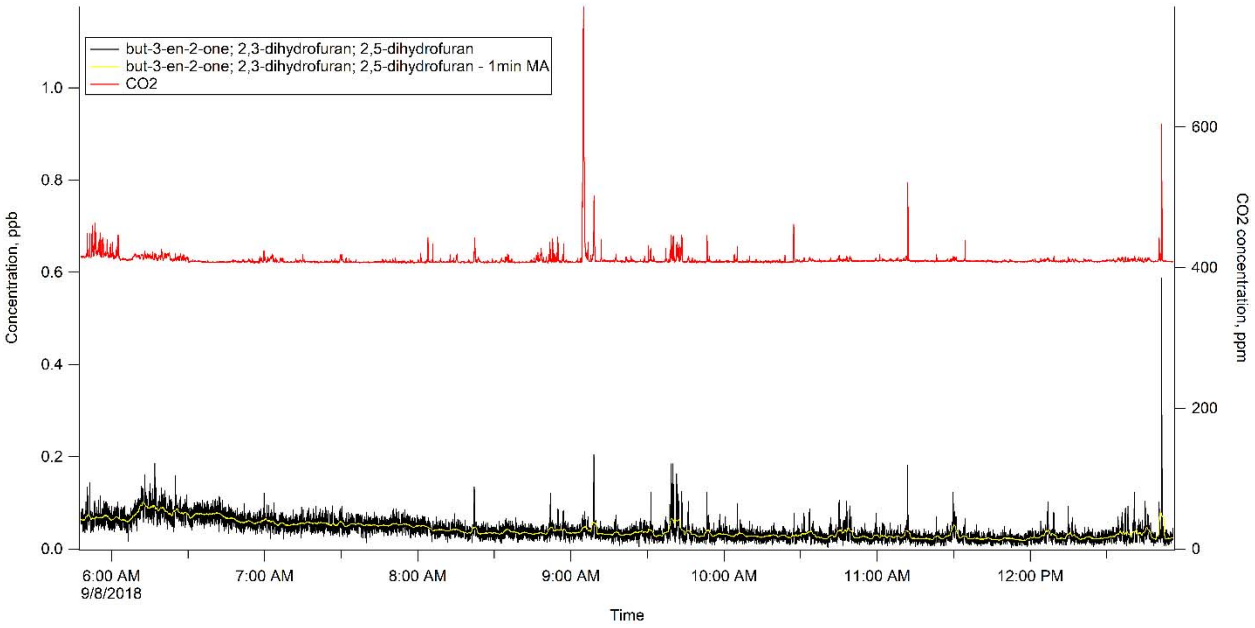

Figure 6-5. but-3-en-2-one; 2,3-dihydrofuran; 2,5-dihydrofuran.

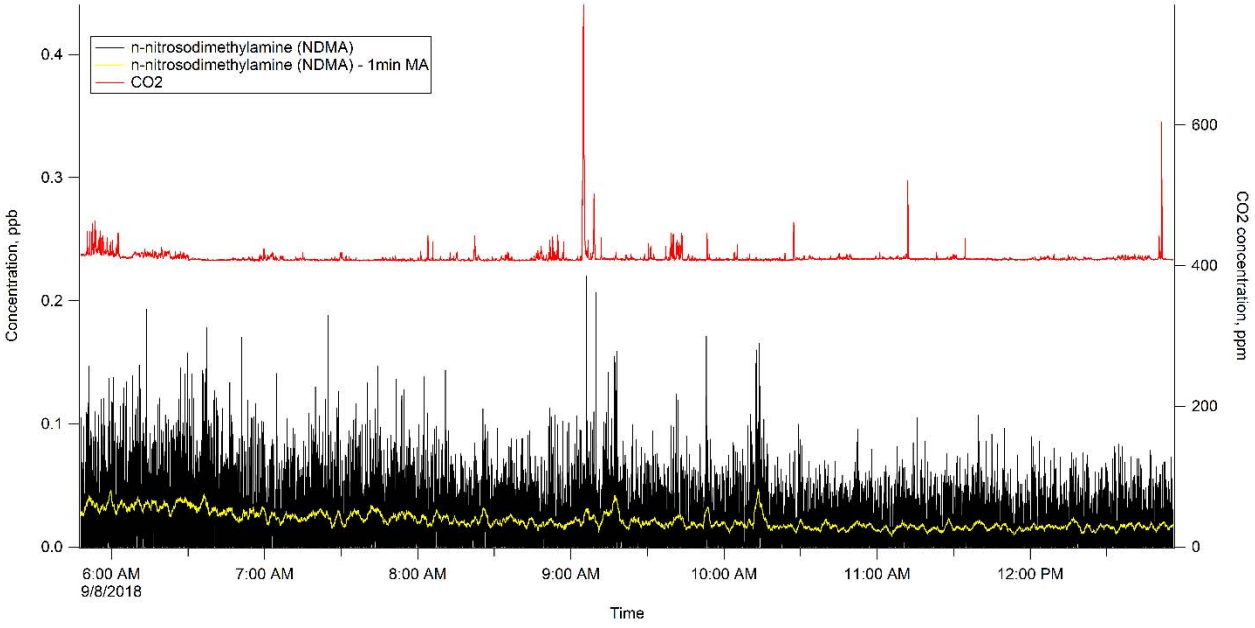

Figure 6-6. N-nitrosodimethylamine (NDMA).

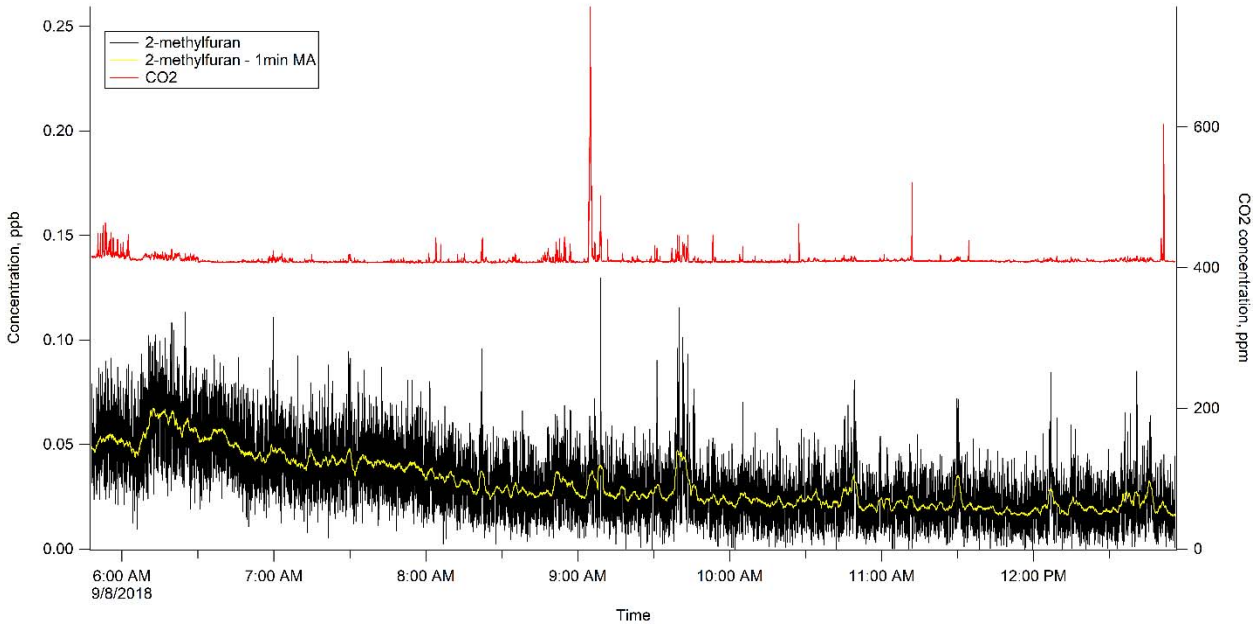

Figure 6-7. 2-methylfuran.

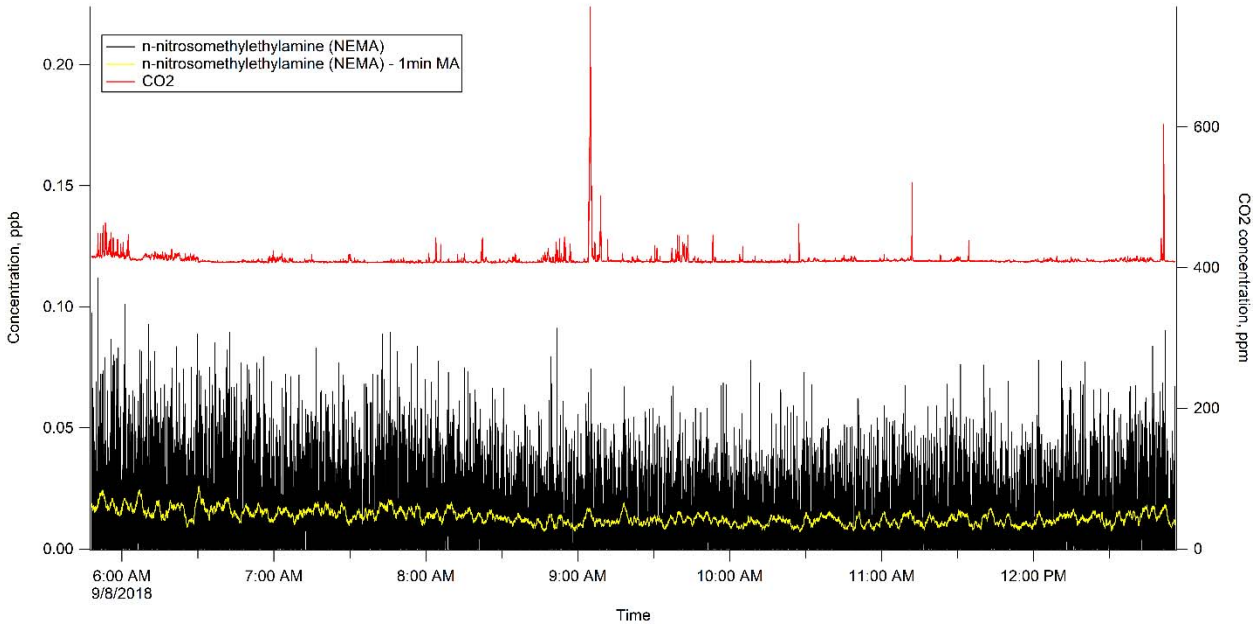

Figure 6-8. N-nitrosomethylethylamine (NEMA).

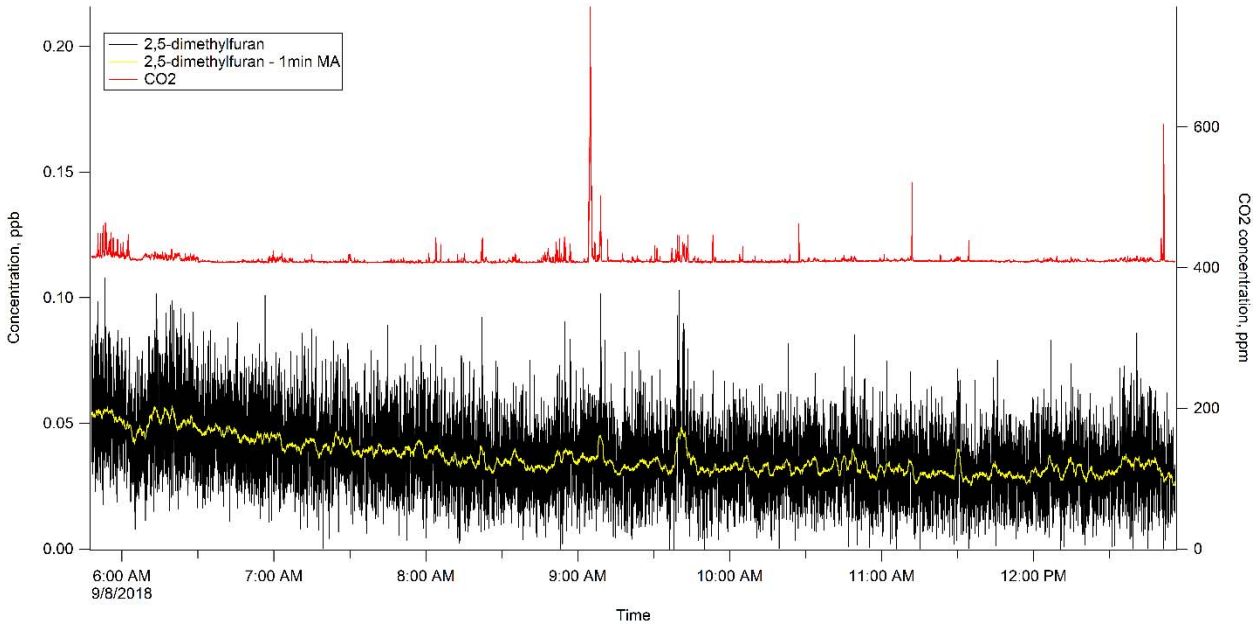

Figure 6-9. 2, 5-dimethylfuran.

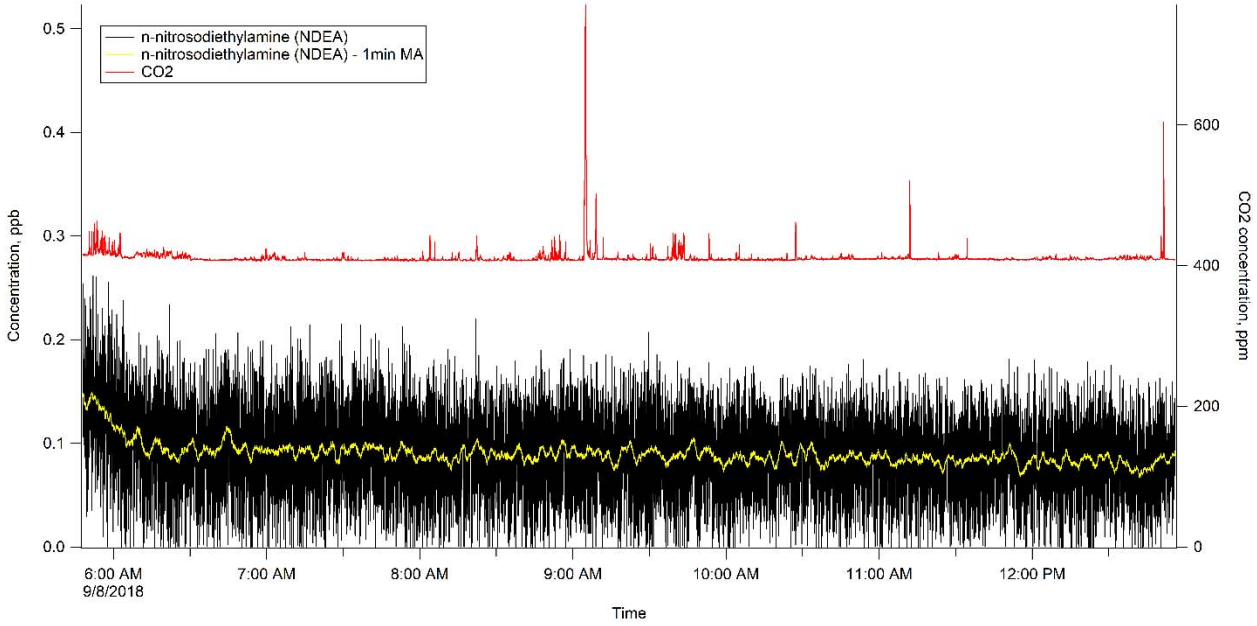

Figure 6-10. N-nitrosodiethylamine (NDEA).

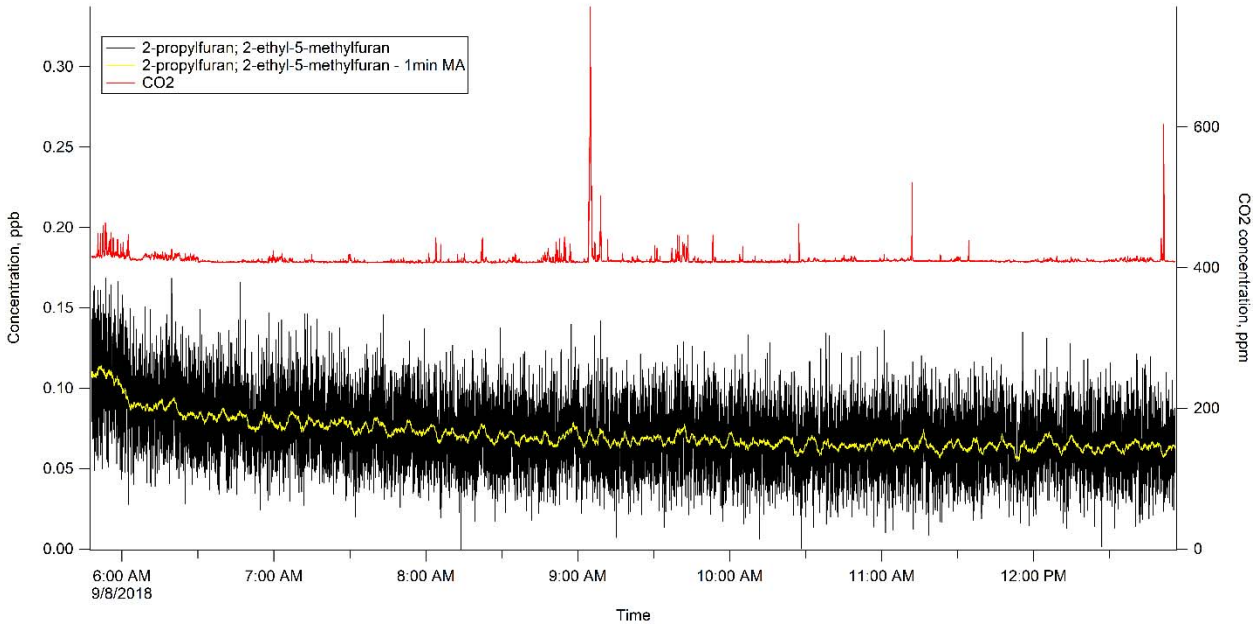

Figure 6-11. 2-propylfuran; 2-ethyl-5-methylfuran.

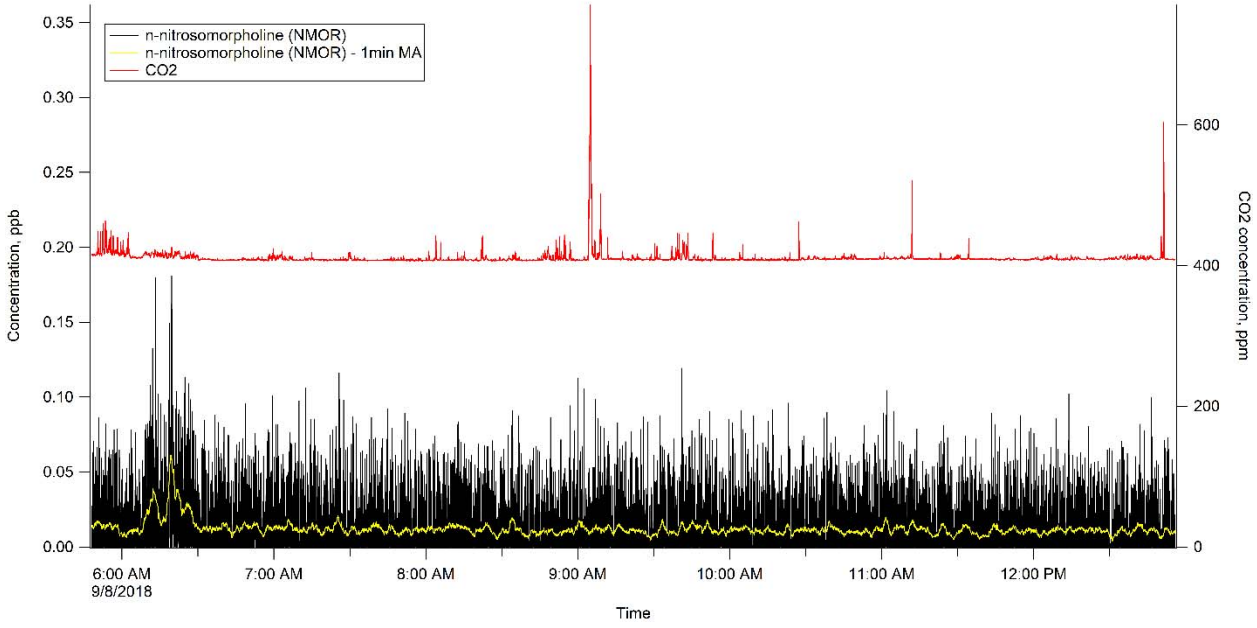

Figure 6-12. N-nitrosomorpholine (NMOR).

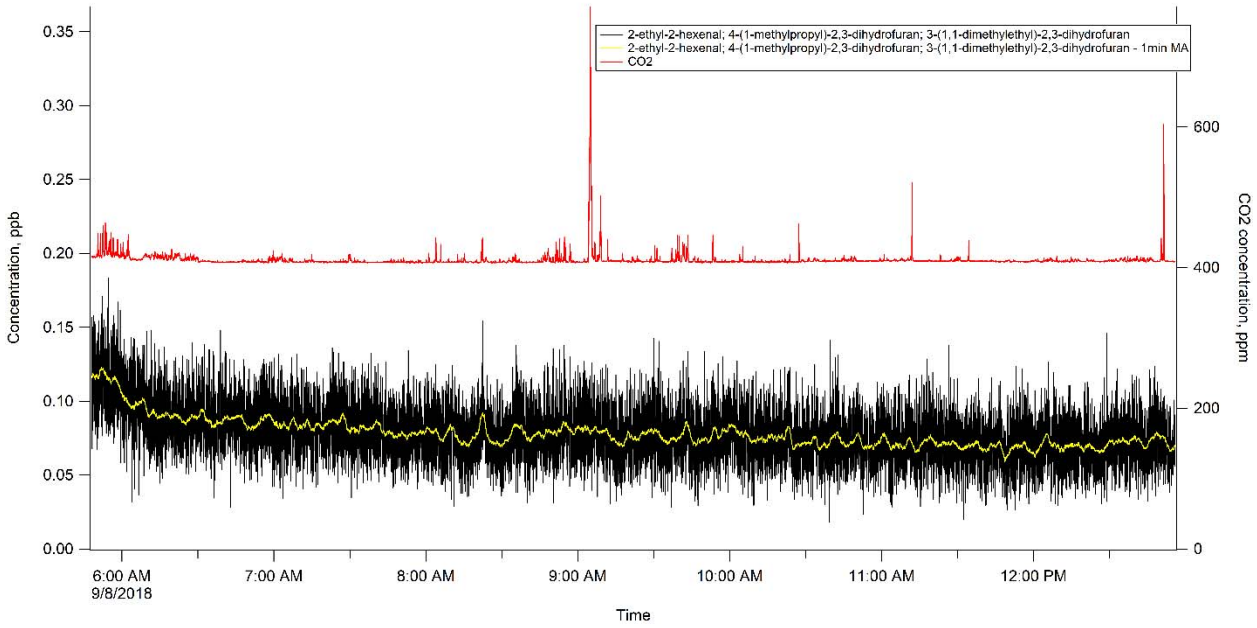

Figure 6-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran; 3-(1,1-dimethylethyl)-2,3-dihydrofuran.

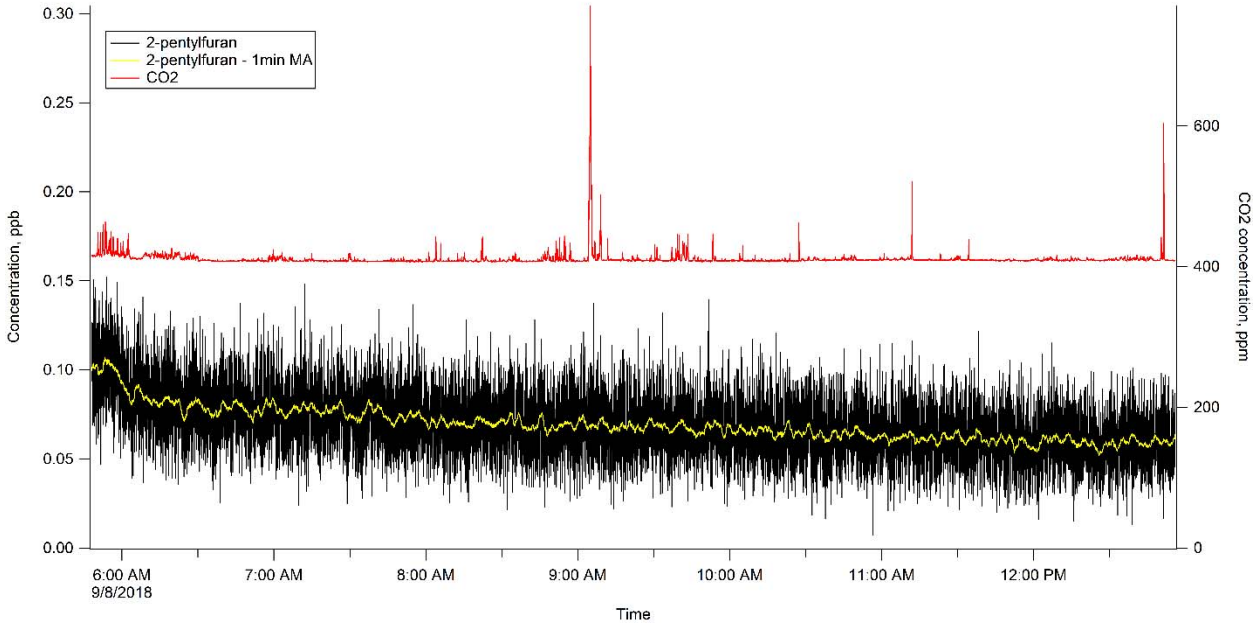

Figure 6-14. 2-pentylfuran.

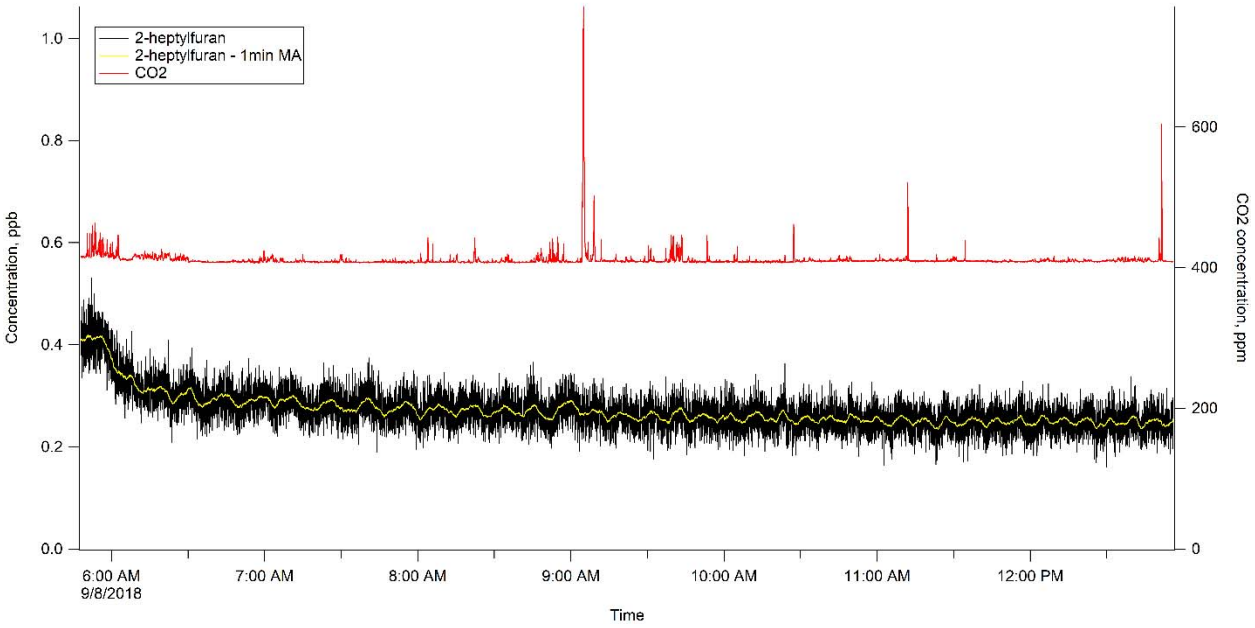

Figure 6-15. 2-heptylfuran.

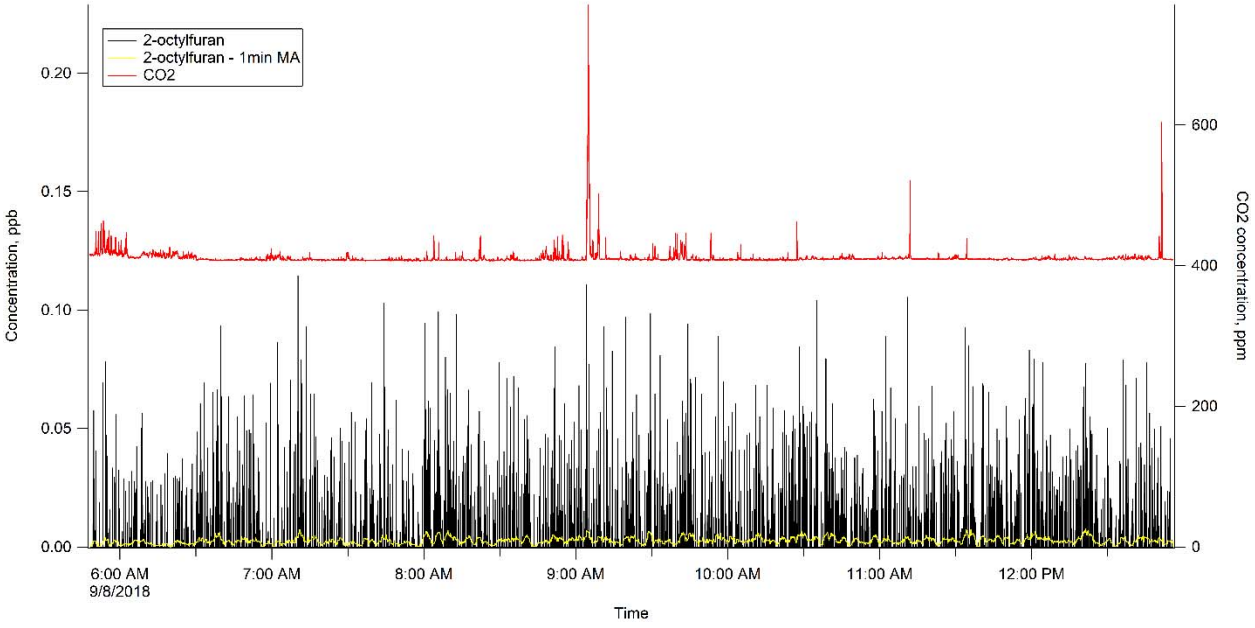

Figure 6-16. 2-octylfuran.

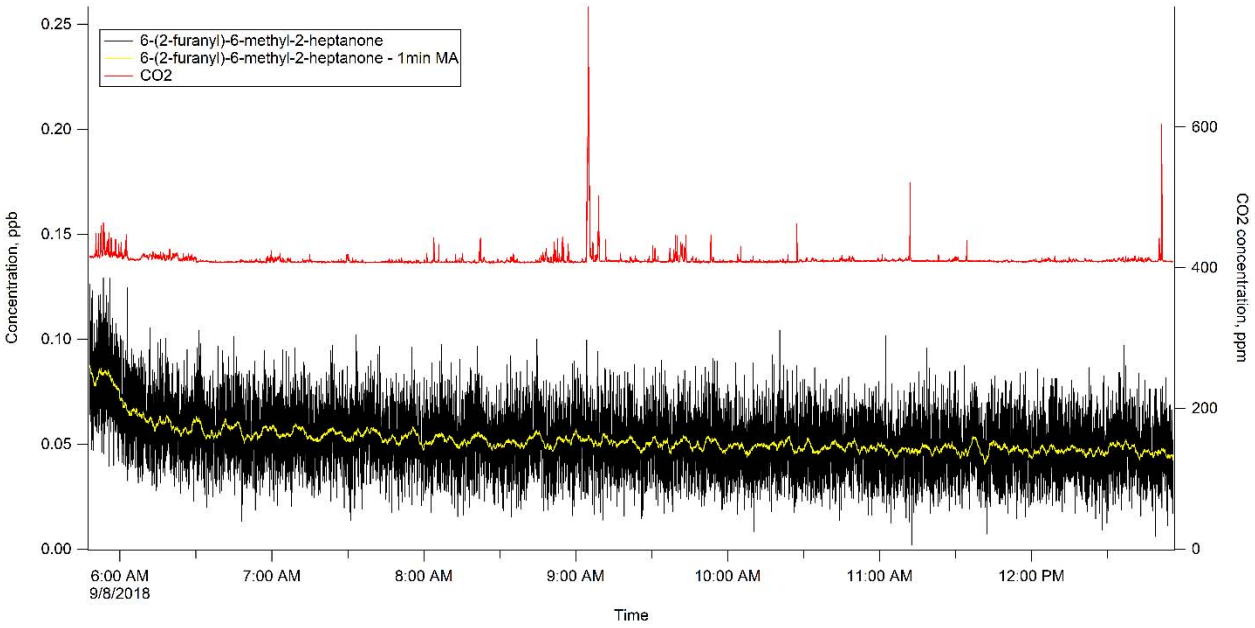

Figure 6-17. 6-(2-furanyl)-6-methyl-2-heptanone.

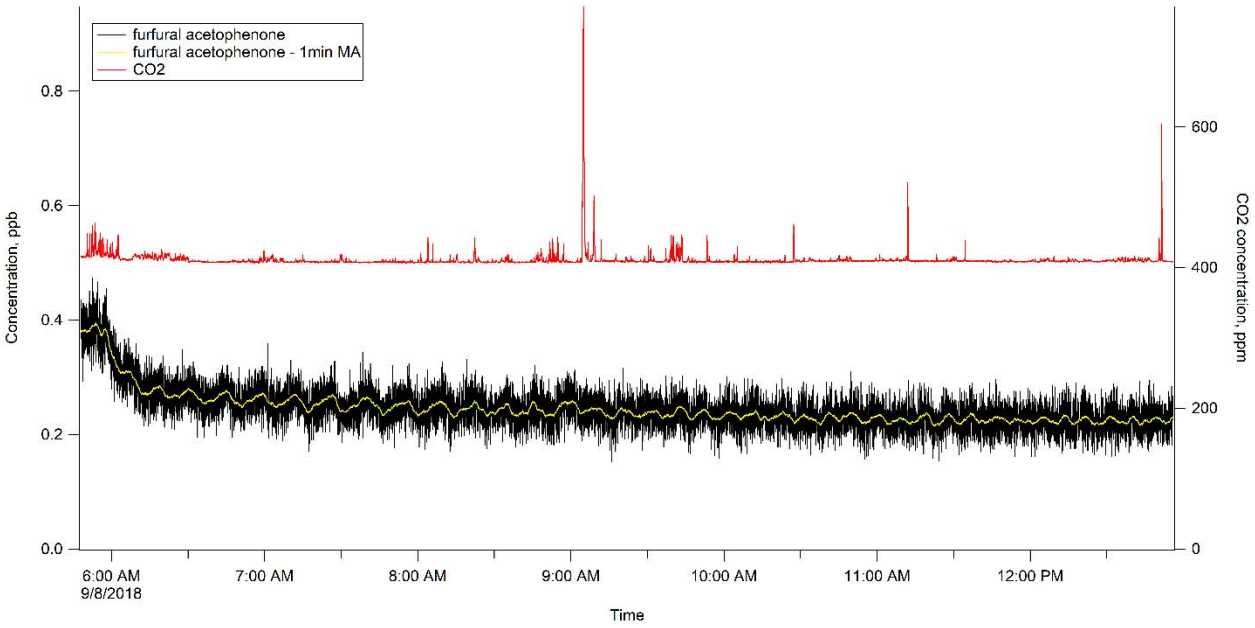

Figure 6-18. Furfural Acetophenone.

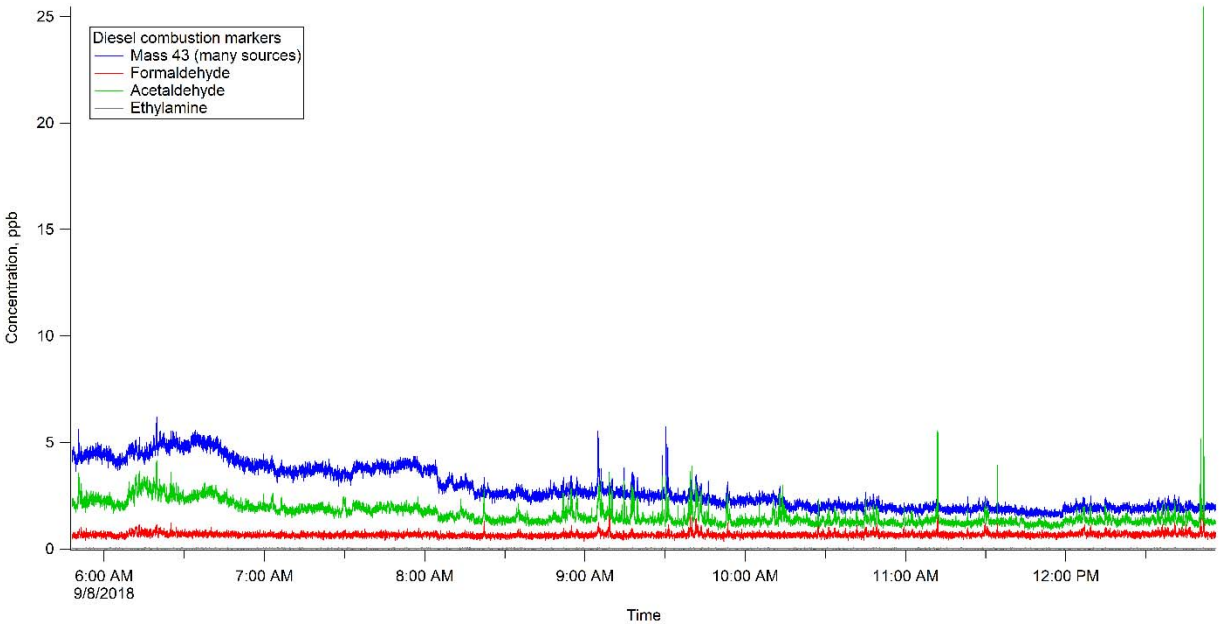

Figure 6-19. Diesel Combustion Markers.

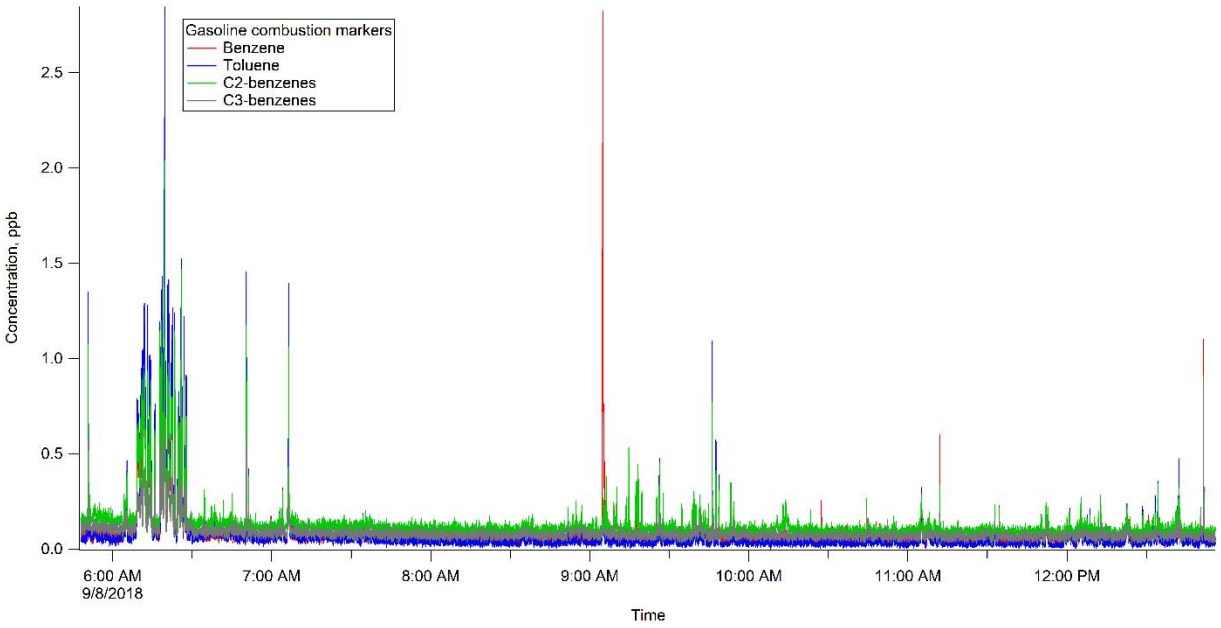

Figure 6-20. Gasoline Combustion Markers.

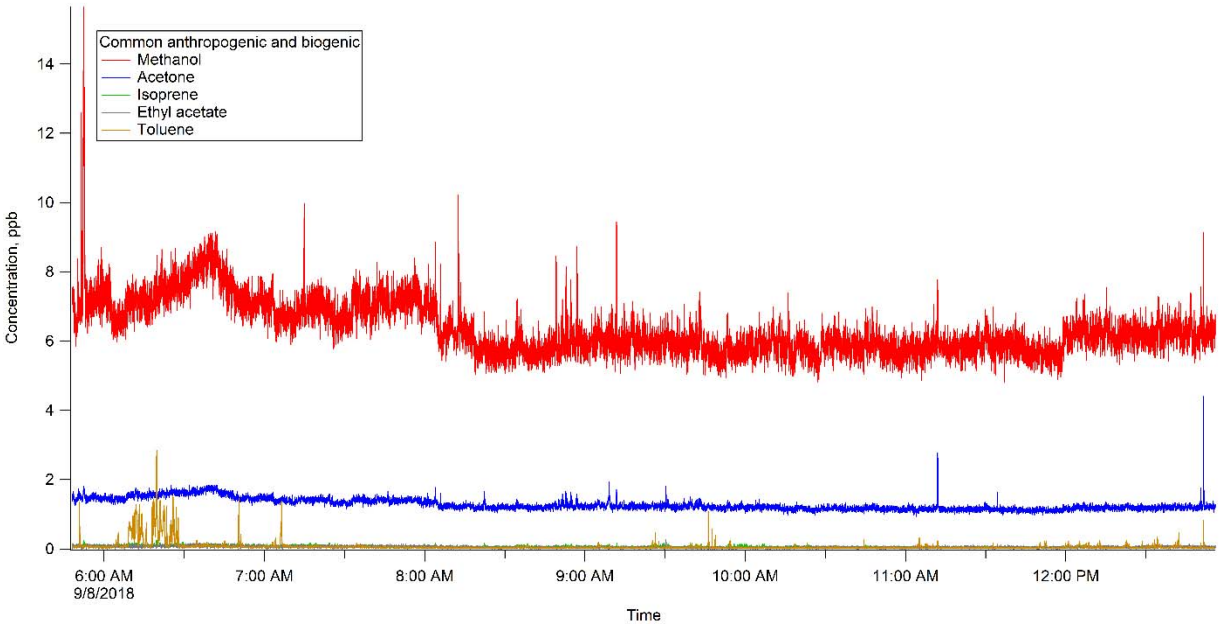

Figure 6-21. Plant and Human Markers.

7.0 REFERENCES

17124-DOE-HS-102, 2017, "Mobile Laboratory Data Processing-Analysis," Revision 0, TerraGraphics Environmental Engineering, Inc., Pasco, Washington.

66409-RPT-004, 2018, *Mobile Laboratory Operational Procedure*, Revision 4, TerraGraphics Environmental Engineering, Inc., Pasco, Washington.