WEEKLY REPORT FOR WEEK 24
(JANUARY 14, 2019 – JANUARY 20, 2019)

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Prepared for:

Washington River Protection Solutions, LLC
P.O. Box 850
Richland, WA 99352

Subcontract 53005, Release 81

Prepared by:

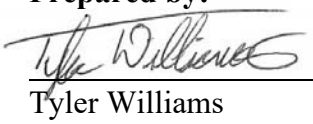
TerraGraphics Environmental Engineering, Inc.
2926 E. Ainsworth
Pasco, WA 99301

TerraGraphics

www.terragraphics.com

Approval Form

Prepared by:



Date: 09/20/2019

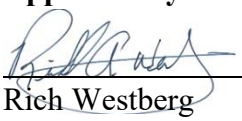
Tyler Williams

Reviewed by:

Date: 09/20/2019

Matthew Erickson, Ph.D.

Approved by:



Date: 09/20/2019

Rich Westberg

Record of Revision

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

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Appendices

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Tables

Acronyms and Abbreviations

AOP	Abnormal Operating Procedure
COPC	Chemical of Potential Concern
DNPH	2,4-dinitrophenylhydrazine
DR	Deficiency Report
MDL	Method Detection Limit
ML	Mobile Laboratory
NDEA	N-nitrosodiethylamine
NDMA	N-nitrosodimethylamine
NEMA	N-nitrosomethylethylamine
NMOR	N-nitrosomorpholine
OEL	Occupational Exposure Limit
PTR-MS	Proton Transfer Reaction – Mass Spectrometer
PTR-TOF	Proton Transfer Reaction – Time of Flight
QA	Quality Assurance
QC	Quality Control
RL	Reporting Limit
SME	Subject Matter Expert

1.0 INTRODUCTION

During the week of January 14, 2019, through January 20, 2019, TerraGraphics personnel operated the Mobile Laboratory (ML) in execution of a winter background study at pre-determined locations on and off the Hanford Site. The ML successfully measured ambient concentrations of volatile and semi-volatile organic compounds at six locations (Figure 1-1).

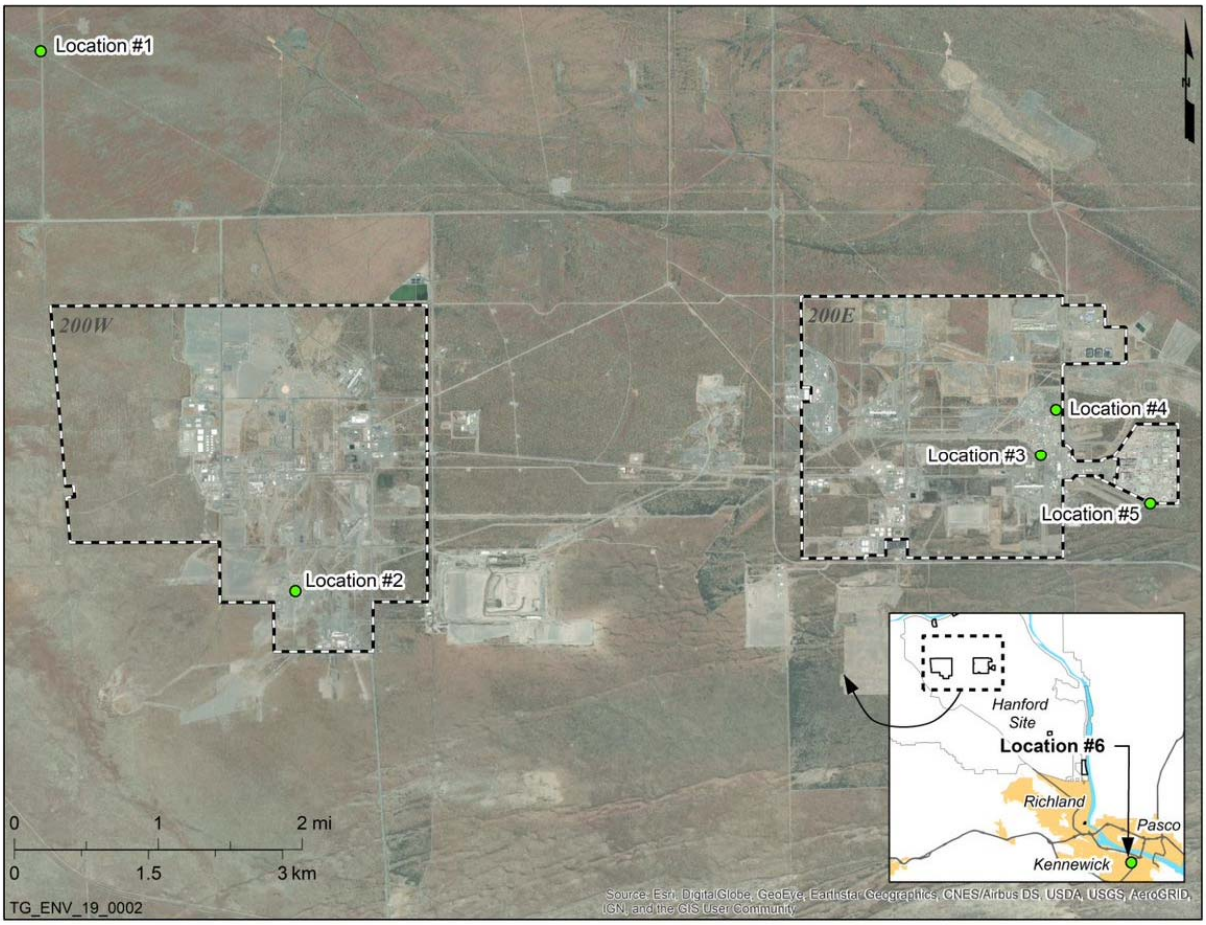

Figure 1-1. Background Study Locations.

Tables of measurement results are provided in the following sections. The basis of comparison for ML measurements has been occupational exposure limits (OELs). 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.

Confirmatory measurements were also taken during this study to validate ML measurements. Standard sampling media and standard laboratory methods for confirmation and validation of ML PTR-MS results were performed and analyzed by ALS Environmental. The analysis of confirmatory measurements can be found in further detail in Month 5 Report.

Beginning on January 14, 2019, issues with the Proton Transfer Reaction – Mass Spectrometer (PTR-MS) sensitivity were observed and documented in Deficiency Report (DR) No. DR19-001. Troubleshooting measures were taken to rectify the drifting sensitivity, and a process for routine checks by Subject Matter Experts (SMEs) was established to keep the instrument running at the highest rate of performance possible. The issue is illustrated in compound graphs in the following sections, where baseline responses begin gradual drifts upward, followed by a dramatic drop back to normal operating signal baseline. Method detection limits (MDLs) were calculated and adjusted upward to maintain confidence in compound detections.

2.0 JANUARY 14, 2019 – JANUARY 15, 2019 – STUDY SITE #1

2.1 Quality Assessment

Data from January 14, 2019, were assessed using Procedure 17124-DOE-HS-102, "Mobile Laboratory Data Processing – Analysis." A Data Acceptance Checklist was completed. The data were accepted by TerraGraphics with the following comments. DR19-001 was initiated to adequately document failed span checks that occurred on the PTR-MS. See Appendix A for the full DR. This instance will be discussed in detail in a subsequent monthly summary report.

2.2 Summary

The ML personnel performed background sampling using the ML from January 14, 2019, to January 15, 2019, at Study Site 1. Site 1, shown in Figure 2-1, is located on the plateau northwest of the 200W Tank Farm operations. The ML arrived at Site 1 at 07:38 on January 14, 2019. The initial 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 PTR-MS beginning at 08:24. Collection of confirmatory samples began at 08:41. The ML staff departed the monitoring site at 12:50. The SME performed a remote start of NO^+ automation mode at 18:32.

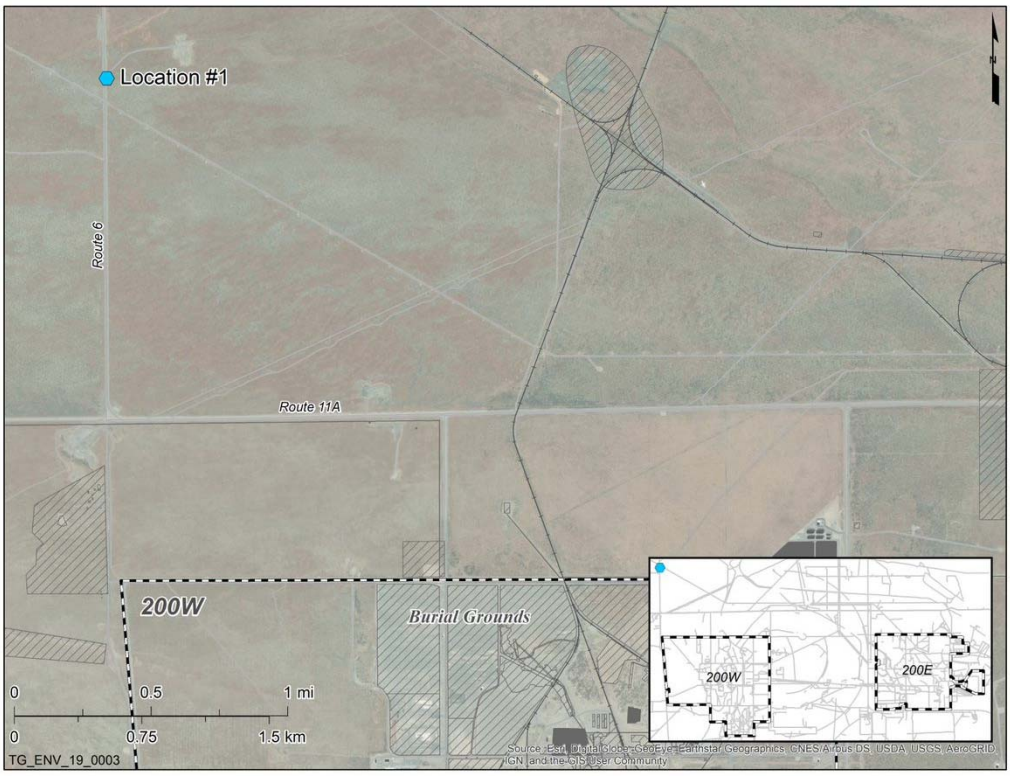

Figure 2-1. Mobile Laboratory Site #1 for the Duration of the Monitoring Period.

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

The ML staff returned to Site 1 at 07:05 on January 15, 2019. At 07:10, the confirmatory sorbent samples were disconnected from the sampling station. The ML moved to Site 2 by 07:52.

Figure 2-2 provides meteorological information obtained from the ML mounted weather station for the time period of sampling at Site 1. Wind direction was typical of prevailing winds from the west northwest at speeds between 0-6 miles per hour. Temperatures ranged between 29-33 degrees Fahrenheit with pressure steadily declining while at Site 1.

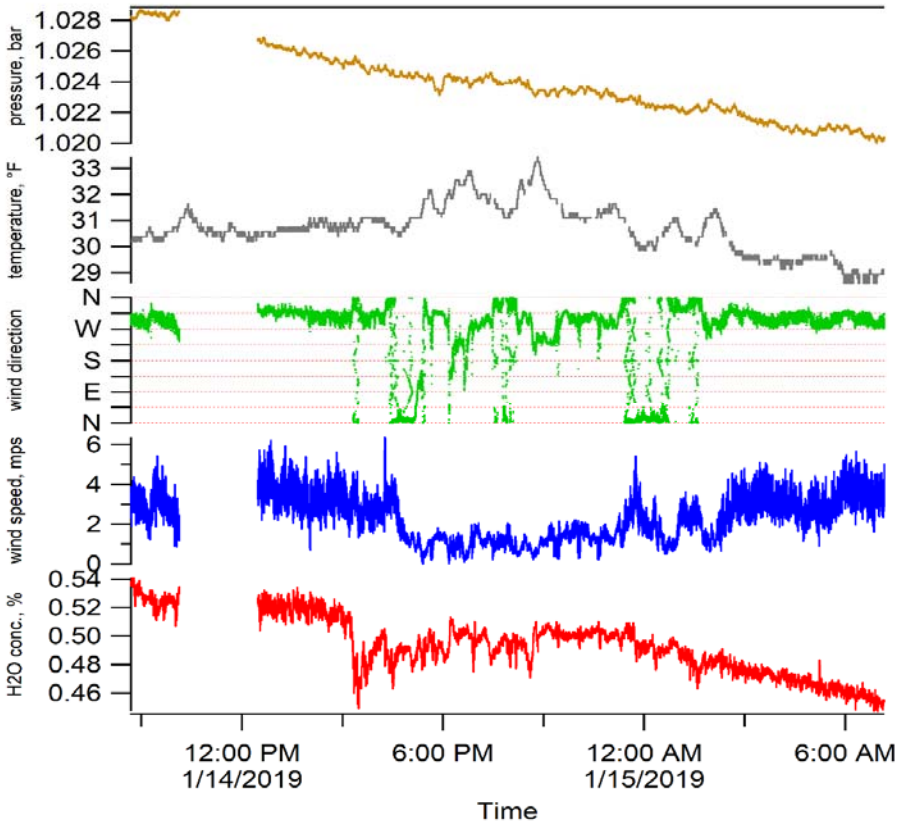

Figure 2-2. Weather Data.

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 on alternative media sources as shown in Table 2-1.

Table 2-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
1	01/14/2019	Thermosorb®[2]/N	EL33204	11:47	14:47	180
1	01/14/2019	Carbotrap®[3]-300	A060160	11:47	17:47	360
1	01/14/2019	LpDNPH	190114-A	08:41	11:41	180

Table 2-2 displays the statistical information for the monitoring period of January 14, 2019, to January 15, 2019.

[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 2-2. Statistical Information for the Monitoring Period of January 14, 2019 – January 15, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	ammonia	25000	0.010	3.980	0.862	21.648	6.778	4.143
2	formaldehyde	300	1.302	<1.302	N/A	N/A	1.037	<1.302
3	methanol	200000	1.839	2.041†	0.218	10.675	3.072	2.072
4	acetonitrile	20000	0.070	<0.070	N/A	N/A	0.088	<0.070
5	acetaldehyde	25000	2.070	<2.070	N/A	N/A	2.981	<2.070
6	ethylamine	5000	0.055	<0.055	N/A	N/A	0.233	<0.055
7	1,3-butadiene	1000	0.122	<0.122	N/A	N/A	0.237	<0.122
8	propanenitrile	6000	0.121	<0.121	N/A	N/A	0.187	<0.121
9	2-propenal	100	0.314	<0.314	N/A	N/A	0.644	<0.314
10	1-butanol + butenes	20000	0.149	<0.149	N/A	N/A	0.170	<0.149
11	methyl isocyanate	20	0.061	<0.061	N/A	N/A	0.140	<0.061
12	methyl nitrite	100	0.117	<0.117	N/A	N/A	0.341	<0.117
13	furan	1	0.053	<0.053	N/A	N/A	0.098	<0.053
14	butanenitrile	8000	0.040	<0.040	N/A	N/A	0.106	<0.040
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.034	<0.034	N/A	N/A	N/A*	N/A*
16	butanal	25000	0.063	<0.063	N/A	N/A	0.087	<0.063
17	NDMA**	0.3	0.020	<0.020	N/A	N/A	0.068	<0.020
18	Benzene	500	0.230	<0.230	N/A	N/A	0.301	<0.230
19	2,4-pentadienenitrile + pyridine	300	0.084	<0.084	N/A	N/A	0.221	<0.084
20	2-methylene butanenitrile	300	0.050	<0.050	N/A	N/A	0.152	<0.050
21	2-methylfuran	1	0.046	<0.046	N/A	N/A	0.126	<0.046
22	pentanenitrile	6000	0.029	<0.029	N/A	N/A	0.103	<0.029
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20	0.048	<0.048	N/A	N/A	0.098	<0.048
24	NEMA**	0.3	0.027	<0.027	N/A	N/A	0.080	<0.027
25	2,5-dimethylfuran	1	0.035	<0.035	N/A	N/A	0.082	<0.035
26	hexanenitrile	6000	0.029	<0.029	N/A	N/A	0.079	<0.029
27	2-hexanone (MBK)	5000	0.030	<0.030	N/A	N/A	0.071	<0.030
28	NDEA**	0.1	0.023	<0.023	N/A	N/A	0.067	<0.023
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.106	<0.106	N/A	N/A	0.232	<0.106
30	2,4-dimethylpyridine	500	0.031	<0.031	N/A	N/A	0.071	<0.031
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.035	<0.035	N/A	N/A	0.069	<0.035
32	heptanenitrile	6000	0.029	<0.029	N/A	N/A	0.076	<0.029
33	4-methyl-2-hexanone	500	0.032	<0.032	N/A	N/A	0.076	<0.032

Table 2-2. Statistical Information for the Monitoring Period of January 14, 2019 – January 15, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
34	NMOR**	0.6	0.017	<0.017	N/A	N/A	0.041	<0.017
35	butyl nitrate	2500	0.019	<0.019	N/A	N/A	0.058	<0.019
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.032	<0.032	N/A	N/A	0.087	<0.032
37	6-methyl-2-heptanone	8000	0.028	<0.028	N/A	N/A	0.074	<0.028
38	2-pentylfuran	1	0.029	0.032†	0.010	30.895	0.096	0.033
39	Biphenyl	200	0.031	<0.031	N/A	N/A	0.081	<0.031
40	2-heptylfuran	1	0.136	<0.136	N/A	N/A	0.302	<0.136
41	1,4-butanediol dinitrate	50	0.184	<0.184	N/A	N/A	0.114	<0.184
42	2-octylfuran	1	0.013	<0.013	N/A	N/A	0.041	<0.013
43	1,2,3-propanetriol 1,3-dinitrate	50	0.132	<0.132	N/A	N/A	0.051	<0.132
44	PCB	1000	0.139	<0.139	N/A	N/A	0.124	<0.139
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.025	<0.025	N/A	N/A	0.080	<0.025
46	furfural acetophenone	1	0.119	<0.119	N/A	N/A	0.336	<0.119
N/A*	The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.187 ppb and the median value was <0.034 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.].							
ND	COPC Averages below the MDL.							
†	COPC Averages between the RL and the MDL.							
	COPC Averages >100% of the OEL.							
	COPC Averages 50-100% of the OEL.							
	COPC Averages 10-50% of the OEL.							

Figure 2-3 through Figure 2-21 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 assist with data visualization), and CO_2, for the monitoring period of January 14, 2019, to January 15, 2019. 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.

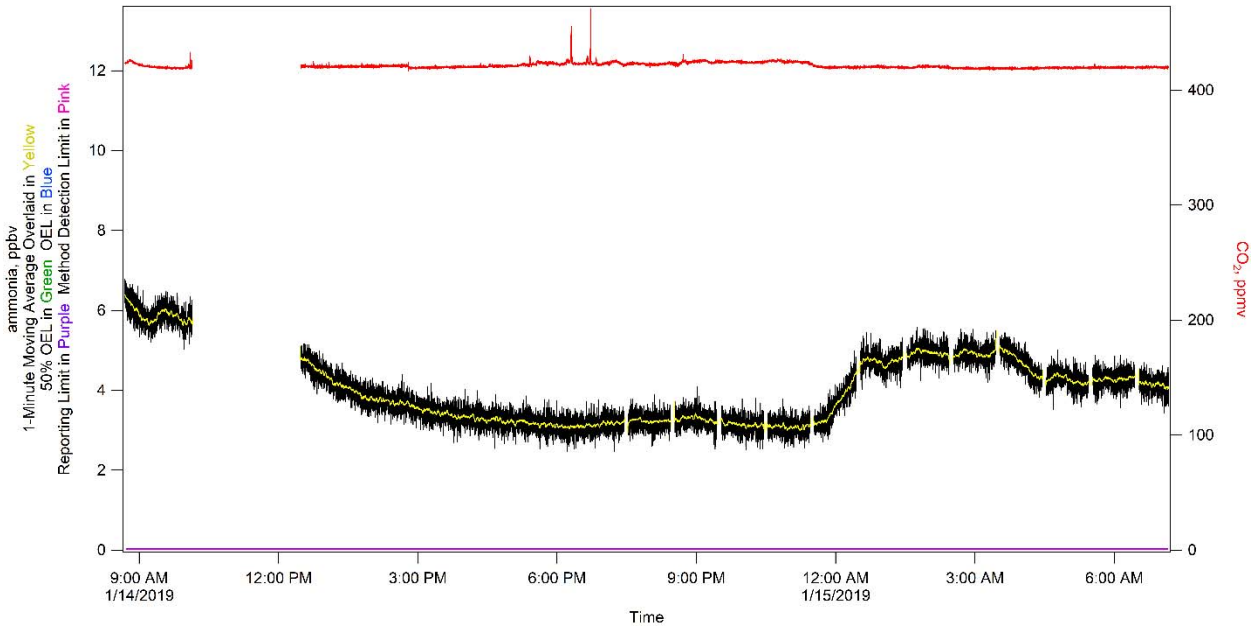

Figure 2-3. Ammonia.

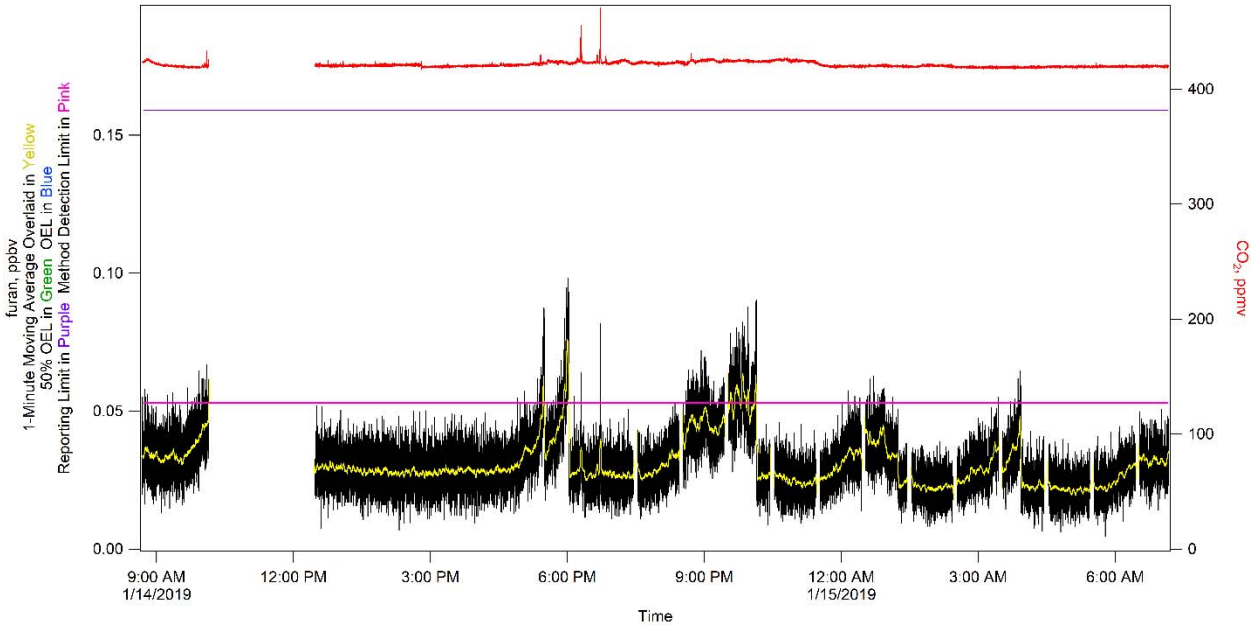

Figure 2-4. Furan.

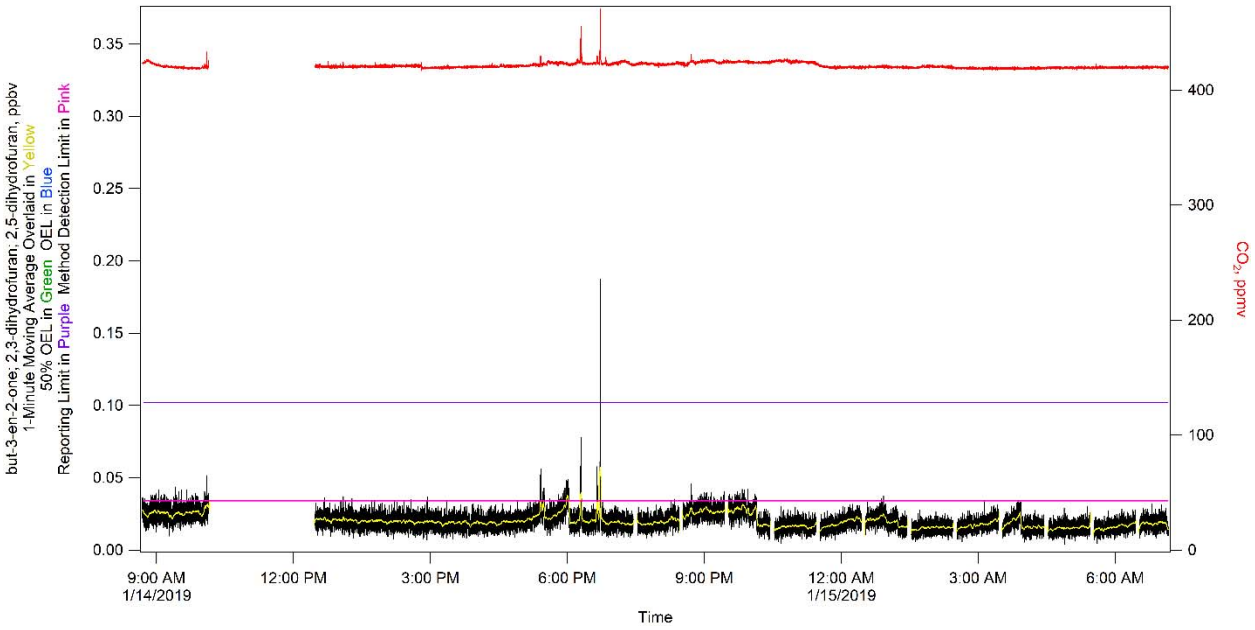

Figure 2-5. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

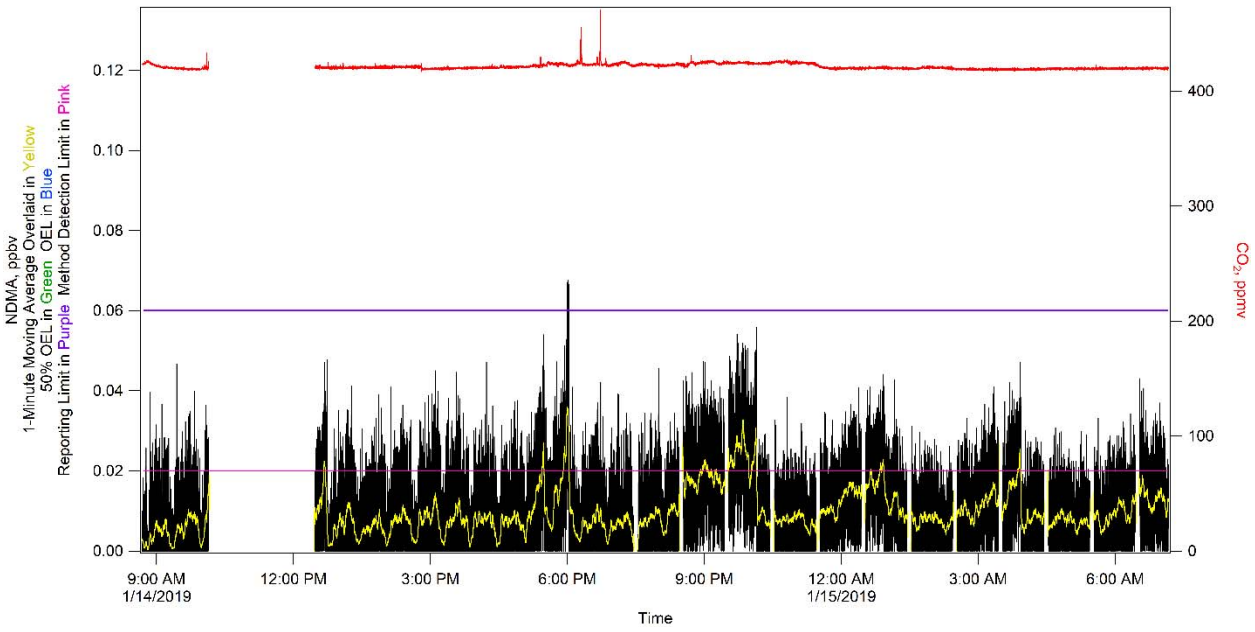

Figure 2-6. N-nitrosodimethylamine (NDMA).

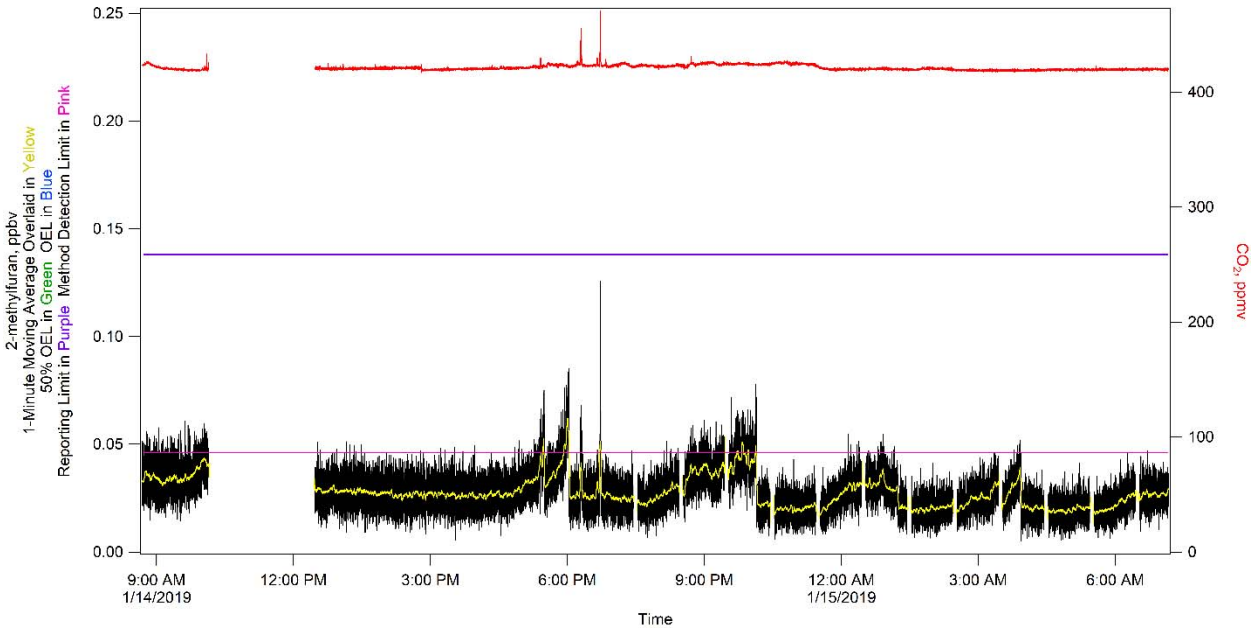

Figure 2-7. 2-methylfuran.

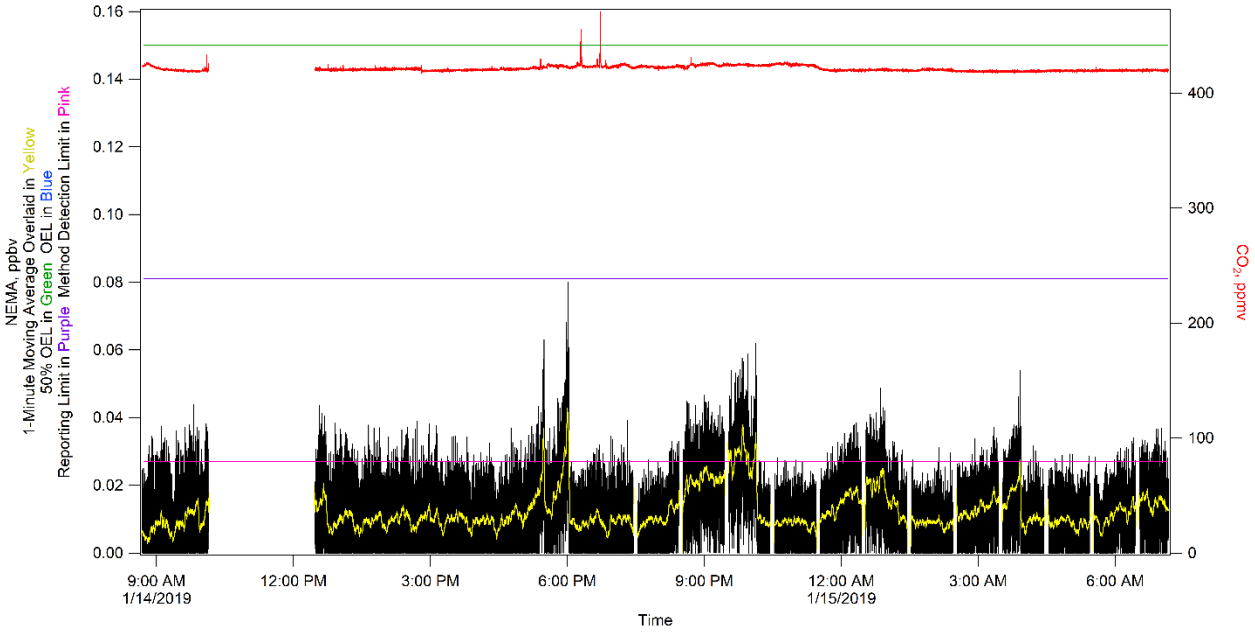

Figure 2-8. N-nitrosomethylethylamine (NEMA).

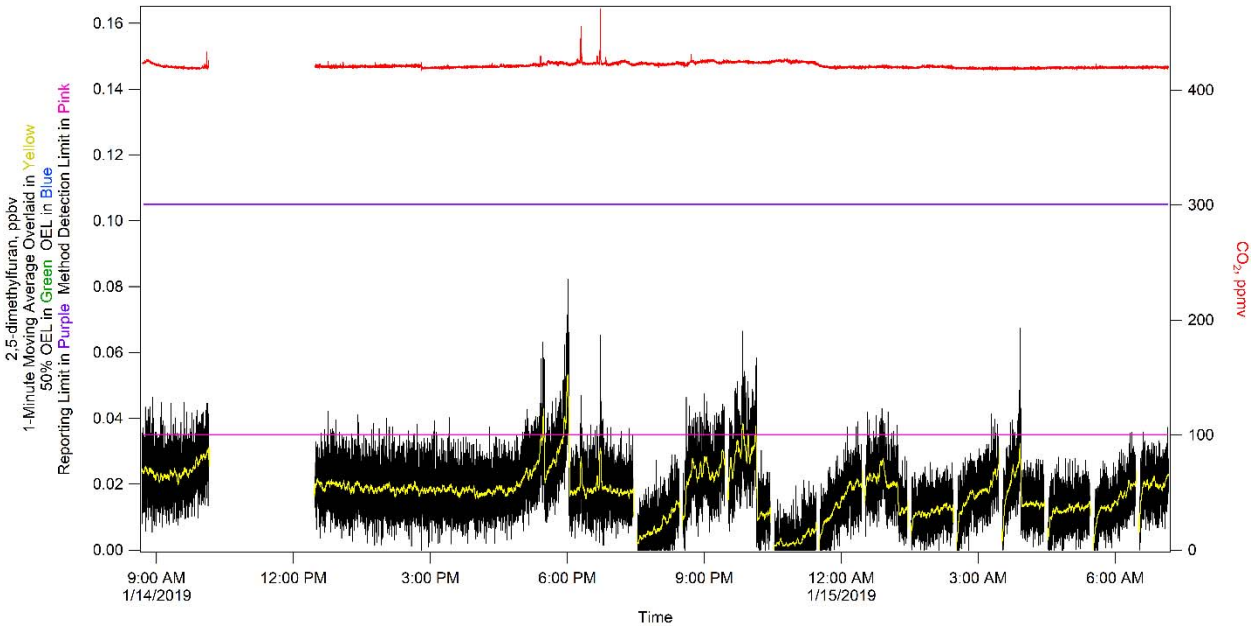

Figure 2-9. 2,5-dimethylfuran.

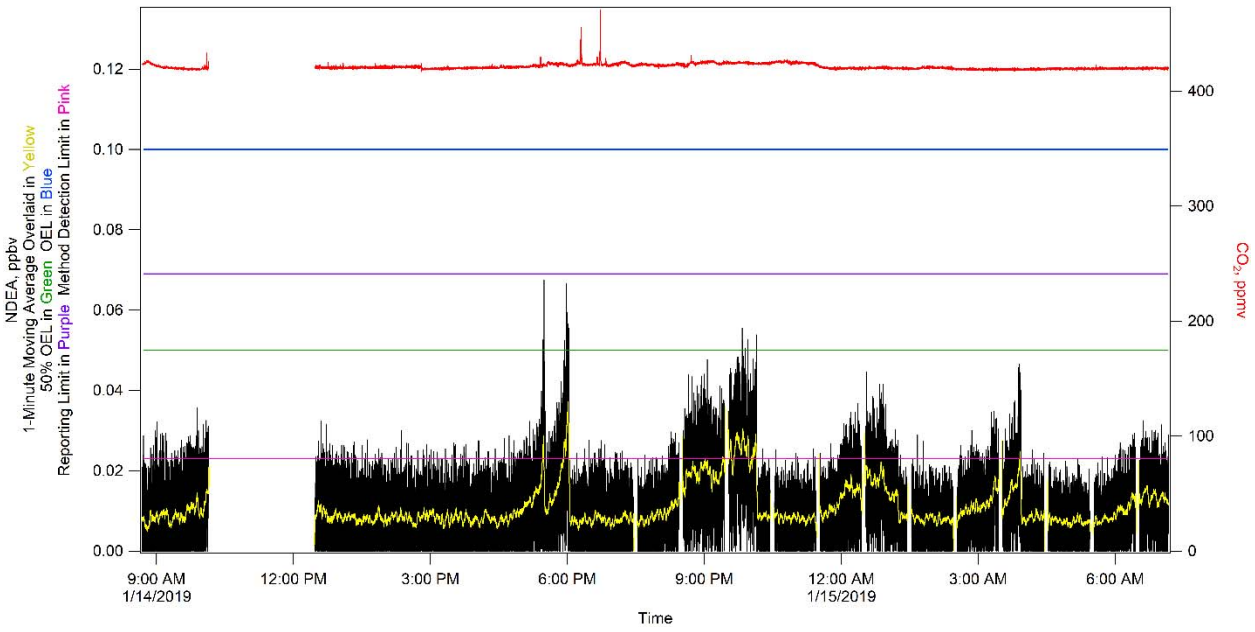

Figure 2-10. N-nitrosodiethylamine (NDEA).

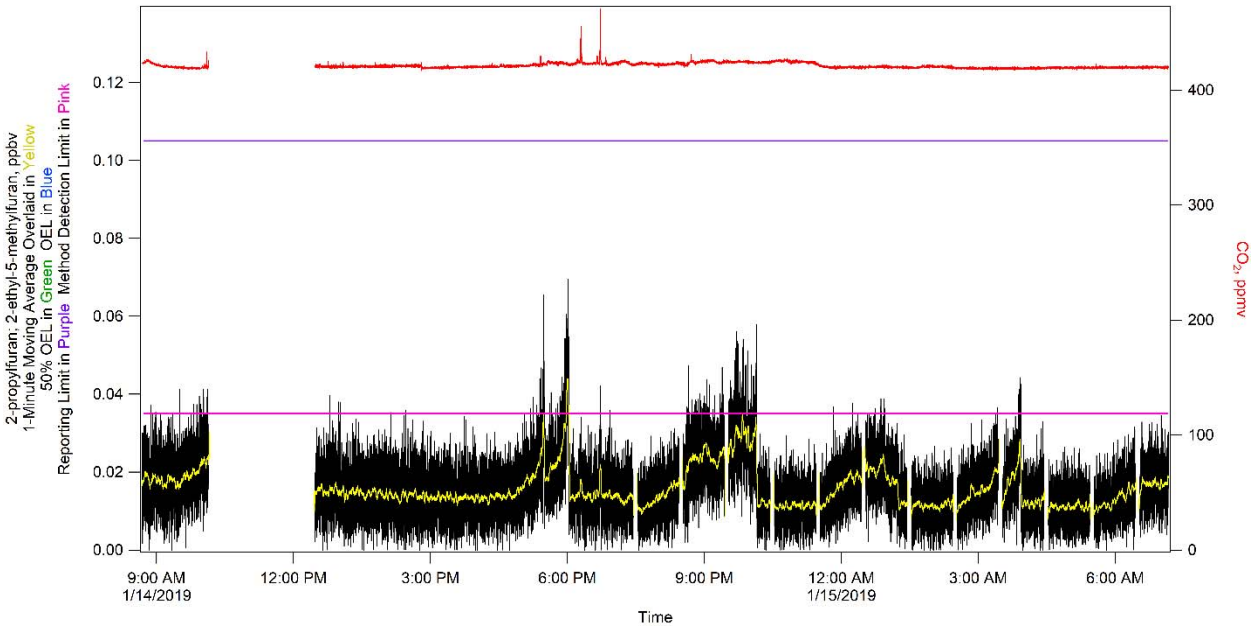

Figure 2-11. 2-propylfuran + 2-ethyl-5-methylfuran.

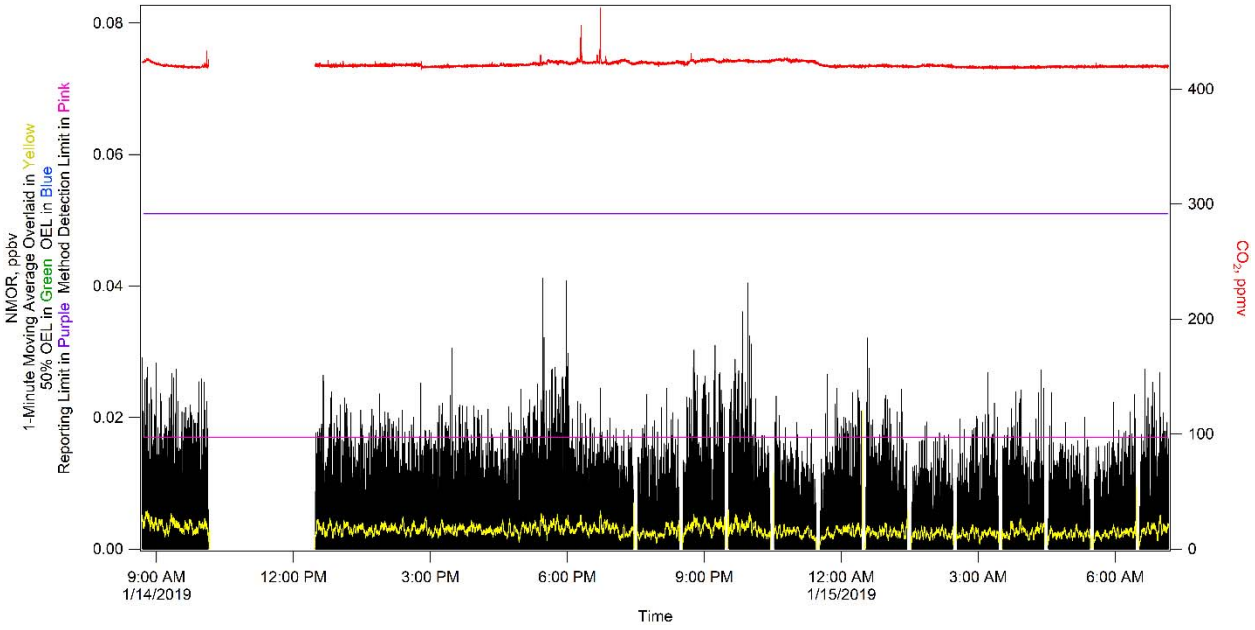

Figure 2-12. N-nitrosomorpholine (NMOR).

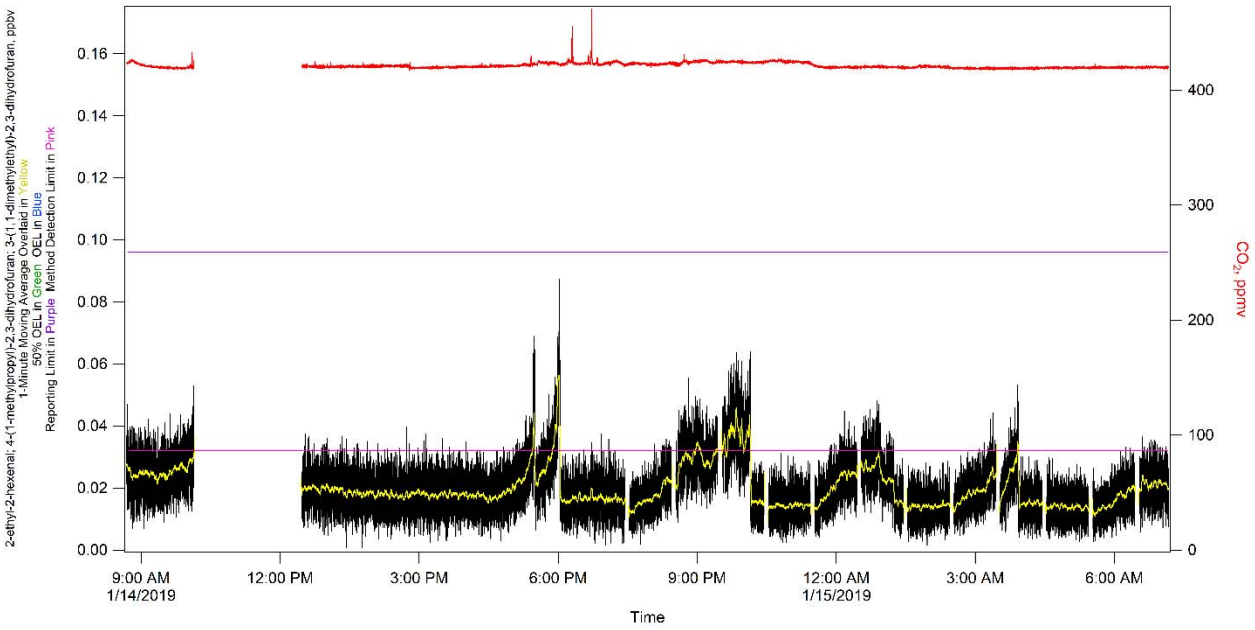

Figure 2-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran +3-(1-1-dimethylethyl)-2,3-dihydrofuran.

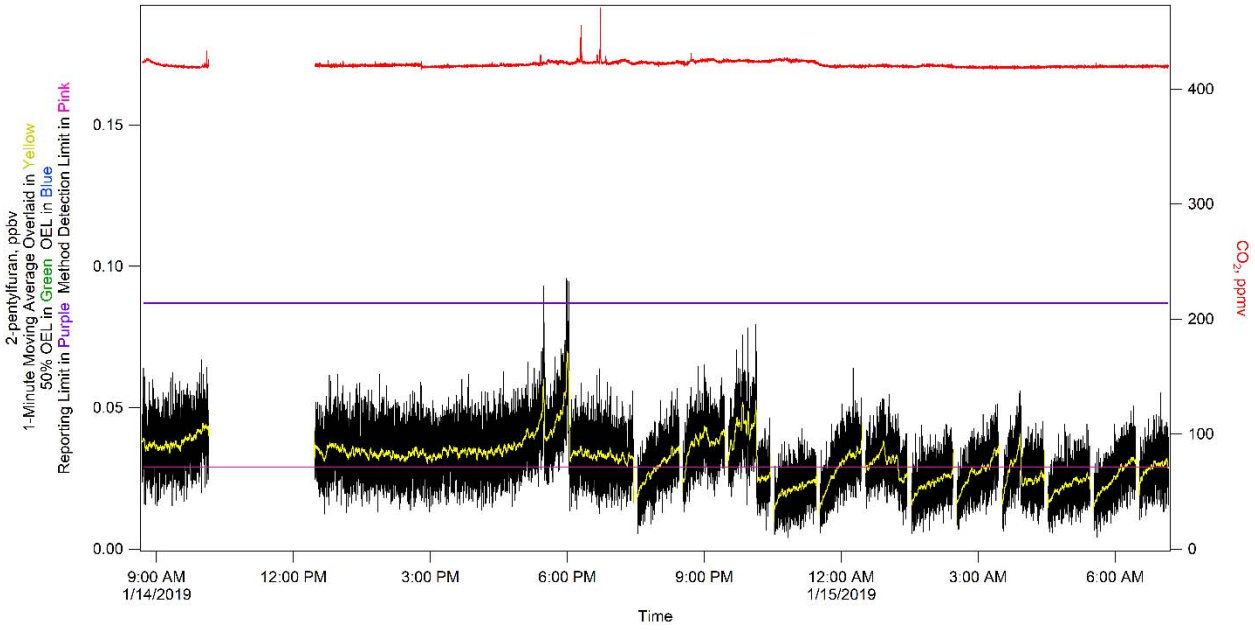

Figure 2-14. 2-pentylfuran.

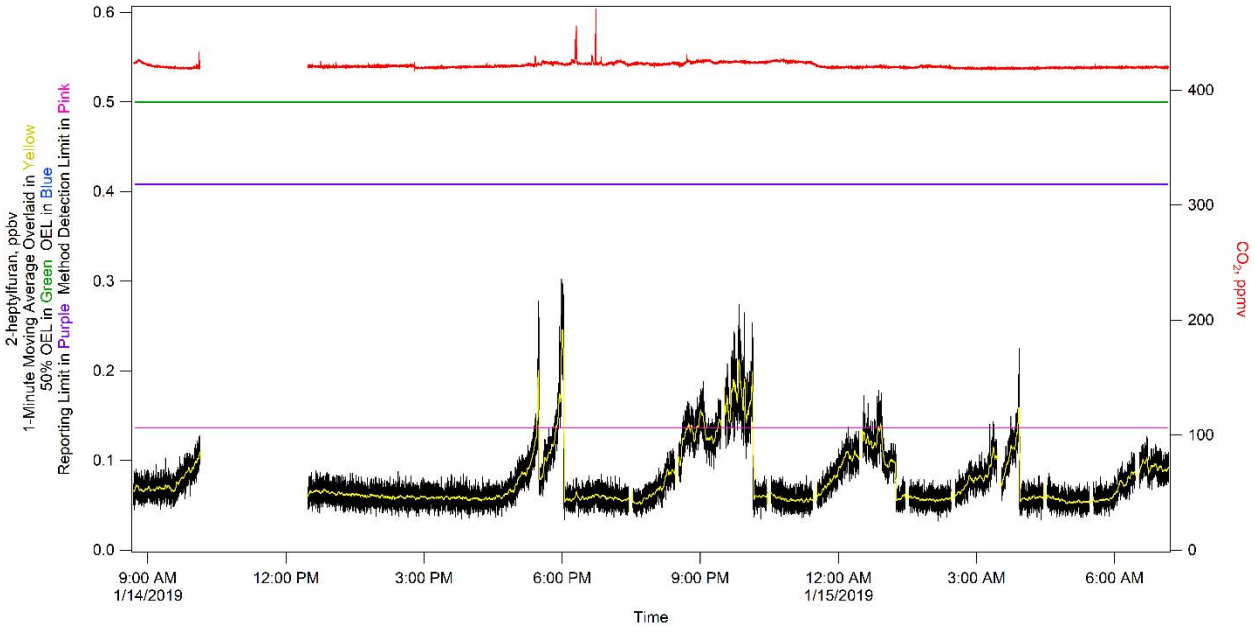

Figure 2-15. 2-heptylfuran.

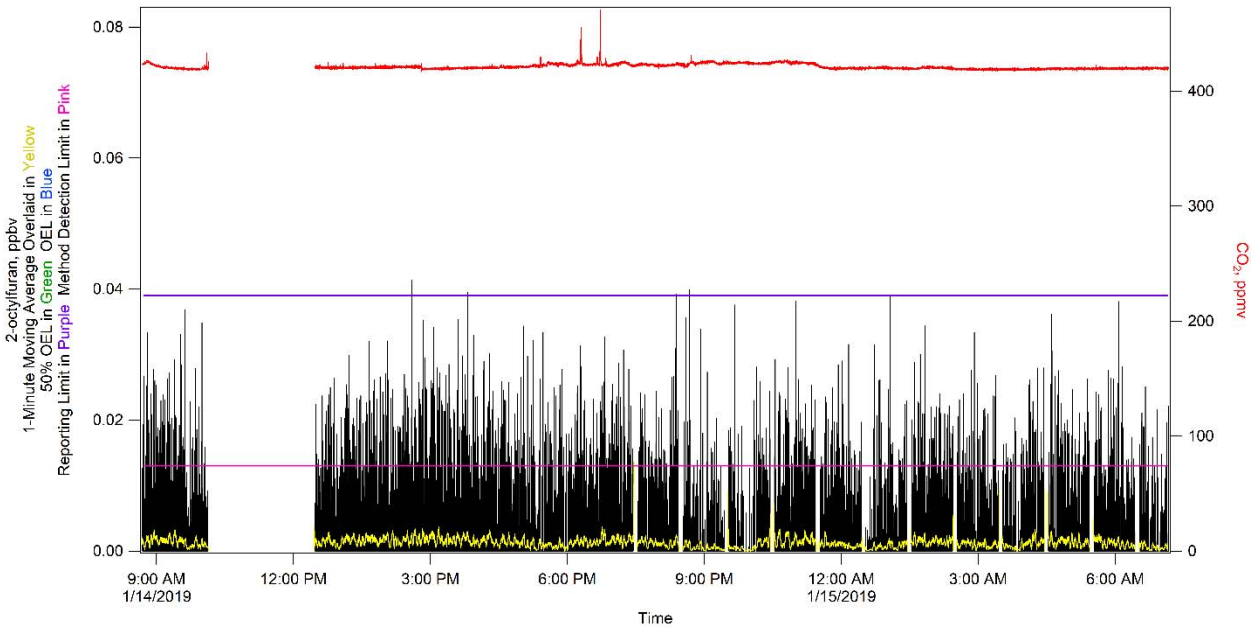

Figure 2-16. 2-octylfuran.

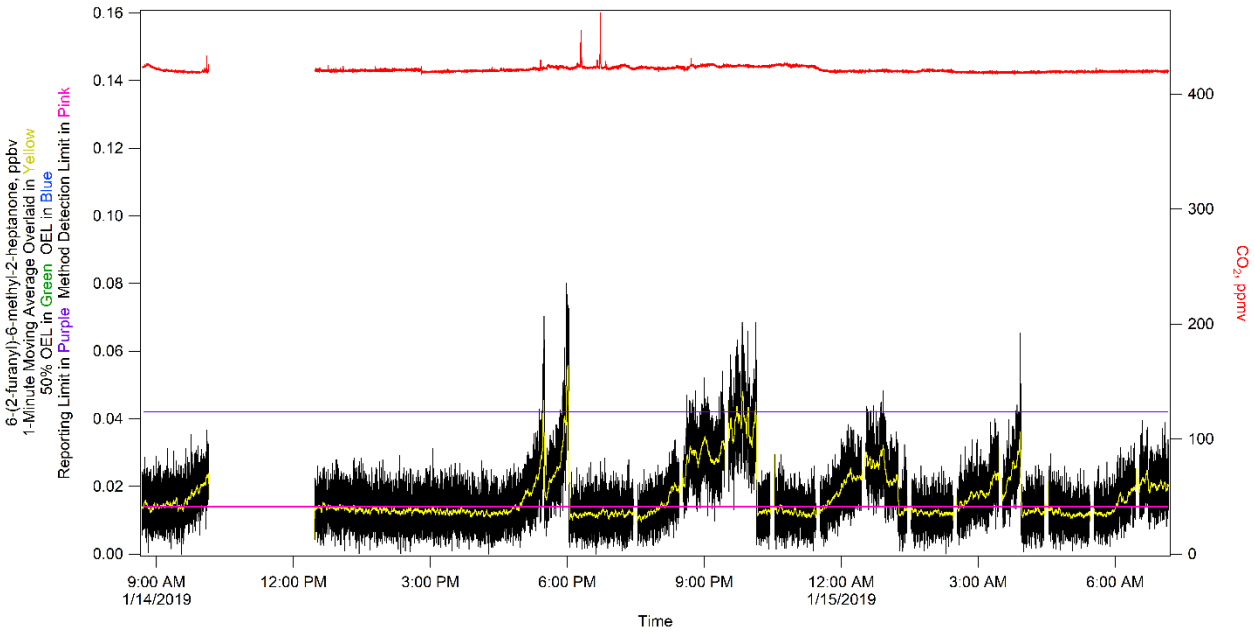

Figure 2-17. 6-(2-furanyl)-6-methyl-2-heptanone.

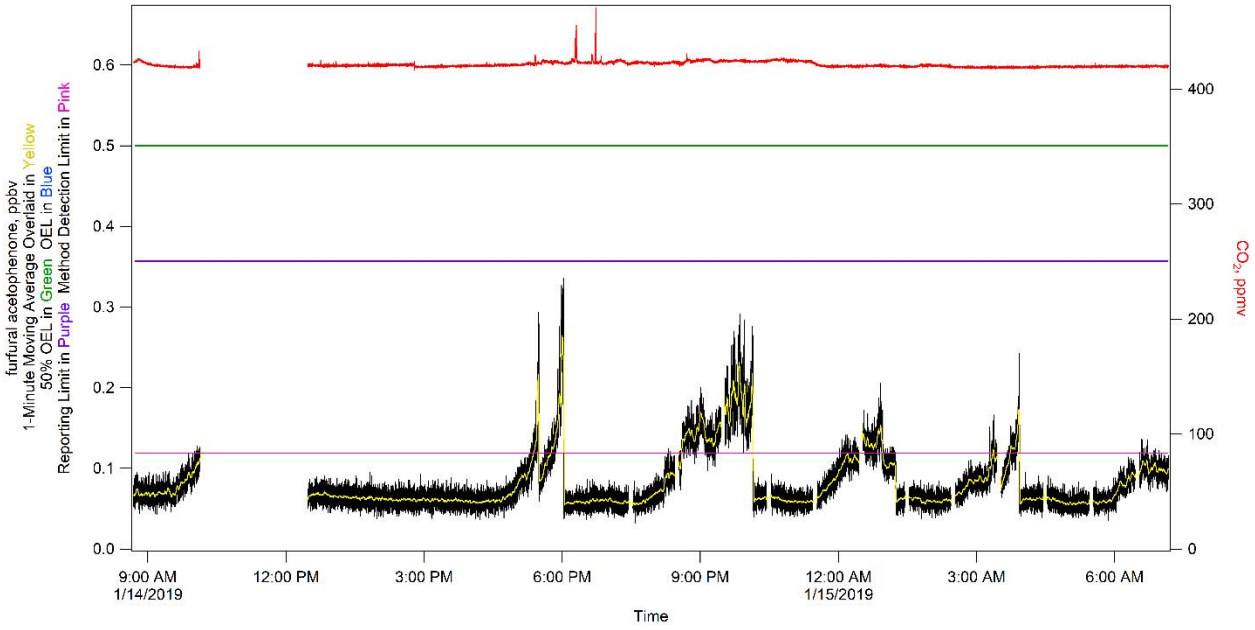

Figure 2-18. Furfural Acetophenone.

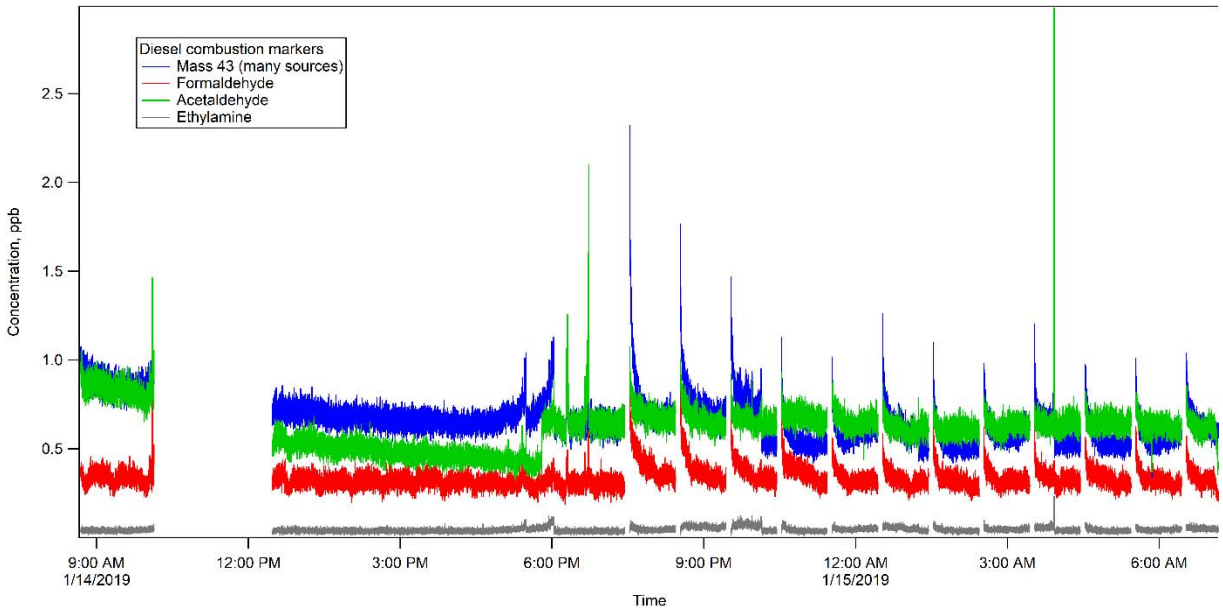

Figure 2-19. Diesel Combustion Markers.

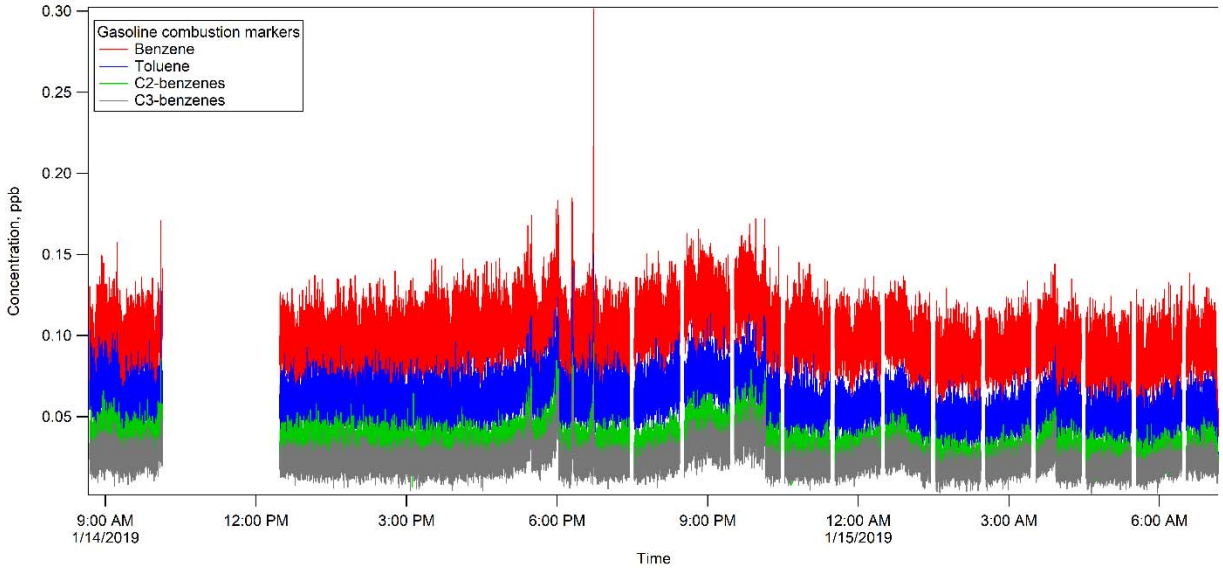

Figure 2-20. Gasoline Combustion Markers.

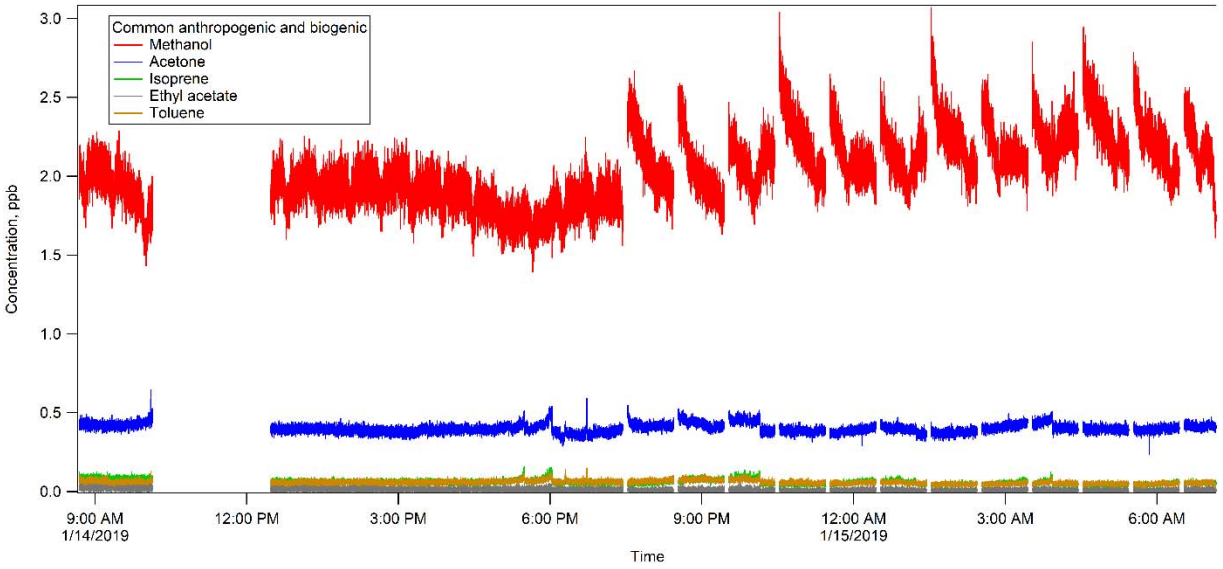

Figure 2-21. Plant and Human Markers.

3.0 JANUARY 15, 2019 – JANUARY 16, 2019 – STUDY SITE #2

3.1 Quality Assessment

Data from January 15, 2019, were assessed using Procedure 17124-DOE-HS-102. A Data Acceptance 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. Report No. DR19-001_Rev.01, "Deficiency Report," was initiated to adequately document failed span checks that occurred on the PTR-MS. See Appendix A for the full DR. This instance will be discussed in detail in a subsequent monthly summary report.

3.2 Summary

The ML personnel performed background sampling from January 15, 2019, to January 16, 2019, at study Site 2. Site 2 is located near the southern end of the 200W Tank Farms (Figure 3-1). The ML arrived at Site 2 at 07:52 on January 15, 2019. The QA/QC zero-air/span checks were performed on the LI-COR CO_2 monitor, the Picarro NH_3 analyzer, and the PTR-MS beginning at 07:26. Confirmatory sorbent samples were not collected on this day of monitoring. The ML staff departed the monitoring site at 12:15. The SME began NO^+ automation mode at 11:09.

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

The ML staff returned to Site 2 at 07:10 on January 16, 2019. The ML moved to Site 3 by 8:18.

Figure 3-2 provides meteorological information obtained from the ML mounted weather station for the time period of sampling at Site 2. Wind direction was typical of prevailing winds from the west northwest at speeds between 0-6 miles per hour. Temperatures ranged between 26-32 degrees Fahrenheit with pressure steadily declining while at Site 2.

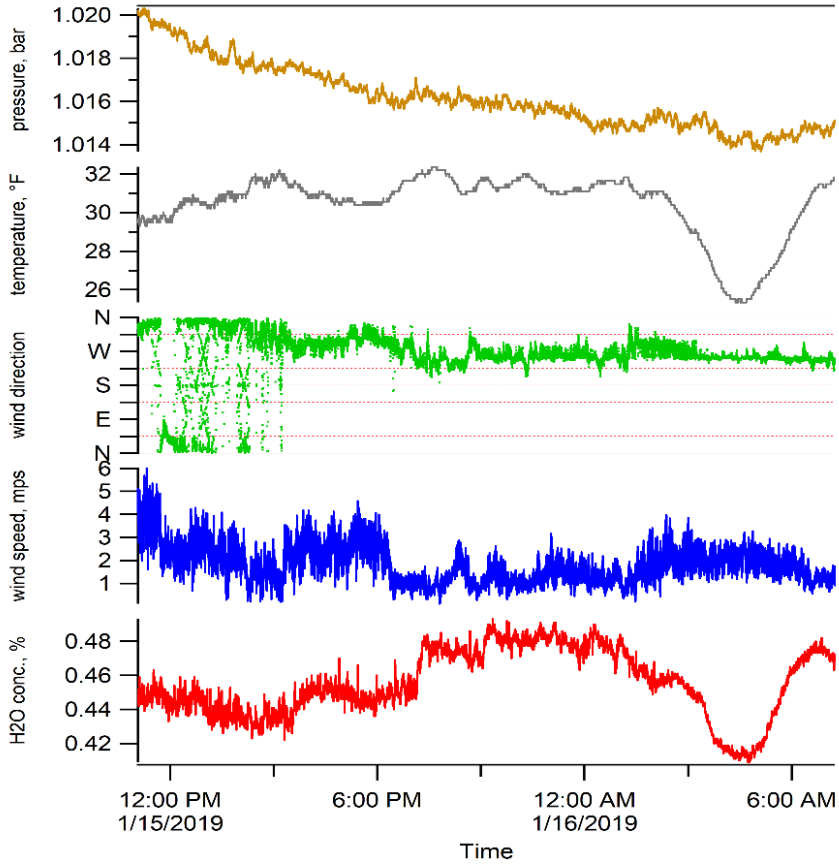

Figure 3-2. Weather Data.

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 not collected during this period. Table 3-1 displays the statistical information for the monitoring period of January 15, 2019, to January 16, 2019.

Table 3-1. Statistical Information for the Monitoring Period of January 15, 2019 – January 16, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	ammonia	25000	0.010	4.029	0.873	21.676	6.911	3.845
2	formaldehyde	300	1.302	<1.302	N/A	N/A	0.812	<1.302
3	methanol	200000	1.839	2.203†	0.200	9.085	3.989	2.216
4	acetonitrile	20000	0.070	<0.070	N/A	N/A	0.092	<0.070
5	acetaldehyde	25000	2.070	<2.070	N/A	N/A	1.536	<2.070
6	ethylamine	5000	0.055	<0.055	N/A	N/A	0.100	<0.055
7	1,3-butadiene	1000	0.122	<0.122	N/A	N/A	0.159	<0.122
8	propanenitrile	6000	0.121	<0.121	N/A	N/A	0.145	<0.121
9	2-propenal	100	0.314	<0.314	N/A	N/A	0.358	<0.314
10	1-butanol + butenes	20000	0.149	<0.149	N/A	N/A	0.154	<0.149
11	methyl isocyanate	20	0.061	<0.061	N/A	N/A	0.098	<0.061
12	methyl nitrite	100	0.117	<0.117	N/A	N/A	0.291	<0.117
13	furan	1	0.053	<0.053	N/A	N/A	0.074	<0.053
14	butanenitrile	8000	0.040	<0.040	N/A	N/A	0.077	<0.040
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.034	<0.034	N/A	N/A	N/A*	N/A*
16	Butanal	25000	0.063	<0.063	N/A	N/A	0.083	<0.063
17	NDMA**	0.3	0.020	<0.020	N/A	N/A	0.064	<0.020
18	Benzene	500	0.230	<0.230	N/A	N/A	0.586	<0.230
19	2,4-pentadienenitrile + pyridine	300	0.084	<0.084	N/A	N/A	0.148	<0.084
20	2-methylene butanenitrile	300	0.050	<0.050	N/A	N/A	0.116	<0.050
21	2-methylfuran	1	0.046	<0.046	N/A	N/A	0.063	<0.046
22	pentanenitrile	6000	0.029	<0.029	N/A	N/A	0.066	<0.029
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20	0.048	<0.048	N/A	N/A	0.057	<0.048
24	NEMA**	0.3	0.027	<0.027	N/A	N/A	0.051	<0.027
25	2,5-dimethylfuran	1	0.035	<0.035	N/A	N/A	0.059	<0.035
26	hexanenitrile	6000	0.029	<0.029	N/A	N/A	0.056	<0.029
27	2-hexanone (MBK)	5000	0.030	<0.030	N/A	N/A	0.054	<0.030
28	NDEA**	0.1	0.023	<0.023	N/A	N/A	0.047	<0.023
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.106	<0.106	N/A	N/A	0.174	<0.106
30	2,4-dimethylpyridine	500	0.031	<0.031	N/A	N/A	0.069	<0.031
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.035	<0.035	N/A	N/A	0.052	<0.035
32	heptanenitrile	6000	0.029	<0.029	N/A	N/A	0.061	<0.029

Table 3-1. Statistical Information for the Monitoring Period of January 15, 2019 – January 16, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
33	4-methyl-2-hexanone	500	0.032	<0.032	N/A	N/A	0.047	<0.032
34	NMOR**	0.6	0.017	<0.017	N/A	N/A	0.032	<0.017
35	butyl nitrate	2500	0.019	<0.019	N/A	N/A	0.044	<0.019
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.032	<0.032	N/A	N/A	0.051	<0.032
37	6-methyl-2-heptanone	8000	0.028	<0.028	N/A	N/A	0.057	<0.028
38	2-pentylfuran	1	0.029	0.029†	0.009	29.404	0.078	0.029
39	biphenyl	200	0.031	<0.031	N/A	N/A	0.057	<0.031
40	2-heptylfuran	1	0.136	<0.136	N/A	N/A	0.233	<0.136
41	1,4-butanediol dinitrate	50	0.184	<0.184	N/A	N/A	0.083	<0.184
42	2-octylfuran	1	0.013	<0.013	N/A	N/A	0.047	<0.013
43	1,2,3-propanetriol 1,3-dinitrate	50	0.132	<0.132	N/A	N/A	0.059	<0.132
44	PCB	1000	0.139	<0.139	N/A	N/A	0.091	<0.139
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.025	<0.025	N/A	N/A	0.064	<0.025
46	furfural acetophenone	1	0.119	<0.119	N/A	N/A	0.249	<0.119
N/A*	The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.098 ppb and the median value was <0.034 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.].							
ND	COPC Averages below the MDL.							
†	COPC Averages between the RL and the MDL.							
	COPC Averages >100% of the OEL.							
	COPC Averages 50-100% of the OEL.							
	COPC Averages 10-50% of the OEL.							

Figure 3-3 through Figure 3-21 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 assist with data visualization), and CO_2, for the monitoring period January 15, 2019, to January 16, 2019. 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.

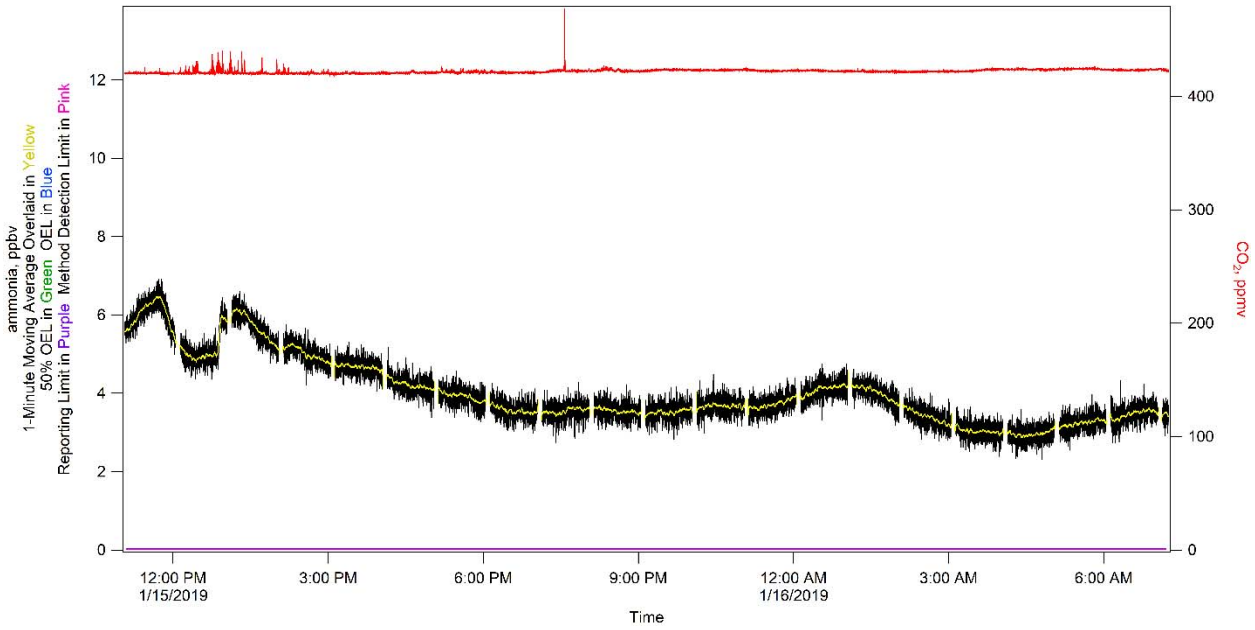

Figure 3-3. Ammonia.

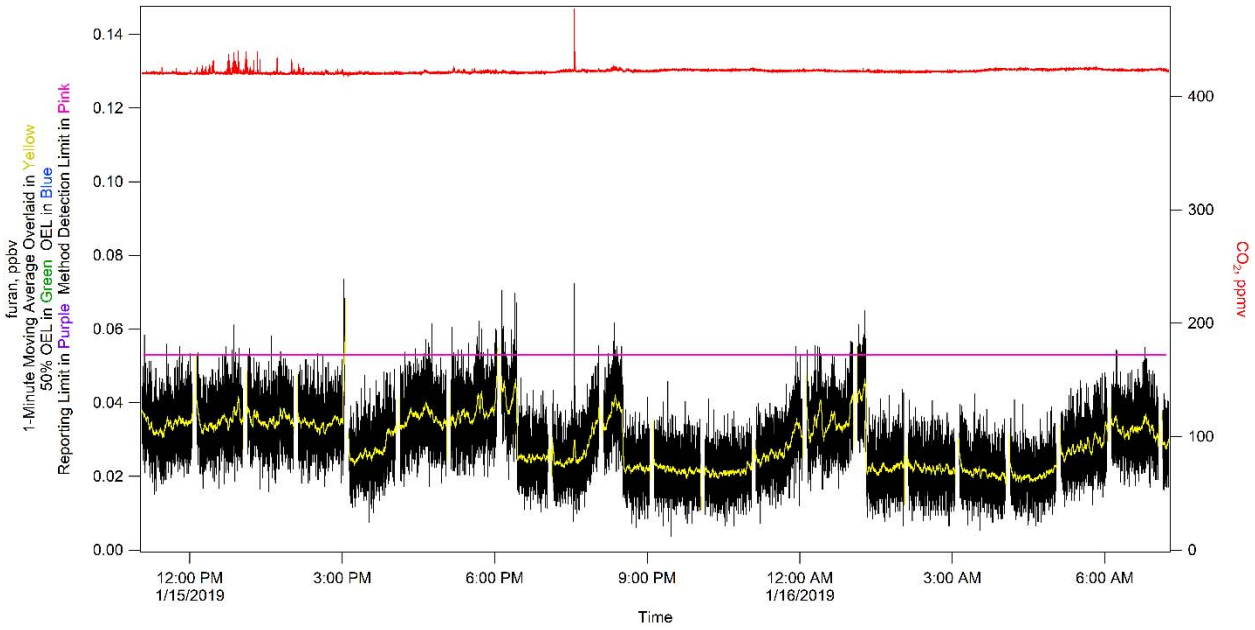

Figure 3-4. Furan.

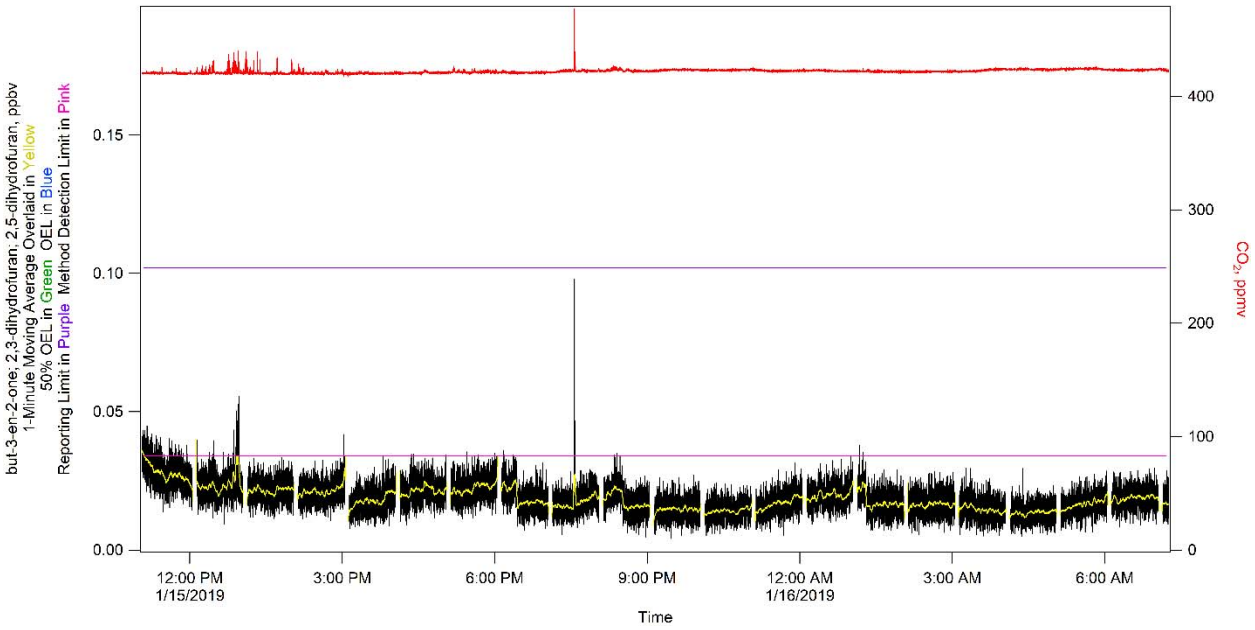

Figure 3-5. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

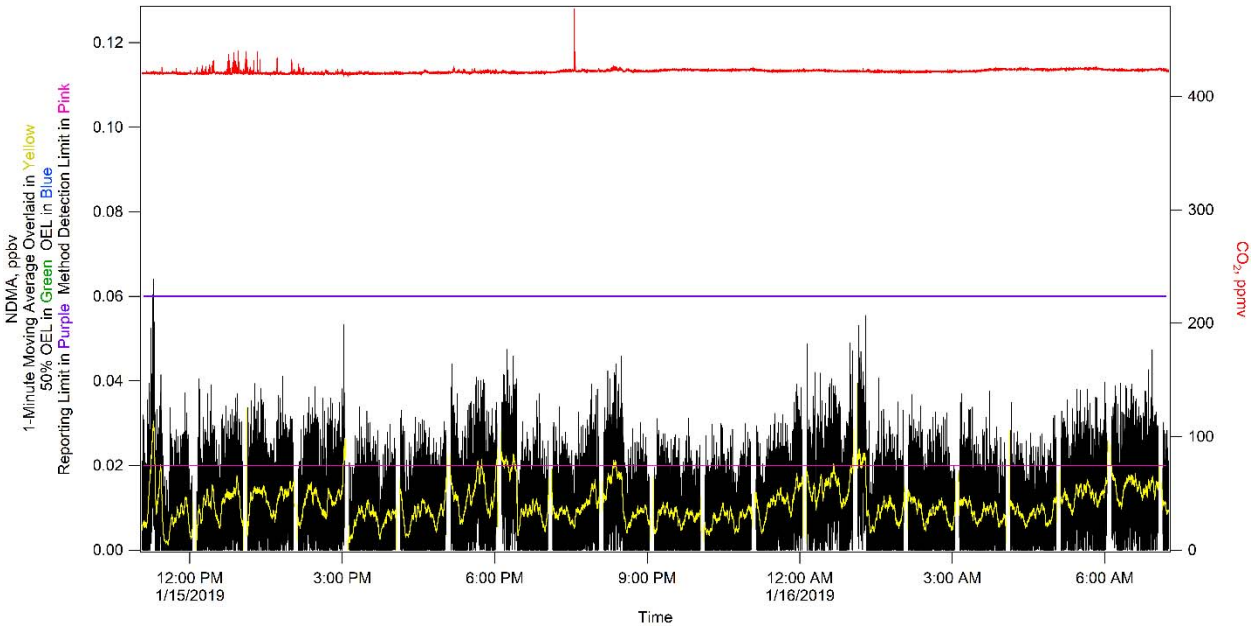

Figure 3-6. N-nitrosodimethylamine (NDMA).

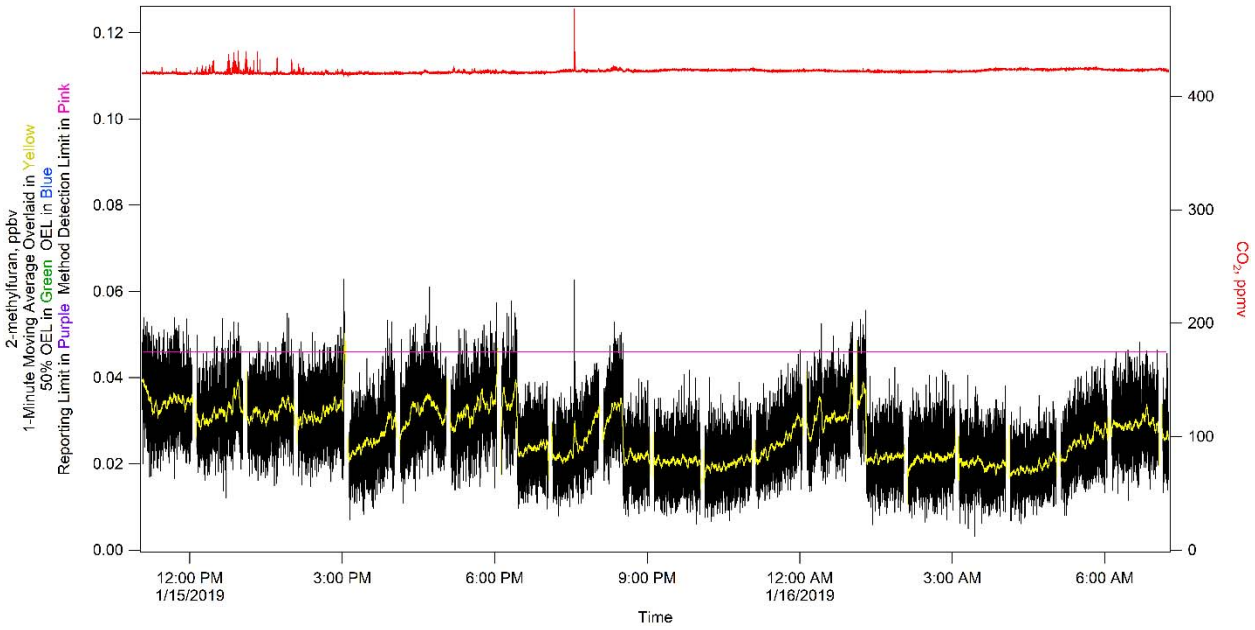

Figure 3-7. 2-methylfuran.

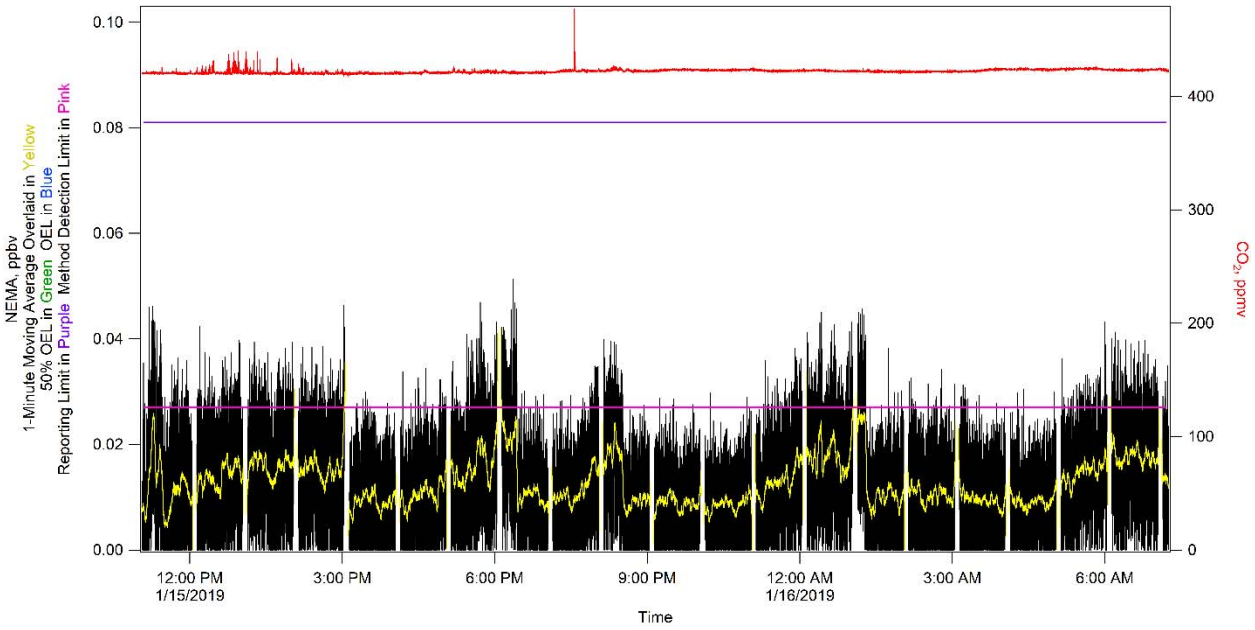

Figure 3-8. N-nitrosomethylethylamine (NEMA).

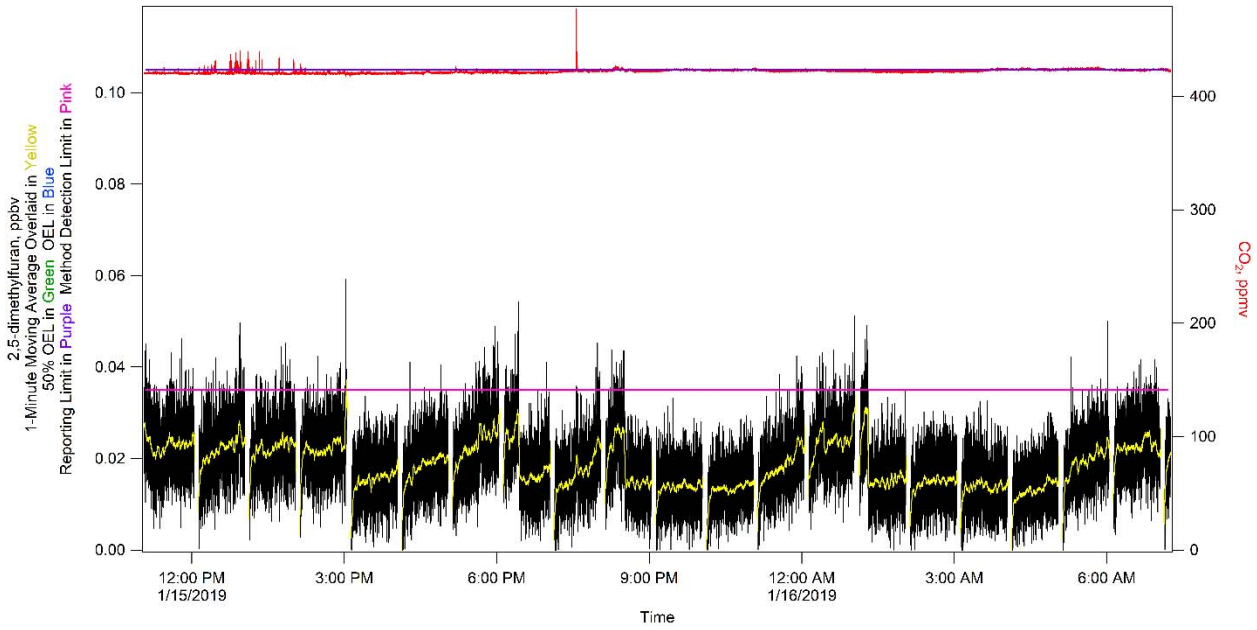

Figure 3-9. 2,5-dimethylfuran.

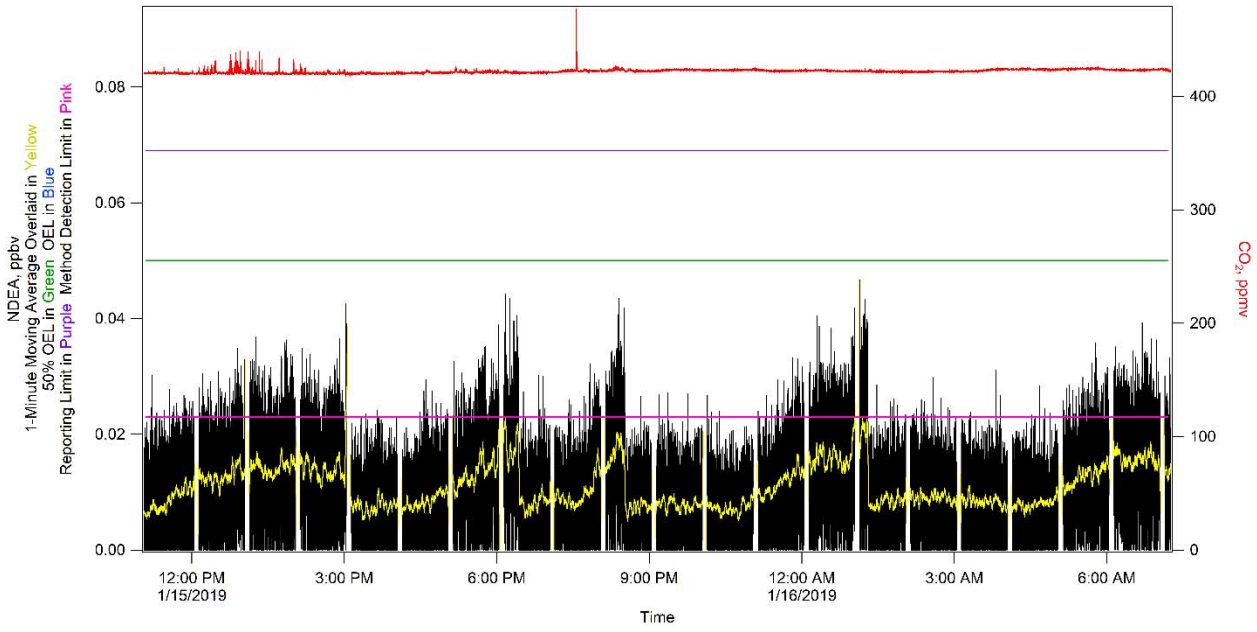

Figure 3-10. N-nitrosodiethylamine (NDEA).

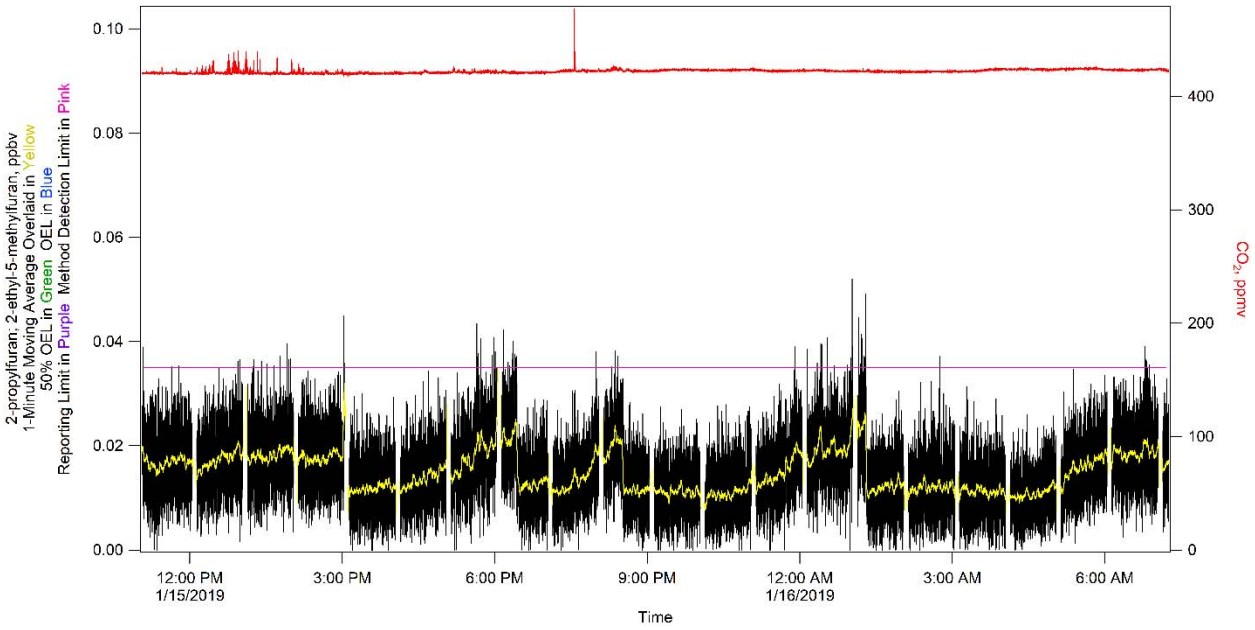

Figure 3-11. 2-propylfuran + 2-ethyl-5-methylfuran.

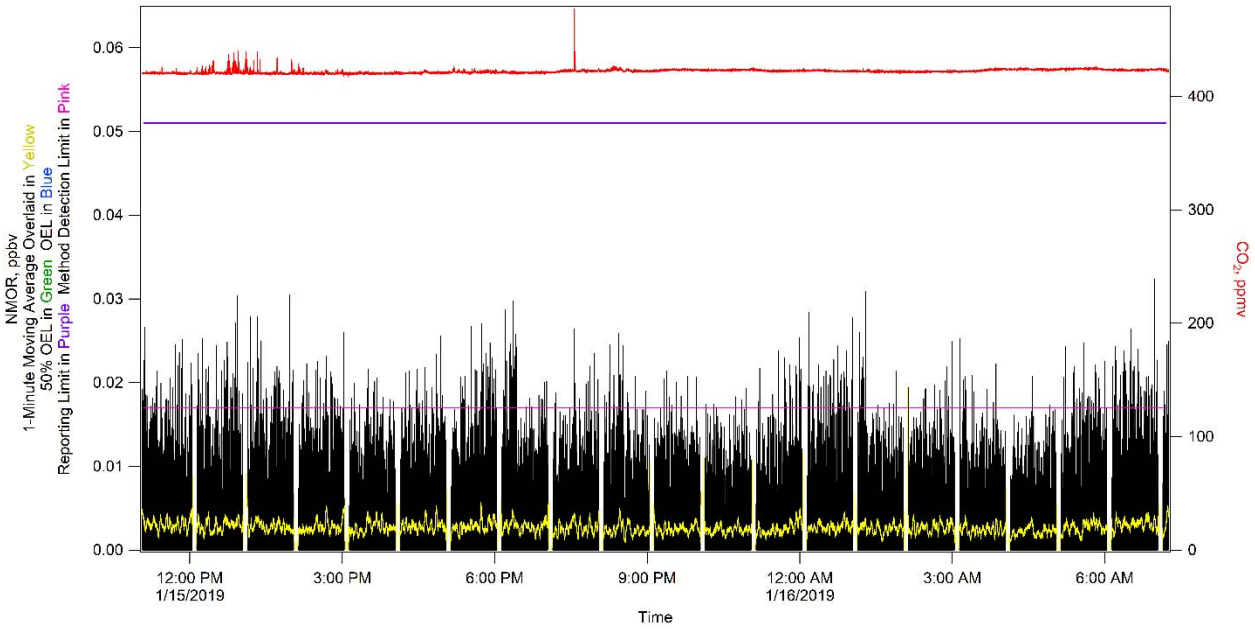

Figure 3-12. N-nitrosomorpholine (NMOR).

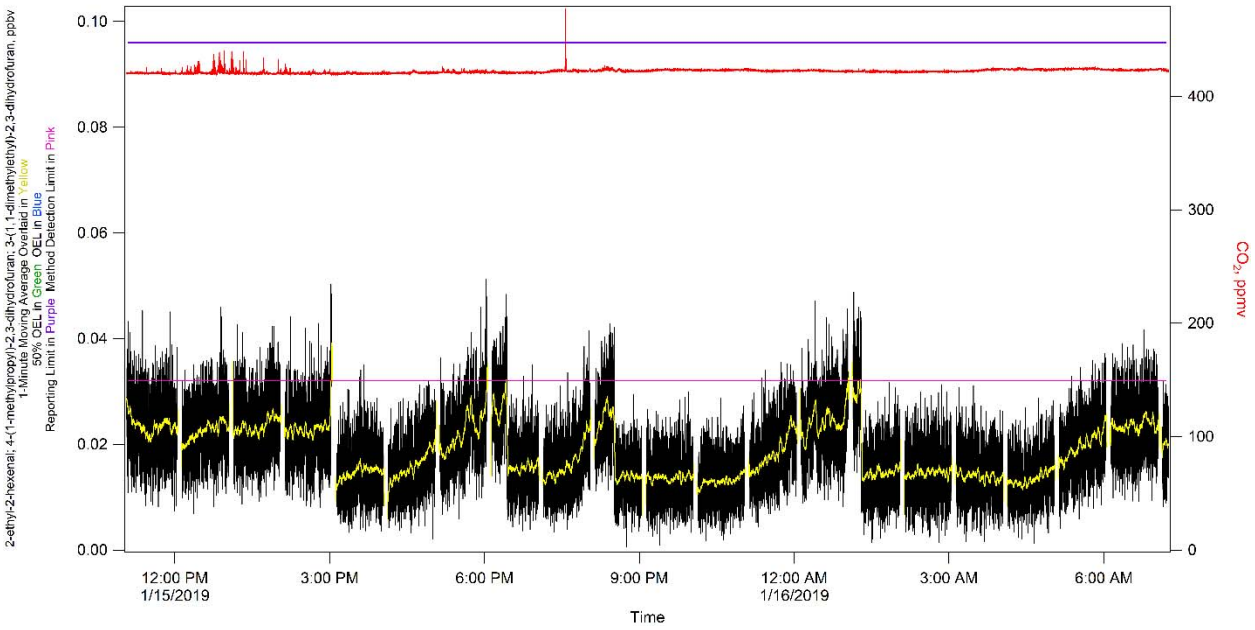

Figure 3-13. 2-ethyl-2-hexenal, 4-(1-methylpropyl)-2,3-dihydrofuran +3-(1-1-dimethylethyl)-2,3-dihydrofuran.

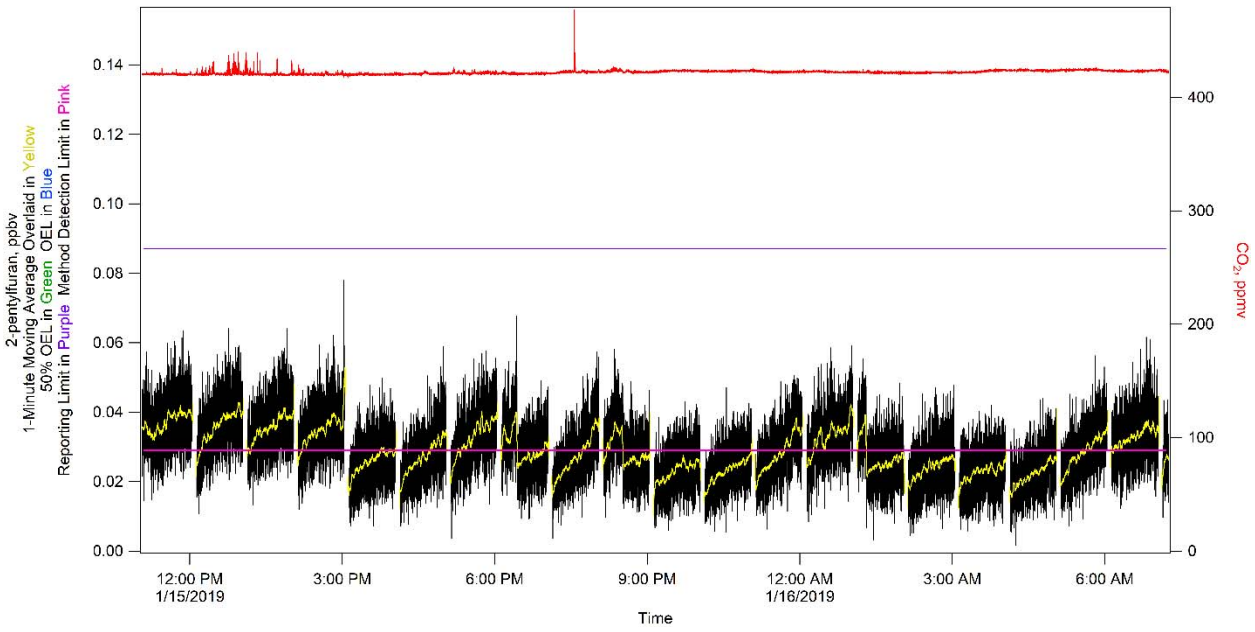

Figure 3-14. 2-pentylfuran.

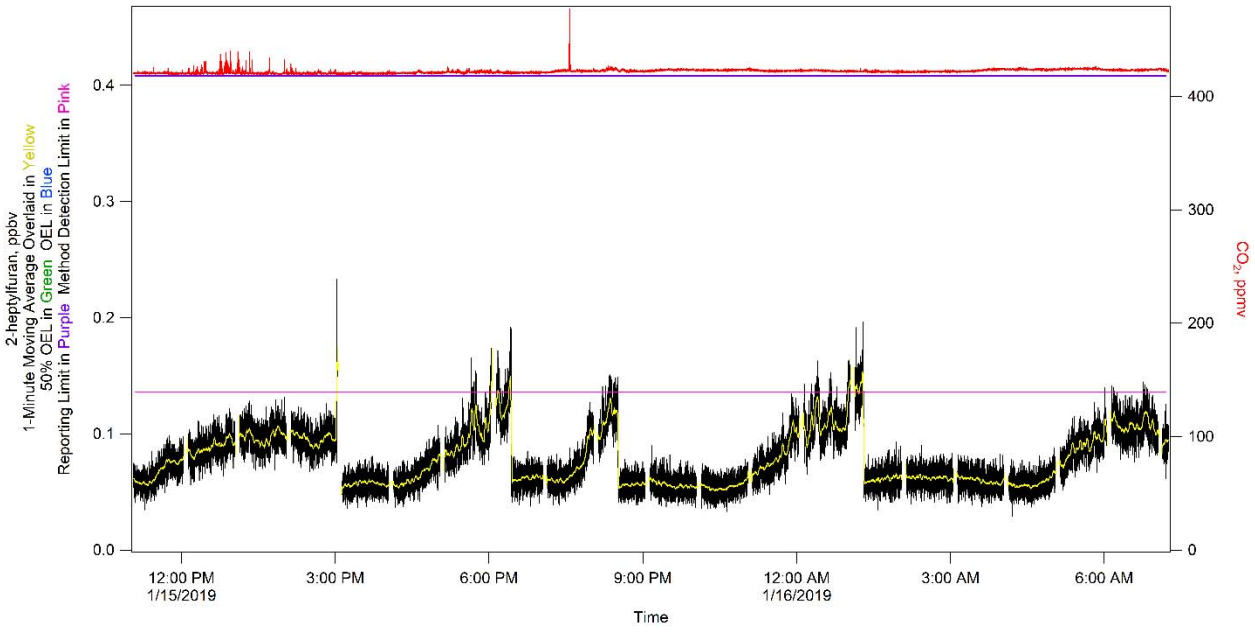

Figure 3-15. 2-heptylfuran.

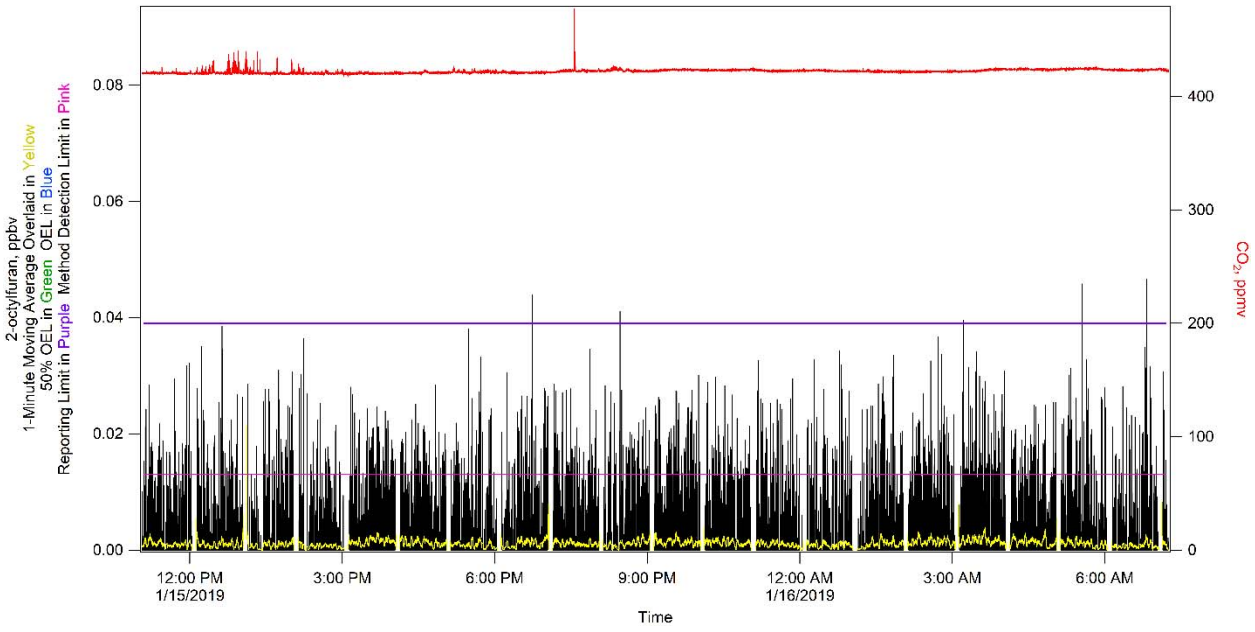

Figure 3-16. 2-octylfuran.

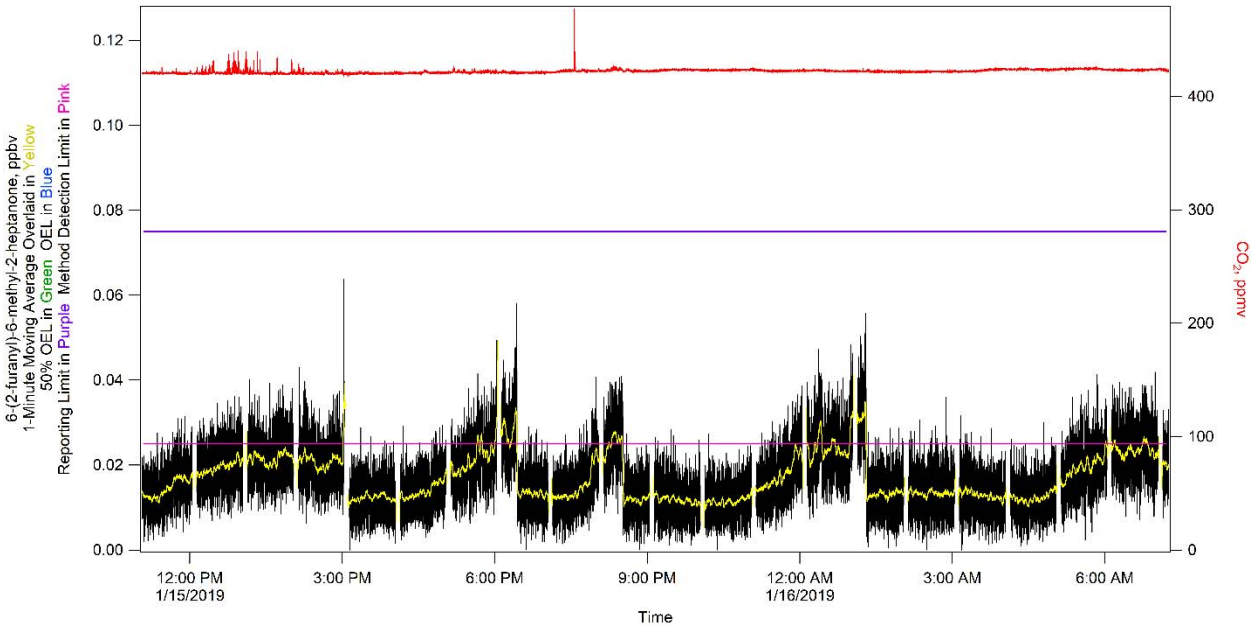

Figure 3-17. 6-(2-furanyl)-6-methyl-2-heptanone.

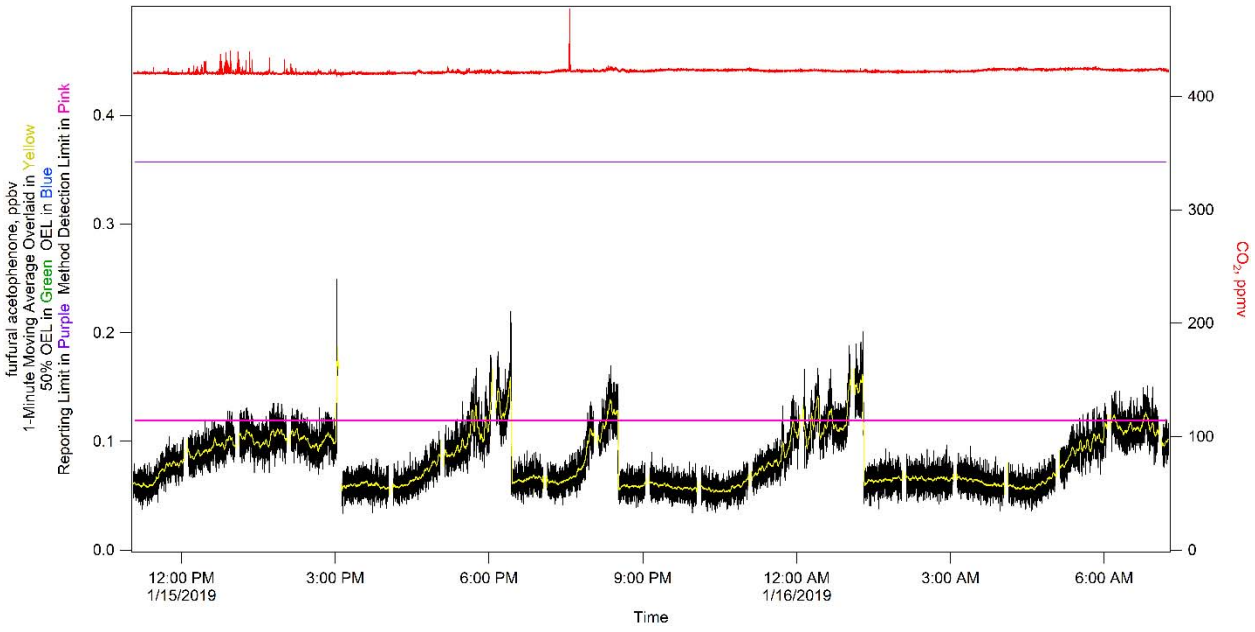

Figure 3-18. Furfural Acetophenone.

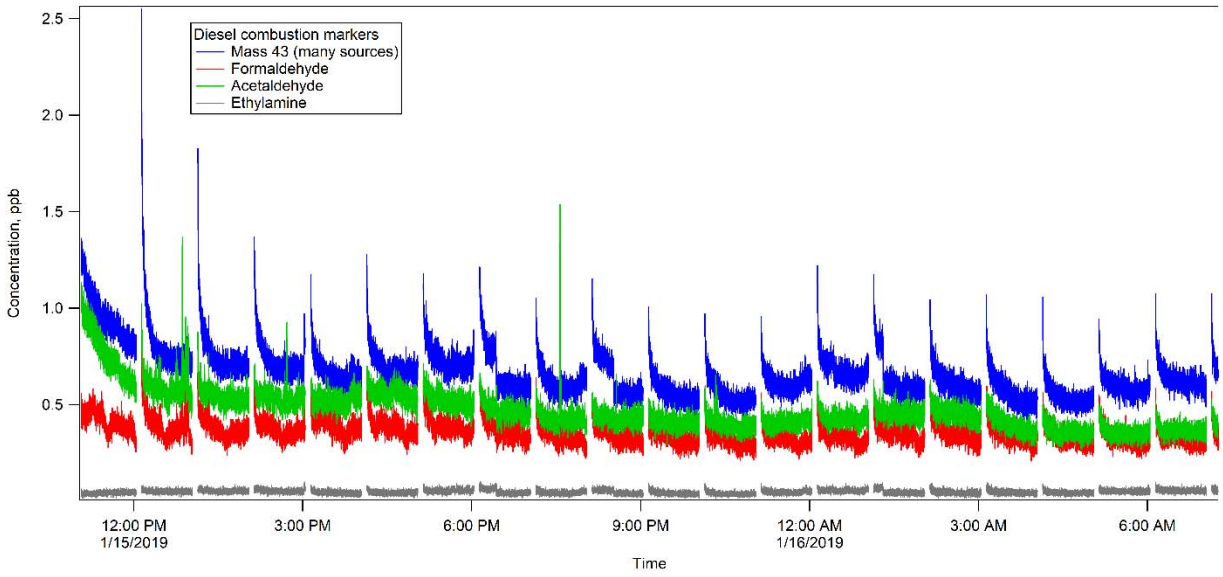

Figure 3-19. Diesel Combustion Markers.

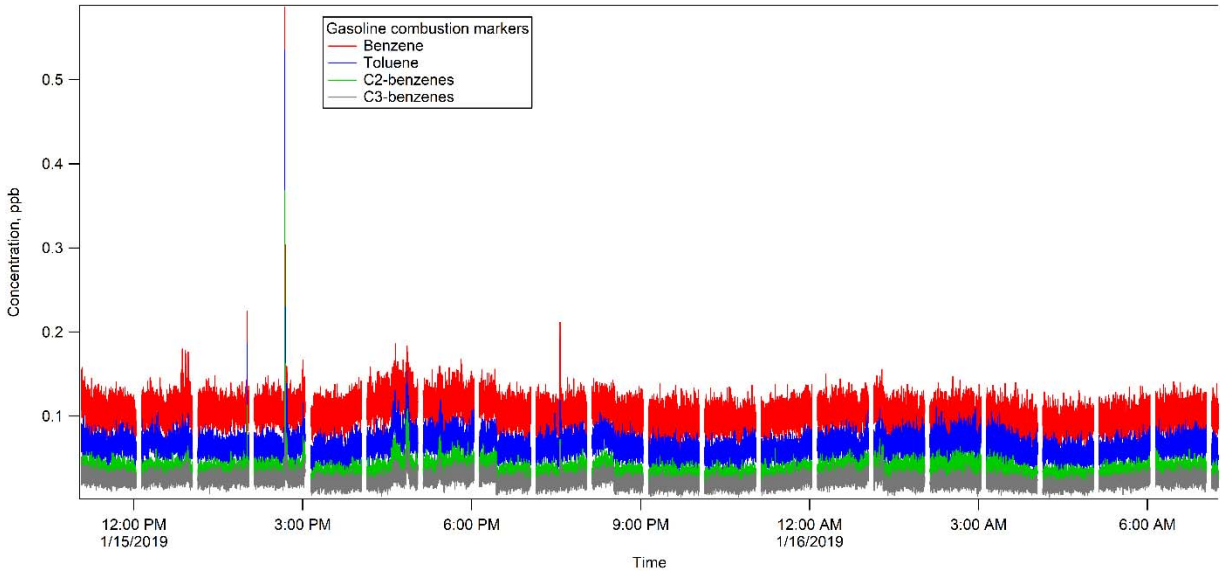

Figure 3-20. Gasoline Combustion Markers.

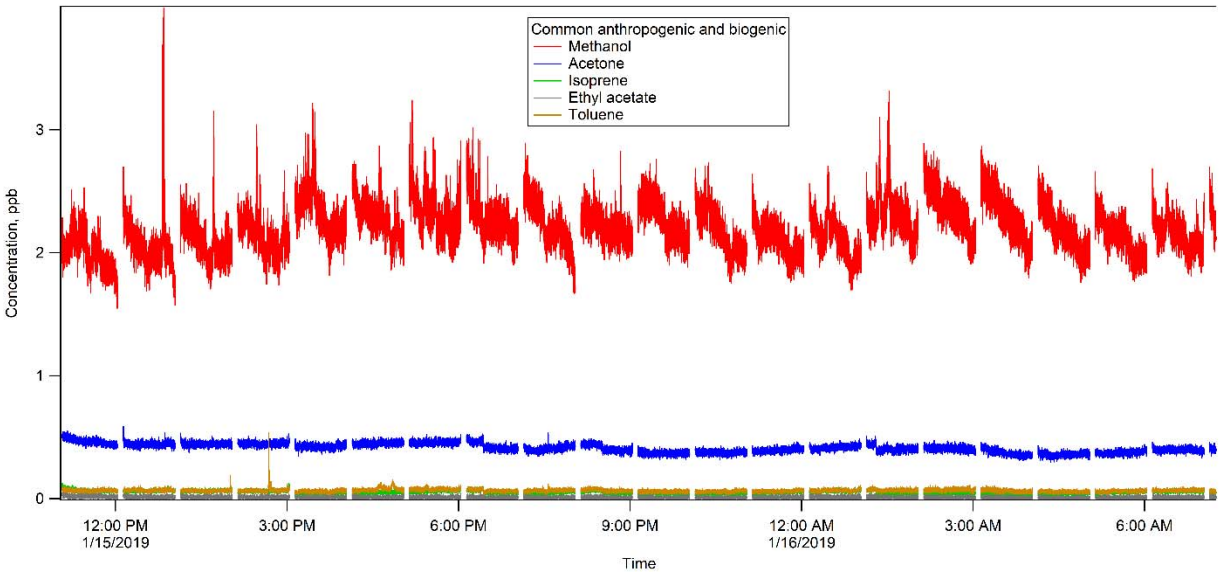

Figure 3-21. Plant and Human Markers.

4.0 JANUARY 16, 2019 – JANUARY 17, 2019 – STUDY SITE #3

4.1 Quality Assessment

Data from January 16, 2019, were assessed using Procedure 17124-DOE-HS-102. A Data Acceptance Checklist was completed. The data were accepted by TerraGraphics with the following comments. Deficiency Report No. DR19-002, "Deficiency Report," was initiated to adequately document a loss of Proton Transfer Reaction – Time of Flight (PTR-TOF) data on January 16, 2019. See Appendix A for the full DR. The instance will be discussed in detail in a subsequent monthly summary report.

4.2 Summary

The ML personnel performed background sampling from January 16, 2019, to January 17, 2019, at study Site 3. Site 3 is located near the corner of 4th and Buffalo just to the west of the 242-A Evaporator in the 200 East area as shown in Figure 4-1. 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 08:18 on January 16, 2019. The QA/QC zero-air/span checks were performed on the LI-COR CO_2 monitor, the Picarro NH_3 analyzer, and the PTR-MS beginning at 07:24. Collection of confirmatory sorbent samples began at 08:39. The ML personnel departed the site at 12:20. The SME performed a remote start of NO^+ automation mode at 13:51.

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

The ML staff returned to Site 3 at 07:04 on January 17, 2019. At 07:11, the confirmatory sorbent samples were disconnected from the sampling station. The ML moved to Site 4 by 08:00.

Figure 4-2 provides meteorological information obtained from the ML mounted weather station for the time period of sampling at Site 3. Wind direction was typical of prevailing winds from the west-northwest at speeds between 0-12 miles per hour. Temperatures ranged between 32-42 degrees Fahrenheit with pressure steadily declining while at Site 3.

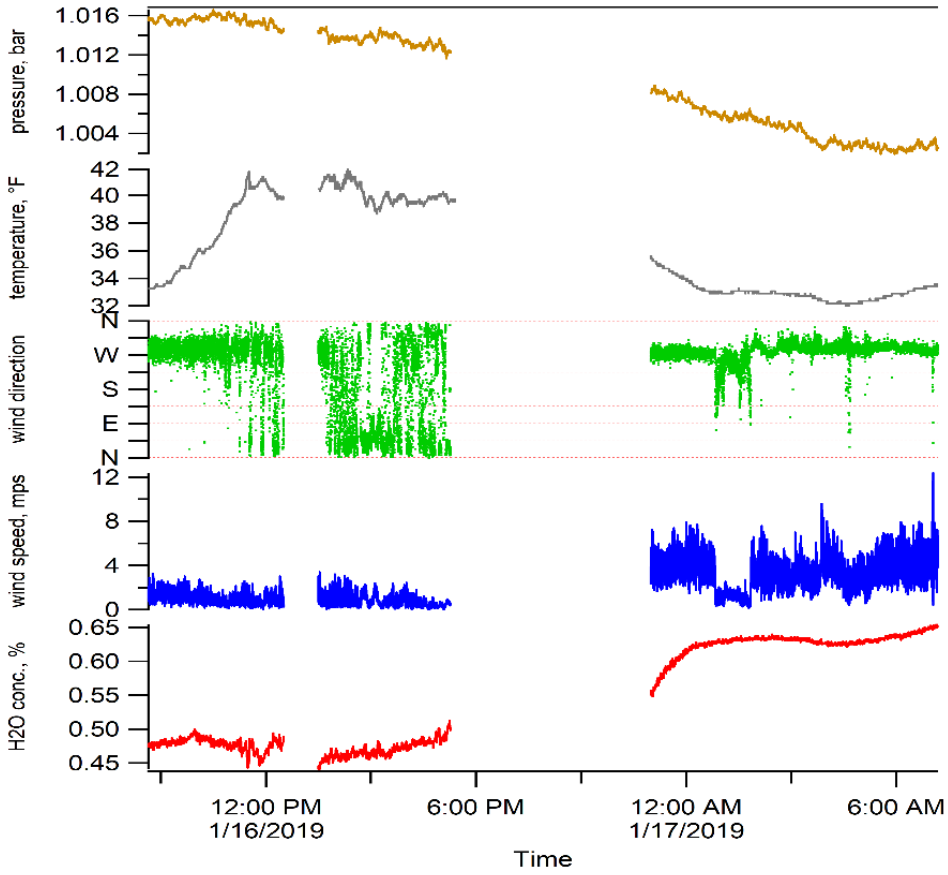

Figure 4-2. Weather Data.

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 on alternative media sources as shown in Table 4-1.

Table 4-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
1	01/16/2019	Thermosorb/N	EL33347	08:39	11:39	180
1	01/16/2019	Carbotrap-300	A060144	08:39	12:40	241
1	01/16/2019	LpDNPH	190116-A	08:39	11:39	180

Table 4-2 displays the statistical information for the monitoring period of January 16, 2019, to January 17, 2019.

Table 4-2. Statistical Information for the Monitoring Period of January 16, 2019 – January 17, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	ammonia	25000	0.010	3.765	1.082	28.722	9.377	3.958
2	formaldehyde	300	1.302	<1.302	N/A	N/A	1.548	<1.302
3	methanol	200000	1.839	2.778†	0.540	19.452	8.392	2.777
4	acetonitrile	20000	0.070	<0.070	N/A	N/A	6.993	<0.070
5	acetaldehyde	25000	2.070	<2.070	N/A	N/A	6.133	<2.070
6	ethylamine	5000	0.055	<0.055	N/A	N/A	0.183	<0.055
7	1,3-butadiene	1000	0.122	<0.122	N/A	N/A	0.294	<0.122
8	propanenitrile	6000	0.121	<0.121	N/A	N/A	0.107	<0.121
9	2-propenal	100	0.314	<0.314	N/A	N/A	0.664	<0.314
10	1-butanol + butenes	20000	0.149	<0.149	N/A	N/A	0.342	<0.149
11	methyl isocyanate	20	0.061	<0.061	N/A	N/A	0.089	<0.061
12	methyl nitrite	100	0.117	<0.117	N/A	N/A	0.422	<0.117
13	furan	1	0.053	<0.053	N/A	N/A	0.084	<0.053
14	butanenitrile	8000	0.040	<0.040	N/A	N/A	0.057	<0.040
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.034	<0.034	N/A	N/A	N/A*	N/A*
16	butanal	25000	0.063	<0.063	N/A	N/A	0.228	<0.063
17	NDMA**	0.3	0.020	<0.020	N/A	N/A	0.073	<0.020
18	benzene	500	0.230	<0.230	N/A	N/A	0.494	<0.230
19	2,4-pentadienenitrile + pyridine	300	0.084	<0.084	N/A	N/A	0.103	<0.084
20	2-methylene butanenitrile	300	0.050	<0.050	N/A	N/A	0.076	<0.050
21	2-methylfuran	1	0.046	<0.046	N/A	N/A	0.099	<0.046
22	pentanenitrile	6000	0.029	<0.029	N/A	N/A	0.045	<0.029
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20	0.048	<0.048	N/A	N/A	0.072	<0.048
24	NEMA**	0.3	0.027	<0.027	N/A	N/A	0.040	<0.027
25	2,5-dimethylfuran	1	0.035	<0.035	N/A	N/A	0.059	<0.035
26	hexanenitrile	6000	0.029	<0.029	N/A	N/A	0.047	<0.029
27	2-hexanone (MBK)	5000	0.030	<0.030	N/A	N/A	0.043	<0.030
28	NDEA**	0.1	0.023	<0.023	N/A	N/A	0.041	<0.023
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.106	<0.106	N/A	N/A	0.109	<0.106
30	2,4-dimethylpyridine	500	0.031	<0.031	N/A	N/A	0.092	<0.031
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.035	<0.035	N/A	N/A	0.045	<0.035
32	heptanenitrile	6000	0.029	<0.029	N/A	N/A	0.040	<0.029
33	4-methyl-2-hexanone	500	0.032	<0.032	N/A	N/A	0.040	<0.032

Table 4-2. Statistical Information for the Monitoring Period of January 16, 2019 – January 17, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
34	NMOR**	0.6	0.017	<0.017	N/A	N/A	0.047	<0.017
35	butyl nitrate	2500	0.019	<0.019	N/A	N/A	0.031	<0.019
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran +3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.032	<0.032	N/A	N/A	0.043	<0.032
37	6-methyl-2-heptanone	8000	0.028	<0.028	N/A	N/A	0.040	<0.028
38	2-pentylfuran	1	0.029	<0.029	N/A	N/A	0.067	<0.029
39	biphenyl	200	0.031	<0.031	N/A	N/A	0.046	<0.031
40	2-heptylfuran	1	0.136	<0.136	N/A	N/A	0.138	<0.136
41	1,4-butanediol dinitrate	50	0.184	<0.184	N/A	N/A	0.061	<0.184
42	2-octylfuran	1	0.013	<0.013	N/A	N/A	0.047	<0.013
43	1,2,3-propanetriol 1,3-dinitrate	50	0.132	<0.132	N/A	N/A	0.045	<0.132
44	PCB	1000	0.139	<0.139	N/A	N/A	0.067	<0.139
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.025	<0.025	N/A	N/A	0.039	<0.025
46	furfural acetophenone	1	0.119	<0.119	N/A	N/A	0.142	<0.119
N/A*	The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.189 and the median value was <0.034 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.].							
ND	COPC Averages below the MDL.							
†	COPC Averages between the RL and the MDL.							
	COPC Averages >100% of the OEL.							
	COPC Averages 50-100% of the OEL.							
	COPC Averages 10-50% of the OEL.							

Figure 4-3 through Figure 4-21 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 January 16, 2019, to January 17, 2019. 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.

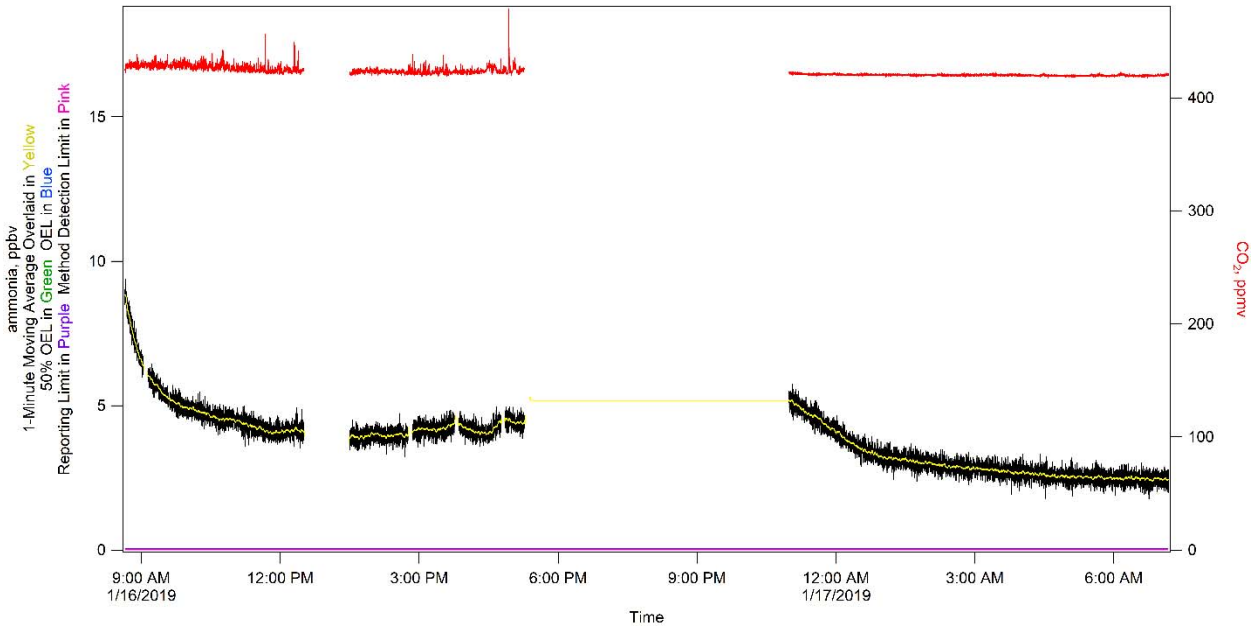

Figure 4-3. Ammonia.

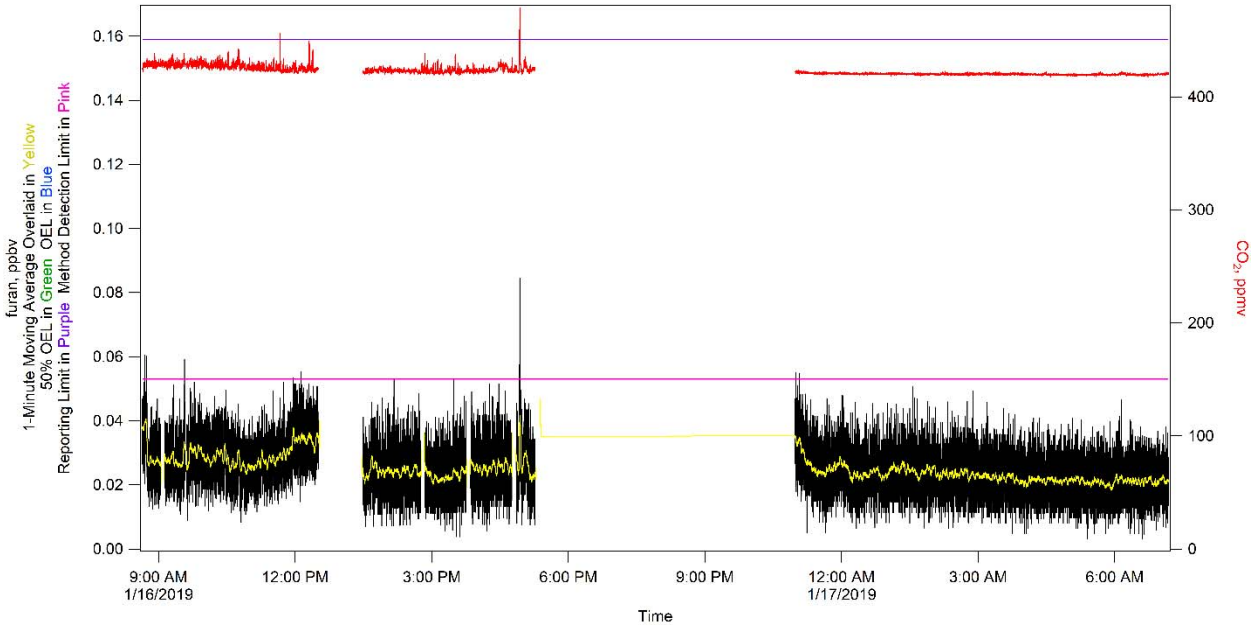

Figure 4-4. Furan.

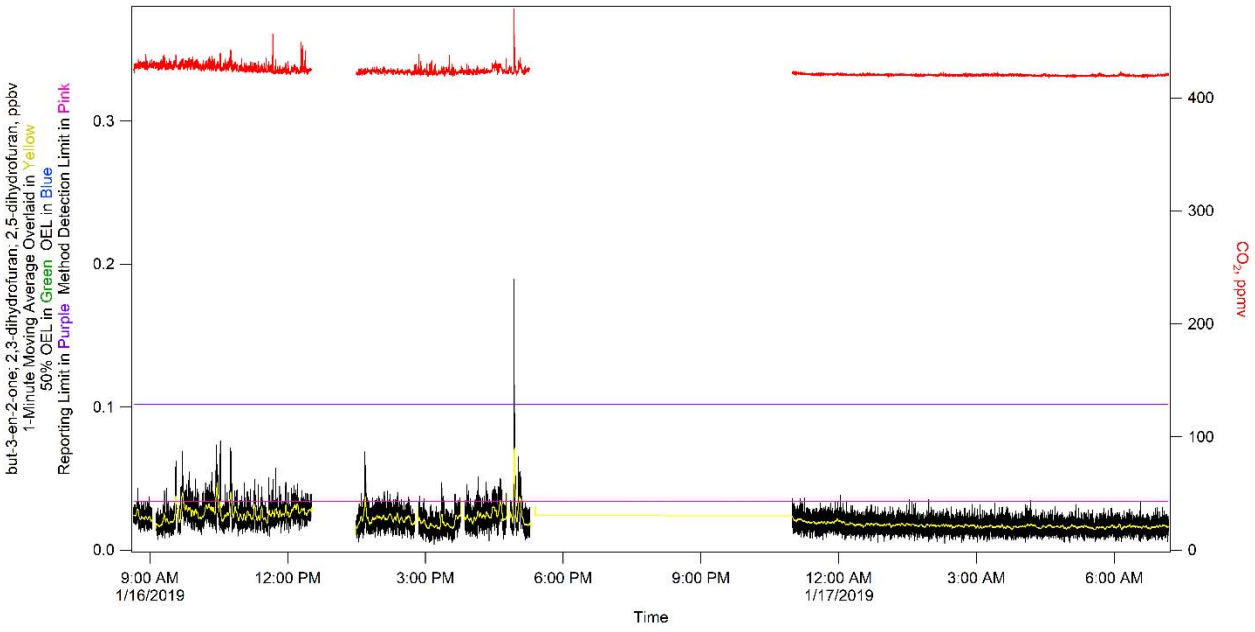

Figure 4-5. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

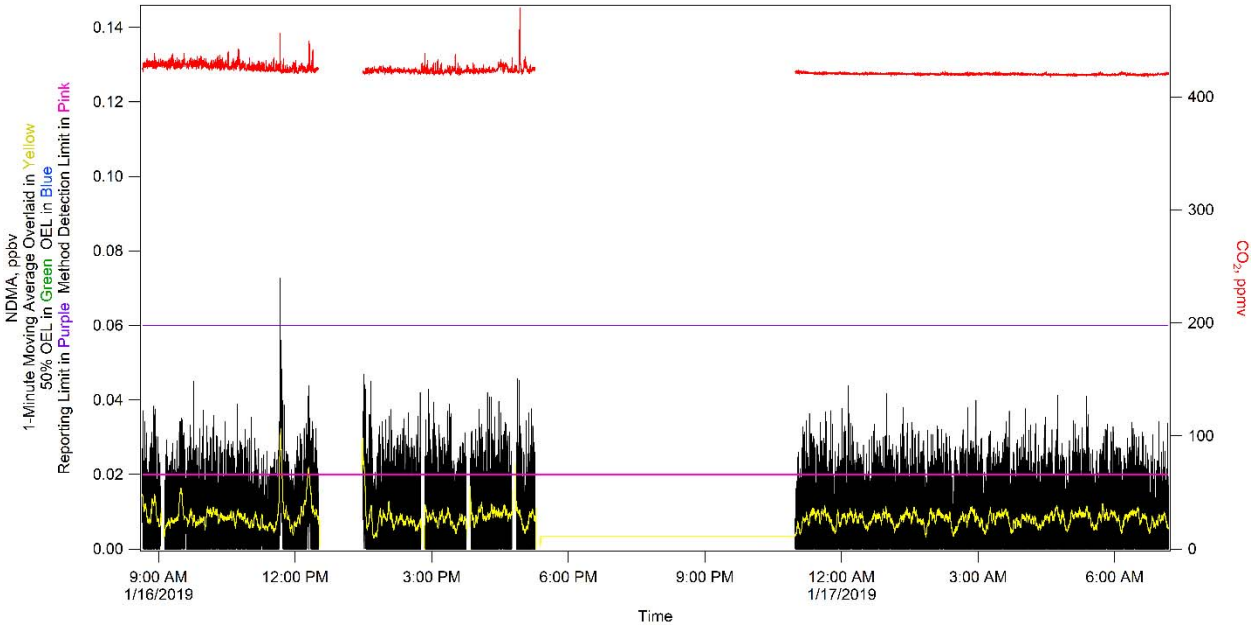

Figure 4-6. N-nitrosodimethylamine (NDMA).

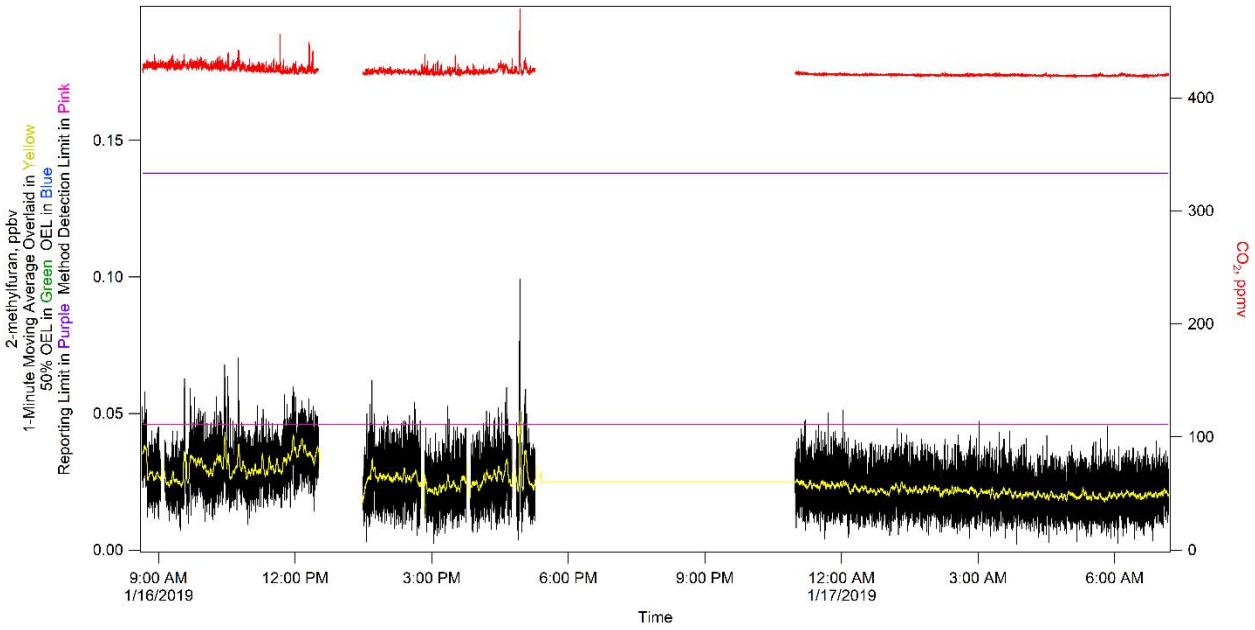

Figure 4-7. 2-methylfuran.

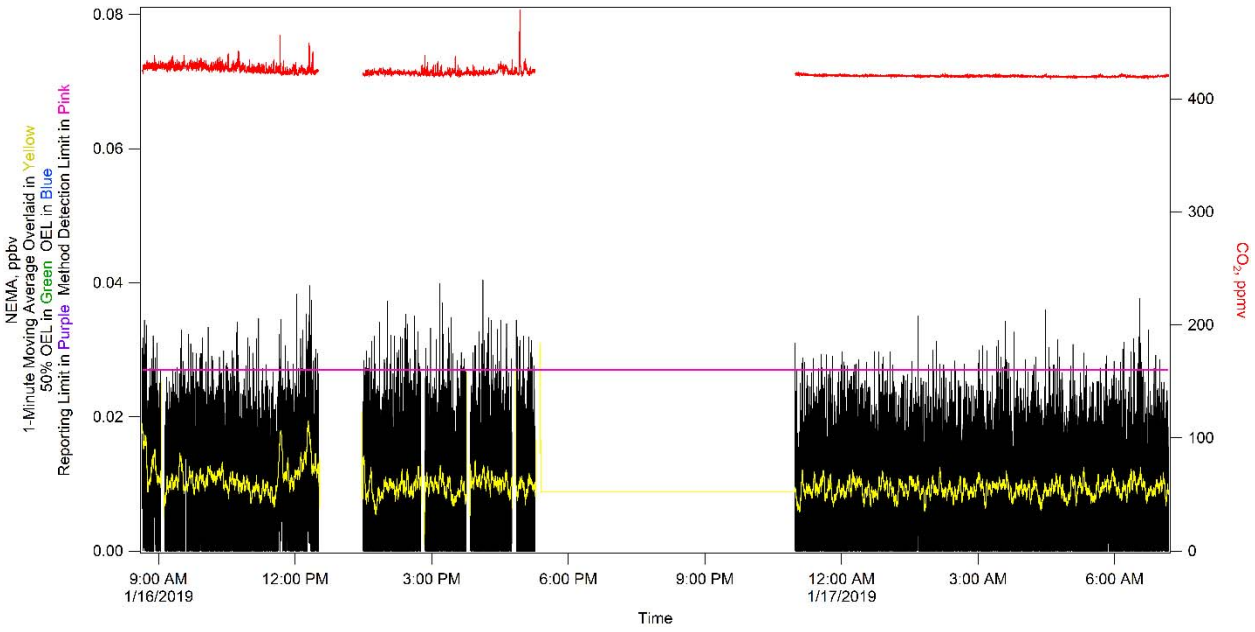

Figure 4-8. N-nitrosomethylethylamine (NEMA).

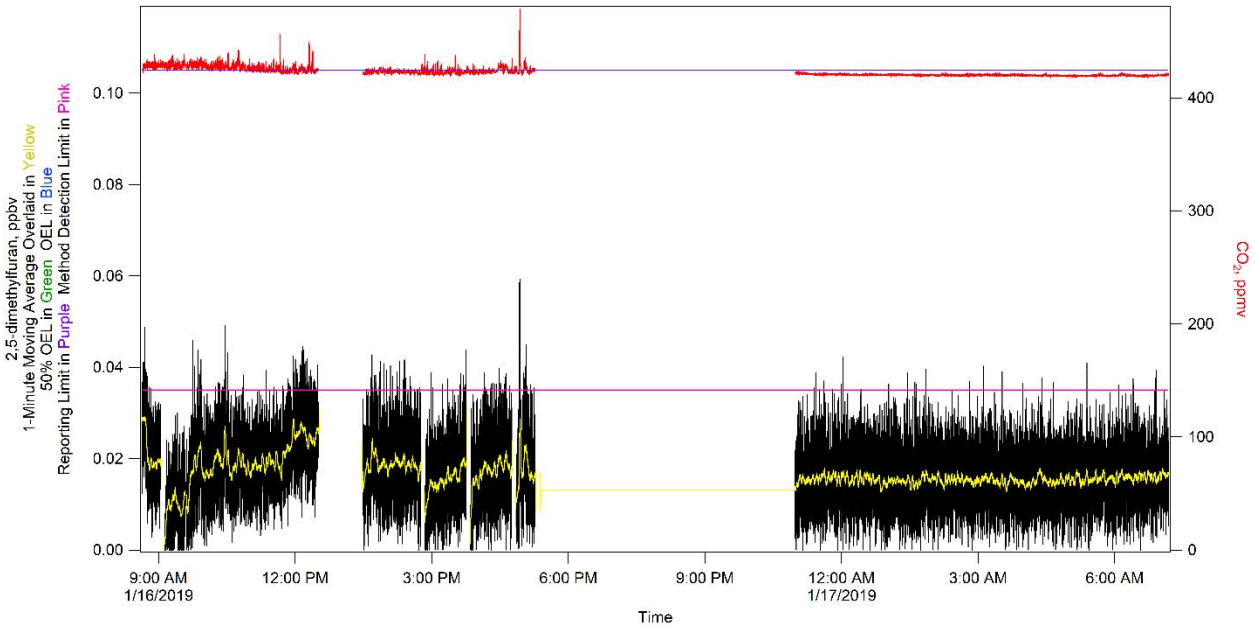

Figure 4-9. 2,5-dimethylfuran.

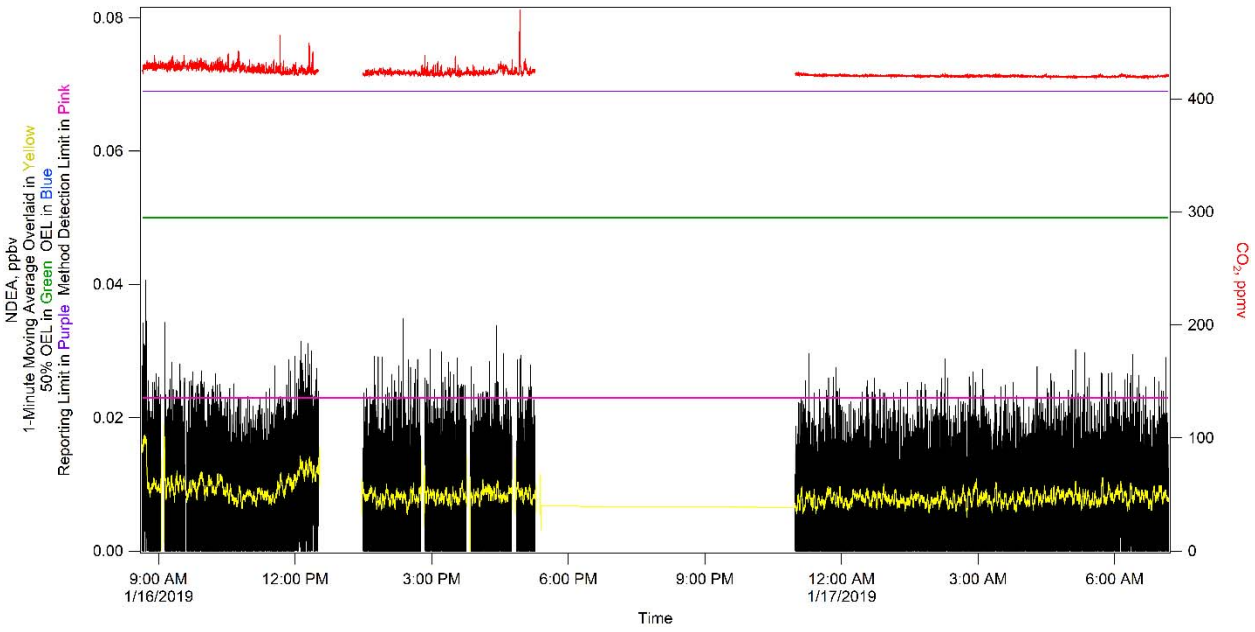

Figure 4-10. N-nitrosodiethylamine (NDEA).

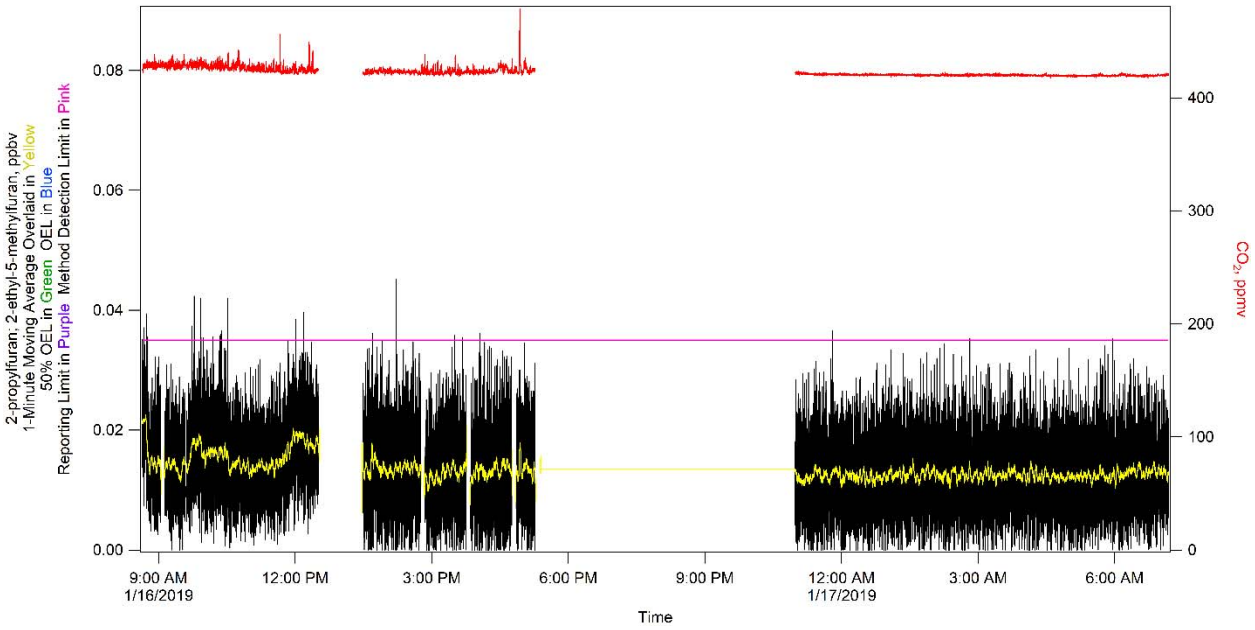

Figure 4-11. 2-propylfuran + 2-ethyl-5-methylfuran.

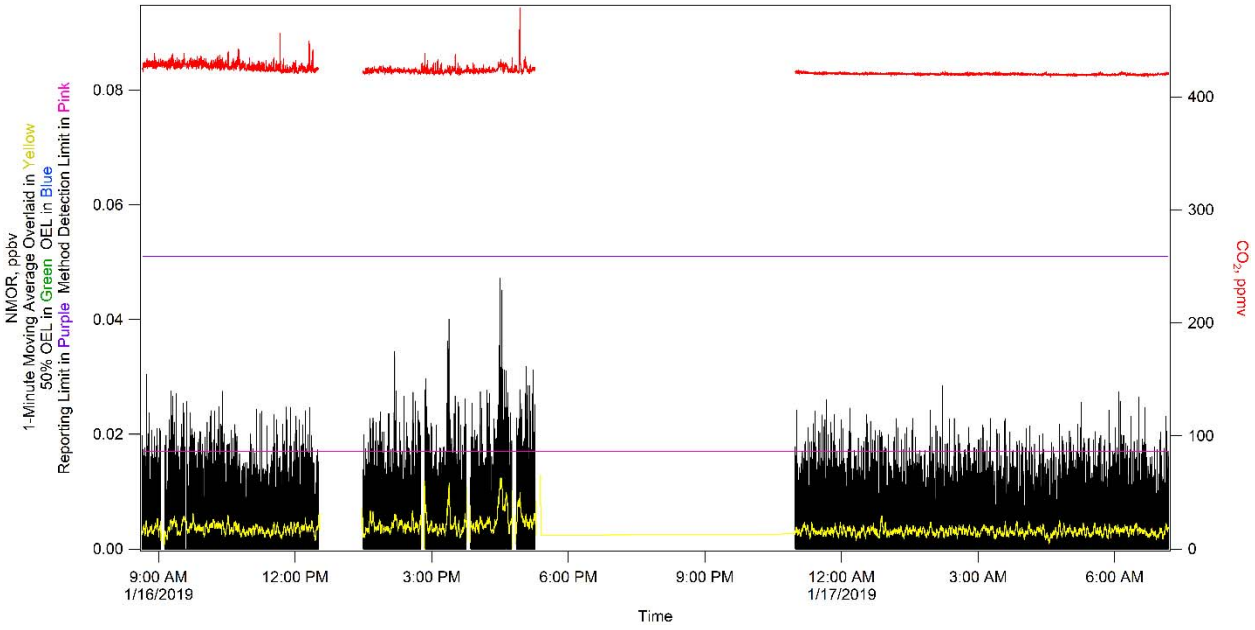

Figure 4-12. N-nitrosomorpholine (NMOR).

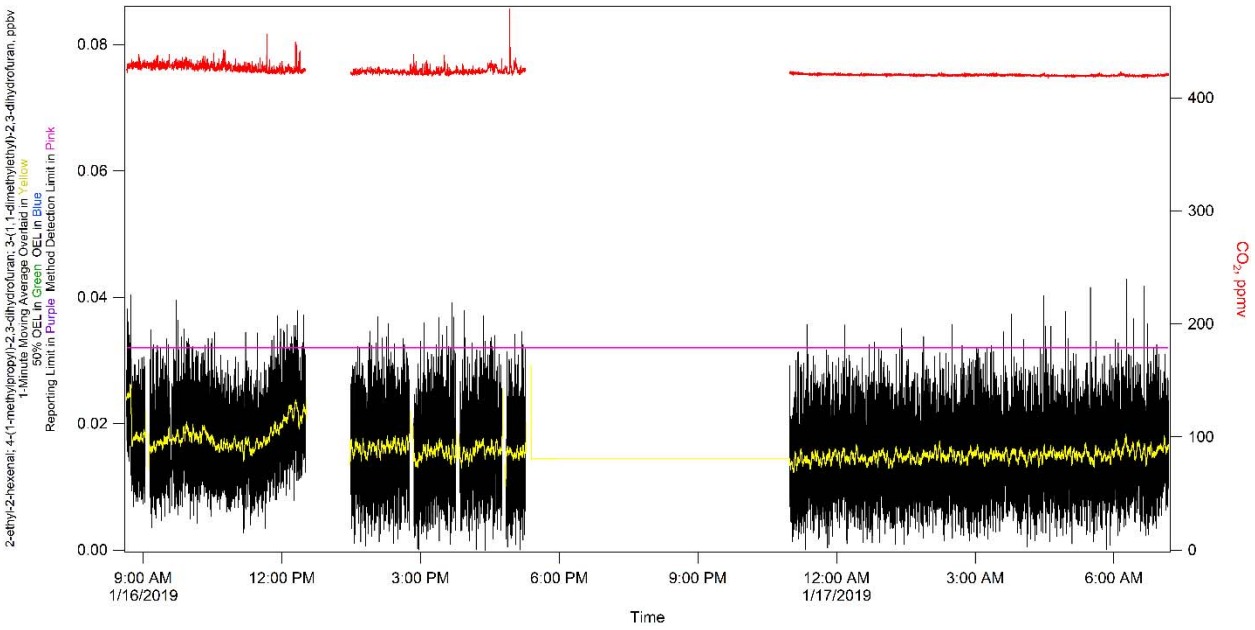

Figure 4-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran +3-(1-1-dimethylethyl)-2,3-dihydrofuran.

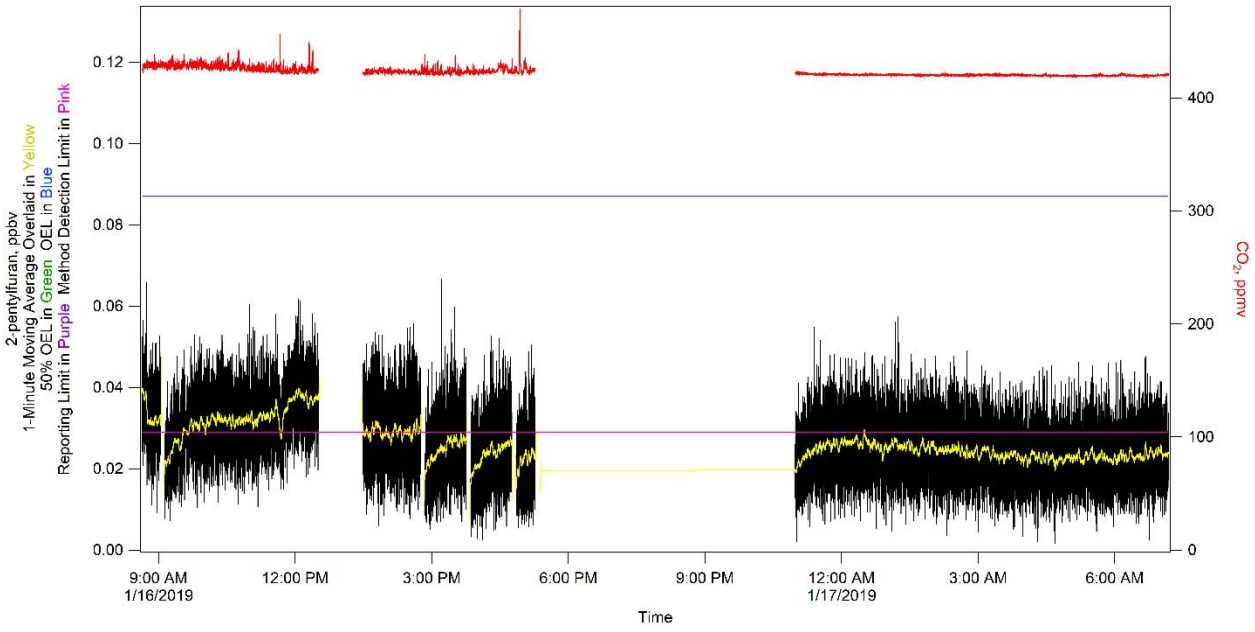

Figure 4-14. 2-pentylfuran.

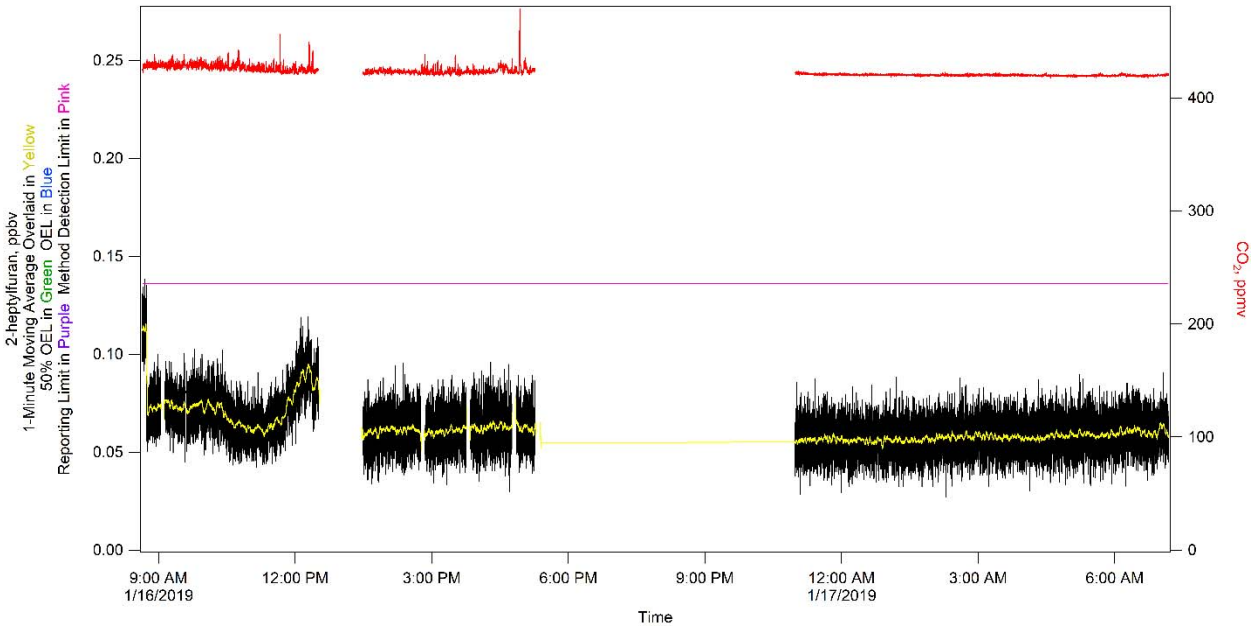

Figure 4-15. 2-heptylfuran.

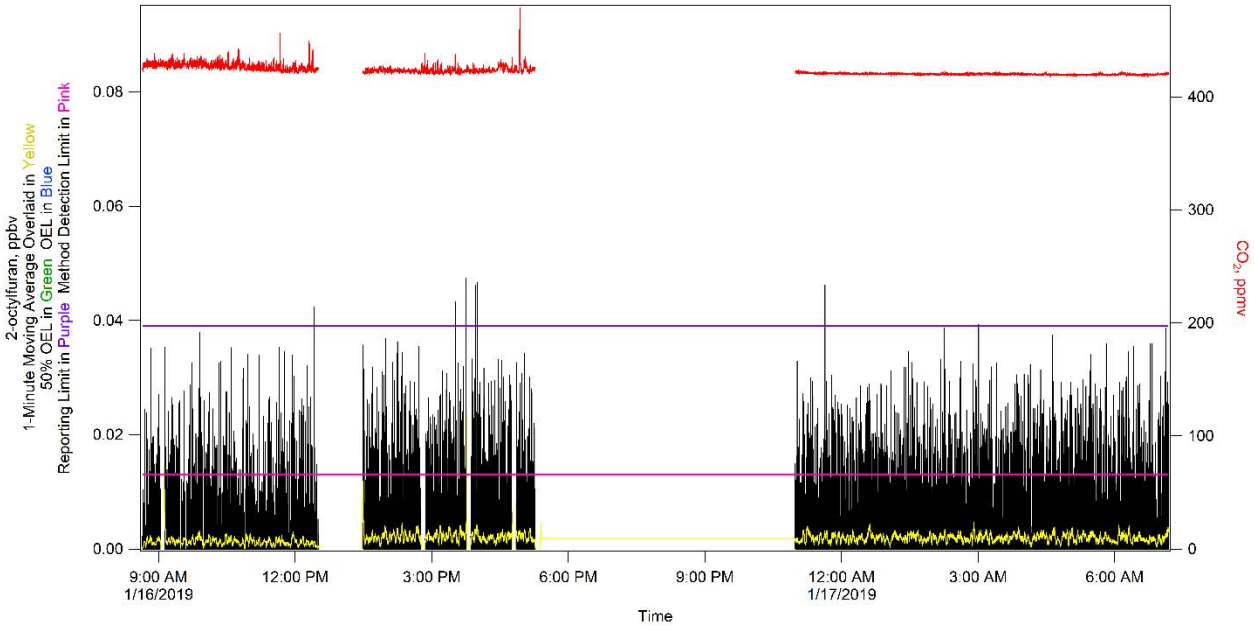

Figure 4-16. 2-octylfuran.

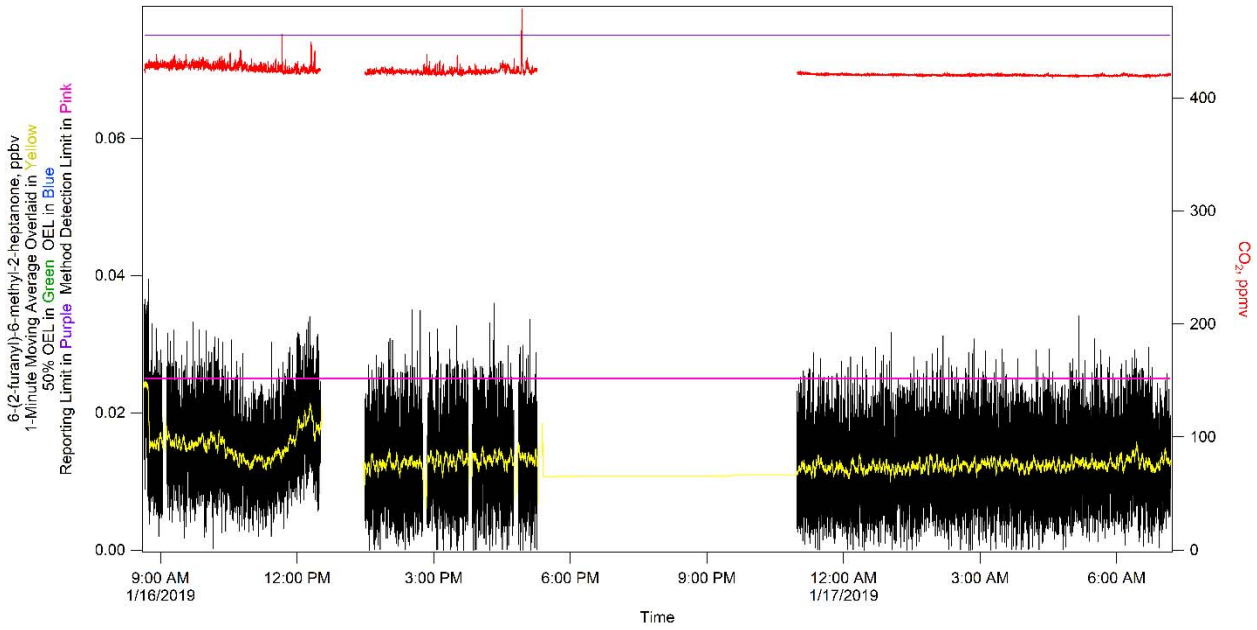

Figure 4-17. 6-(2-furanyl)-6-methyl-2-heptanone.

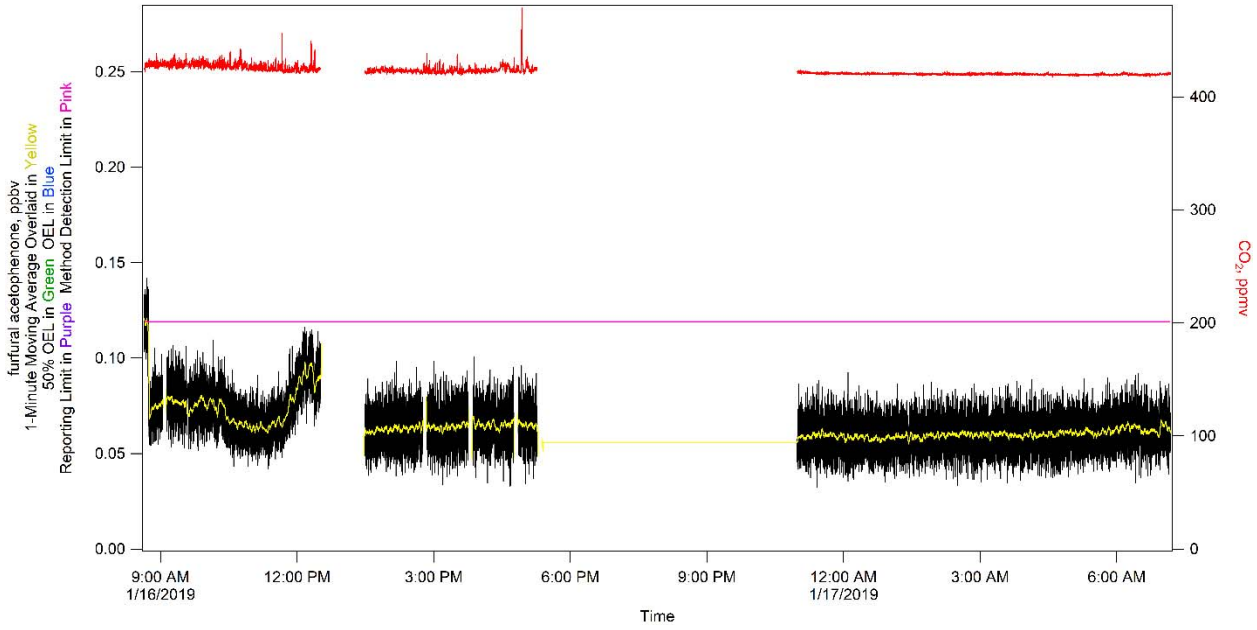

Figure 4-18. Furfural Acetophenone.

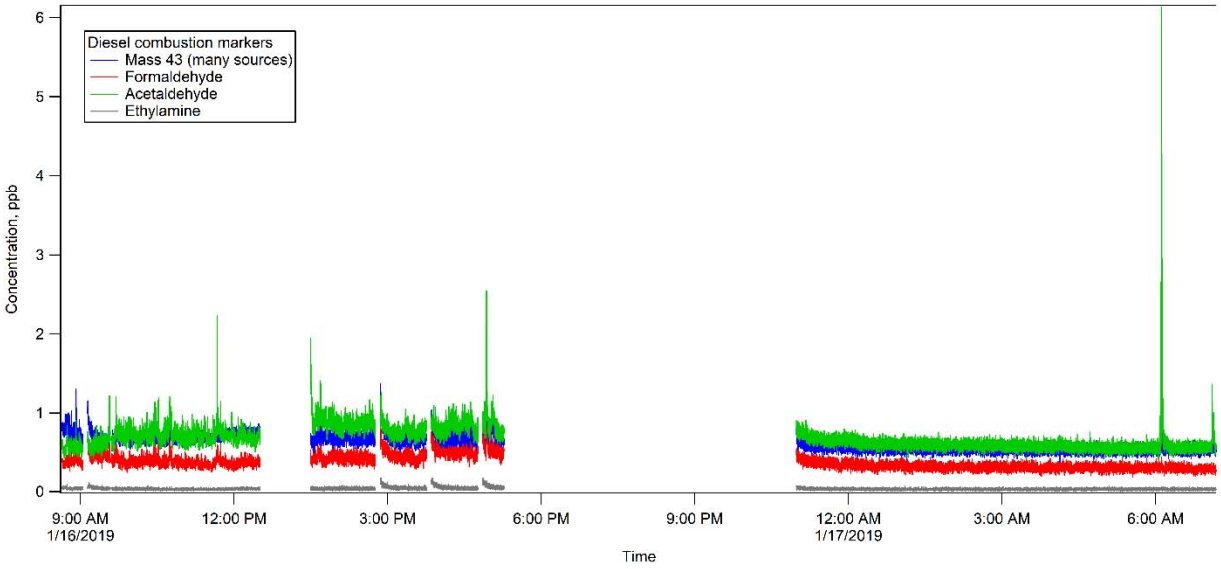

Figure 4-19. Diesel Combustion Markers.

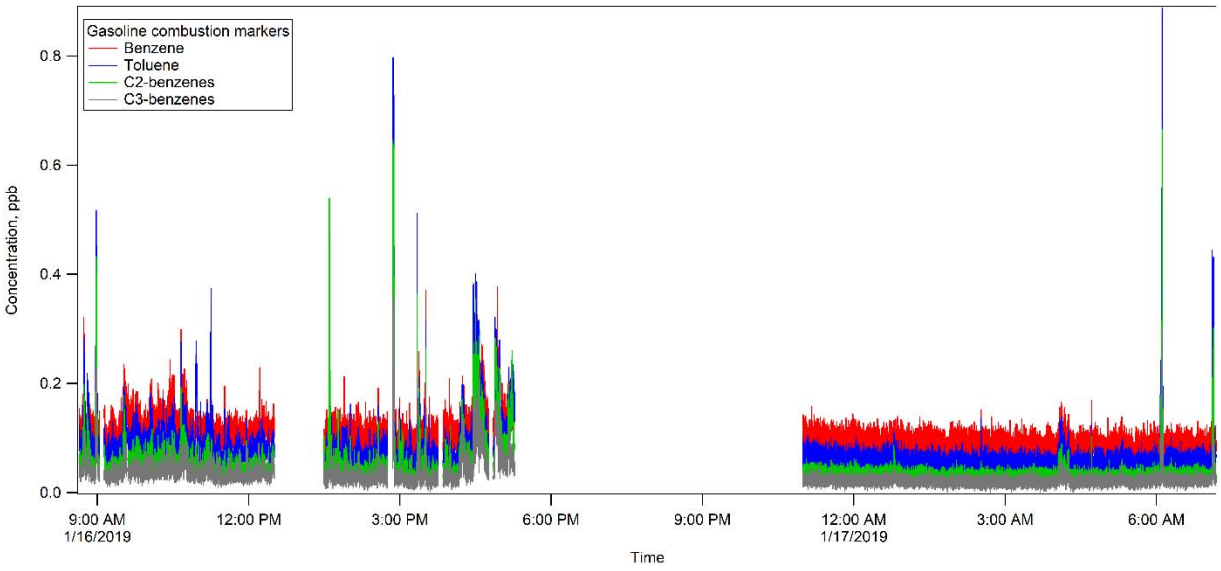

Figure 4-20. Gasoline Combustion Markers.

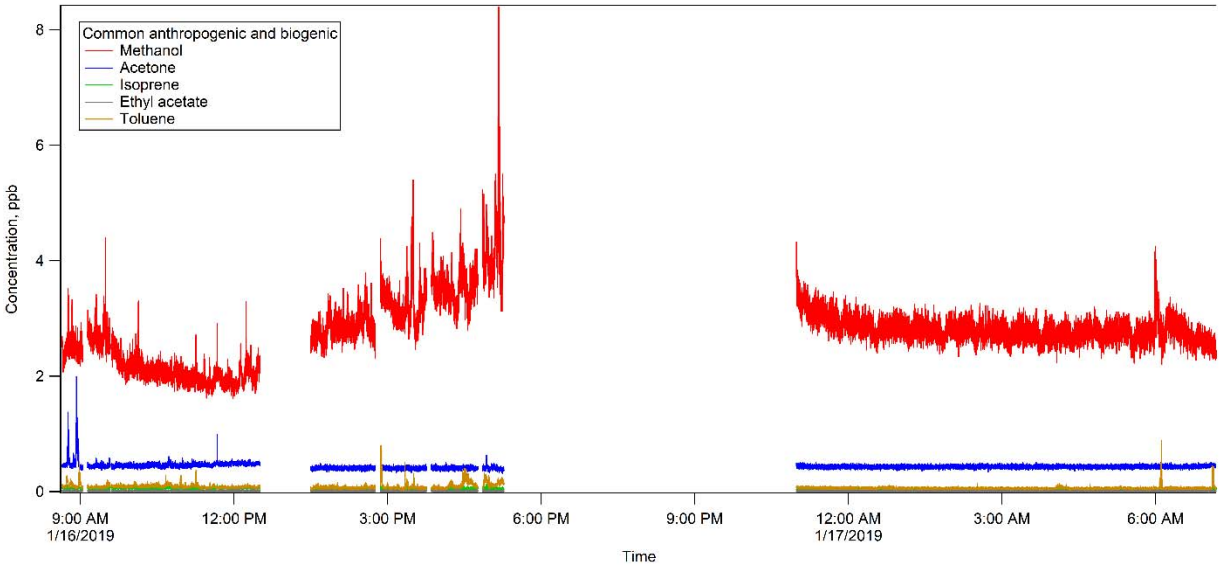

Figure 4-21. Plant and Human Markers.

5.0 JANUARY 17, 2019 – JANUARY 18, 2019 – STUDY SITE #4

5.1 Quality Assessment

Data from January 17, 2019, were assessed using Procedure 17124-DOE-HS-102. A Data Acceptance 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 from January 17, 2019, to January 18, 2019, at study Site 4. Site 4 is located downwind of the AN Tank Farm (Figure 5-1). The ML arrived at Site 4 at 08:00 on January 17, 2019. The QA/QC zero-air/span checks were performed on the LI-COR CO_2 monitor, the Picarro NH_3 analyzer, and the PTR-MS beginning at 08:27. Confirmatory sorbent samples were not collected on this day of monitoring. The ML staff departed at 12:50. The SME performed a remote start of NO^+ automation mode at 14:43.

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

The ML staff returned to Site 4 at 07:00 on January 18, 2019. The ML moved to Site 5 by 07:28.

Figure 5-2 provides meteorological information obtained from the ML mounted weather station for the time period of sampling at Site 4. Wind direction was typical of prevailing winds from the west northwest, with a shift from the southeast on January 17, 2019, at speeds between 0-6 miles per hour. Temperatures ranged between 36-45 degrees Fahrenheit with pressure steadily increasing while at Site 4.

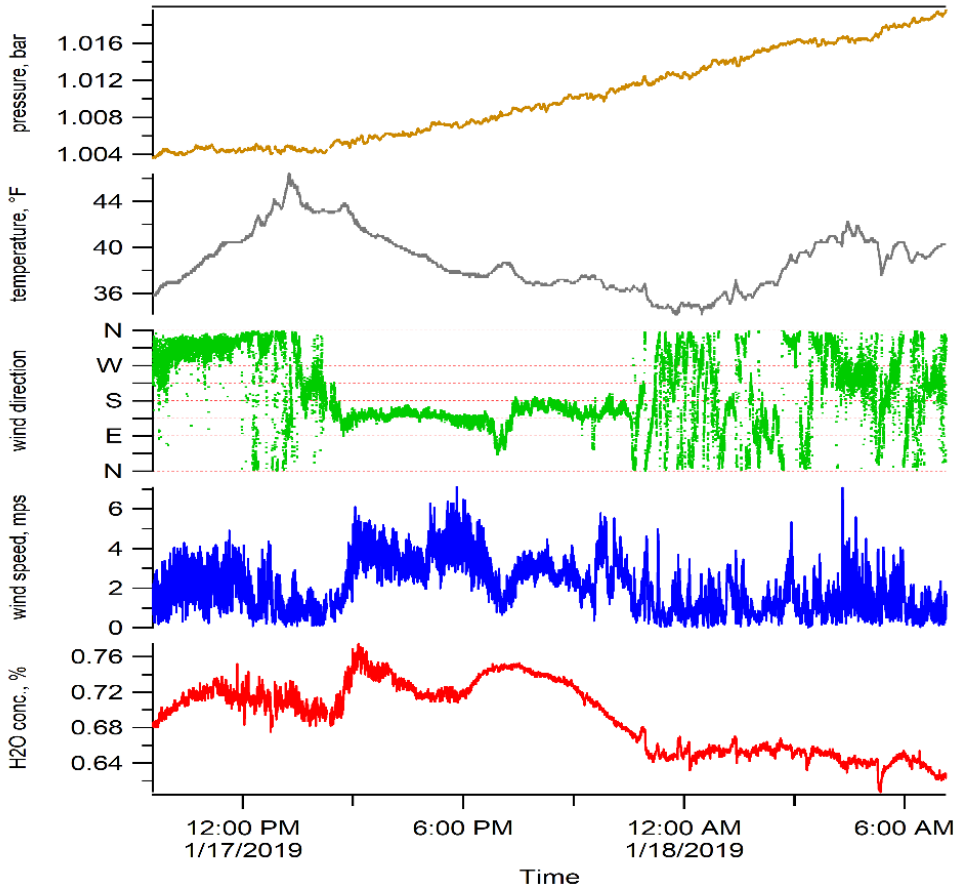

Figure 5-2. Weather Data.

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.

Confirmatory air samples were not collected during this period. Table 5-1 displays the statistical information for the monitoring period of January 17, 2019, to January 18, 2019.

Table 5-1. Statistical Information for the Monitoring Period of January 17, 2019 – January 18, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Deb. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	ammonia	25000	0.010	4.112	0.533	12.964	6.420	4.144
2	formaldehyde	300	1.302	<1.302	N/A	N/A	4.286	<1.302
3	methanol	200000	1.839	2.639†	0.431	16.313	13.953	2.629
4	acetonitrile	20000	0.070	<0.070	N/A	N/A	0.090	<0.070
5	acetaldehyde	25000	2.070	<2.070	N/A	N/A	2.537	<2.070
6	ethylamine	5000	0.055	<0.055	N/A	N/A	0.417	<0.055
7	1,3-butadiene	1000	0.122	<0.122	N/A	N/A	0.219	<0.122
8	propanenitrile	6000	0.121	<0.121	N/A	N/A	0.184	<0.121
9	2-propenal	100	0.314	<0.314	N/A	N/A	0.695	<0.314
10	1-butanol + butenes	20000	0.149	<0.149	N/A	N/A	0.240	<0.149
11	methyl isocyanate	20	0.061	<0.061	N/A	N/A	0.116	<0.061
12	methyl nitrite	100	0.117	<0.117	N/A	N/A	0.407	<0.117
13	furan	1	0.053	<0.053	N/A	N/A	0.079	<0.053
14	butanenitrile	8000	0.040	<0.040	N/A	N/A	0.080	<0.040
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.034	<0.034	N/A	N/A	N/A*	N/A*
16	butanal	25000	0.063	<0.063	N/A	N/A	0.416	<0.063
17	NDMA**	0.3	0.020	<0.020	N/A	N/A	0.050	<0.020
18	benzene	500	0.230	<0.230	N/A	N/A	0.414	<0.230
19	2,4-pentadienenitrile + pyridine	300	0.084	<0.084	N/A	N/A	0.184	<0.084
20	2-methylene butanenitrile	300	0.050	<0.050	N/A	N/A	0.126	<0.050
21	2-methylfuran	1	0.046	<0.046	N/A	N/A	0.086	<0.046
22	pentanenitrile	6000	0.029	<0.029	N/A	N/A	0.062	<0.029
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20	0.048	<0.048	N/A	N/A	0.083	<0.048
24	NEMA**	0.3	0.027	<0.027	N/A	N/A	0.068	<0.027
25	2,5-dimethylfuran	1	0.035	<0.035	N/A	N/A	0.067	<0.035
26	hexanenitrile	6000	0.029	<0.029	N/A	N/A	0.073	<0.029
27	2-hexanone (MBK)	5000	0.030	<0.030	N/A	N/A	0.055	<0.030
28	NDEA**	0.1	0.023	<0.023	N/A	N/A	0.042	<0.023
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.106	<0.106	N/A	N/A	0.208	<0.106
30	2,4-dimethylpyridine	500	0.031	<0.031	N/A	N/A	0.118	<0.031
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.035	<0.035	N/A	N/A	0.056	<0.035

Table 5-1. Statistical Information for the Monitoring Period of January 17, 2019 – January 18, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Deb. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
32	heptanenitrile	6000	0.029	<0.029	N/A	N/A	0.057	<0.029
33	4-methyl-2-hexanone	500	0.032	<0.032	N/A	N/A	0.055	<0.032
34	NMOR**	0.6	0.017	<0.017	N/A	N/A	0.034	<0.017
35	butyl nitrate	2500	0.019	<0.019	N/A	N/A	0.050	<0.019
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran\ + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.032	<0.032	N/A	N/A	0.063	<0.032
37	6-methyl-2-heptanone	8000	0.028	<0.028	N/A	N/A	0.060	<0.028
38	2-pentylfuran	1	0.029	<0.029	N/A	N/A	0.061	<0.029
39	biphenyl	200	0.031	<0.031	N/A	N/A	0.074	<0.031
40	2-heptylfuran	1	0.136	<0.136	N/A	N/A	0.285	<0.136
41	1,4-butanediol dinitrate	50	0.184	<0.184	N/A	N/A	0.082	<0.184
42	2-octylfuran	1	0.013	<0.013	N/A	N/A	0.041	<0.013
43	1,2,3-propanetriol 1,3-dinitrate	50	0.132	<0.132	N/A	N/A	0.055	<0.132
44	PCB	1000	0.139	<0.139	N/A	N/A	0.102	<0.139
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.025	<0.025	N/A	N/A	0.050	<0.025
46	furfural acetophenone	1	0.119	<0.119	N/A	N/A	0.279	<0.119
N/A*	The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.162 ppb and the median value was <0.034 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.].							
ND	COPC Averages below the MDL.							
†	COPC Averages between the RL and the MDL.							
	COPC Averages >100% of the OEL.							
	COPC Averages 50-100% of the OEL.							
	COPC Averages 10-50% of the OEL.							

Figure 5-3 through Figure 5-21 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 January 17, 2019, to January 18, 2019. 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.

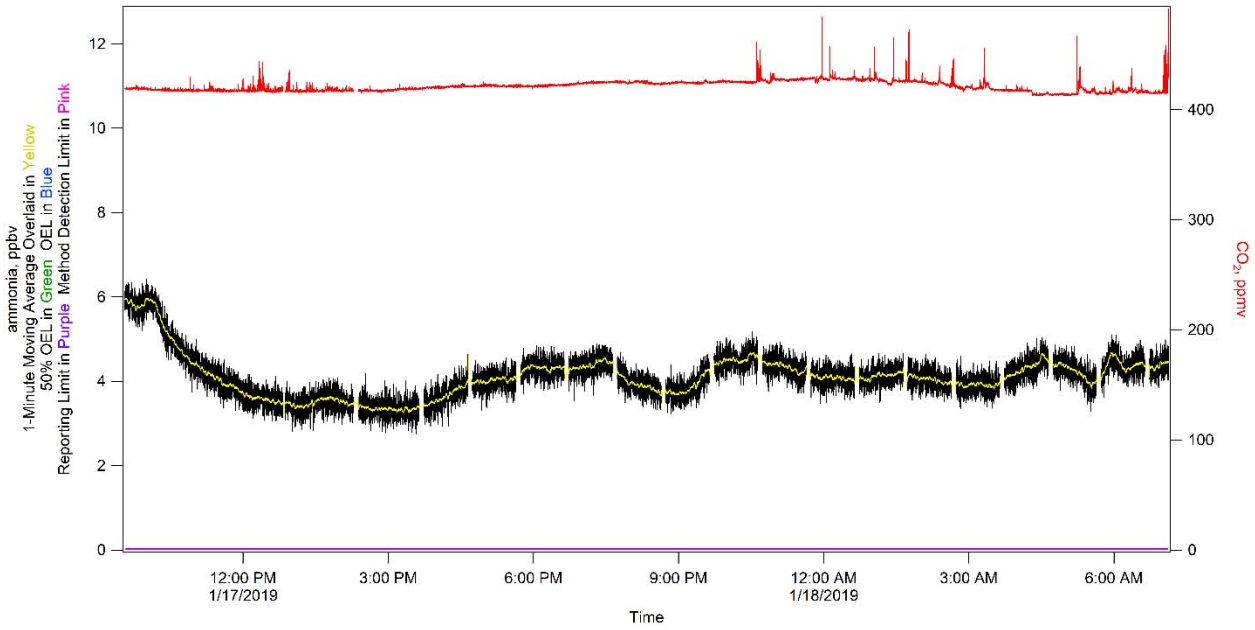

Figure 5-3. Ammonia.

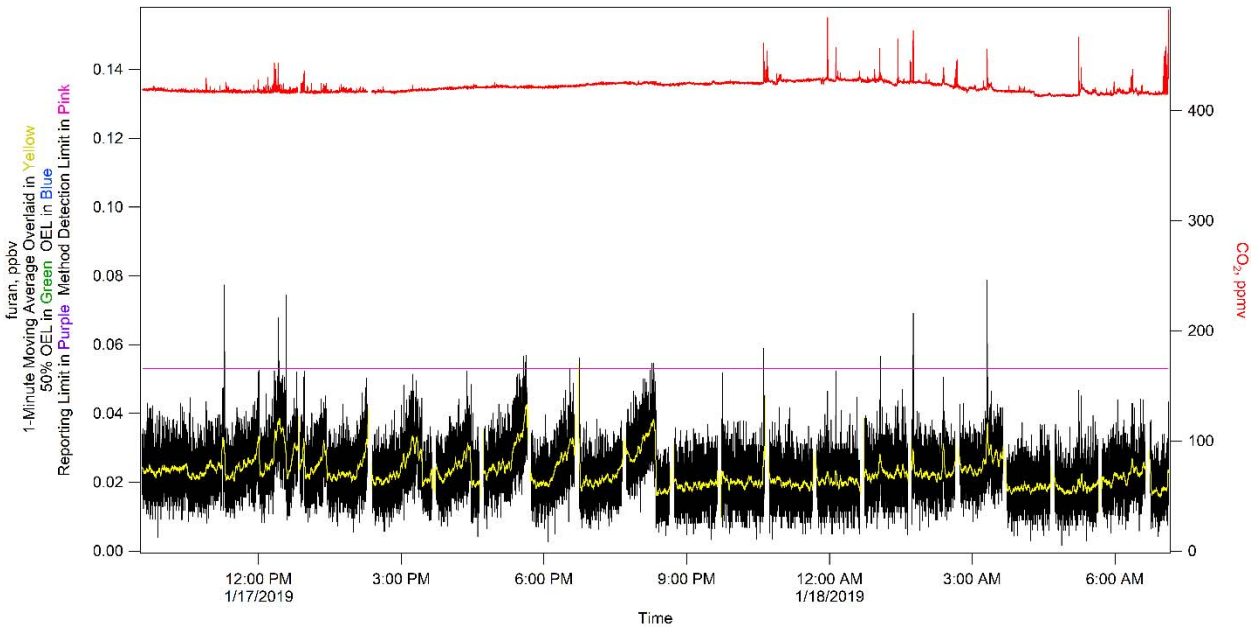

Figure 5-4. Furan.

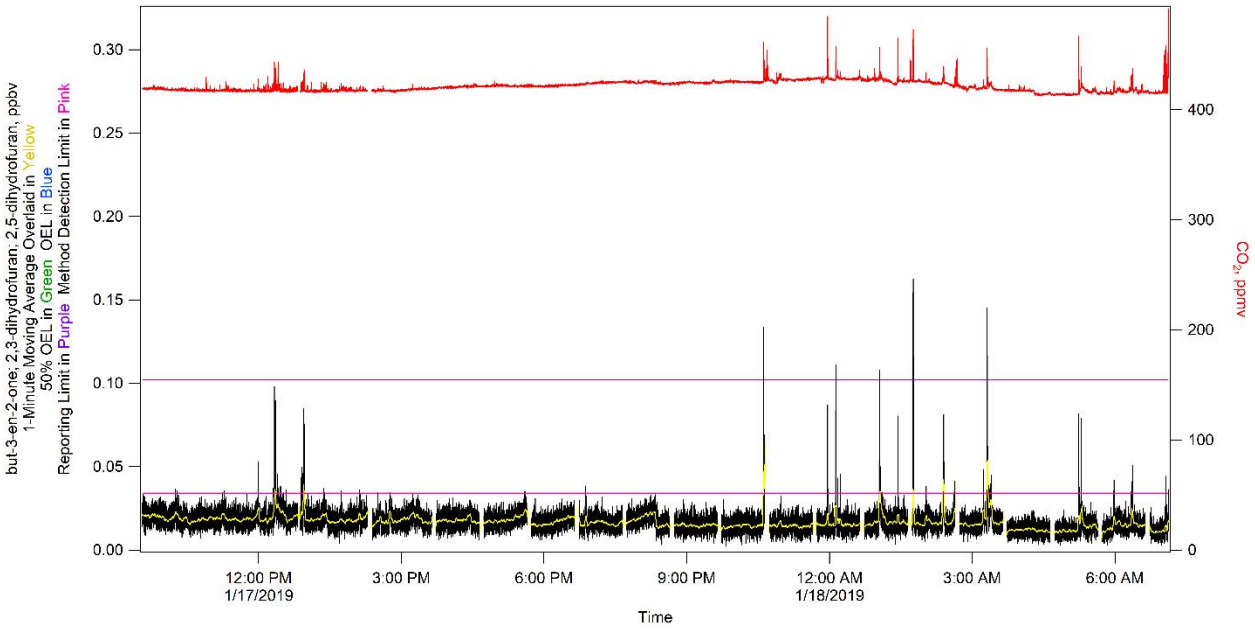

Figure 5-5. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

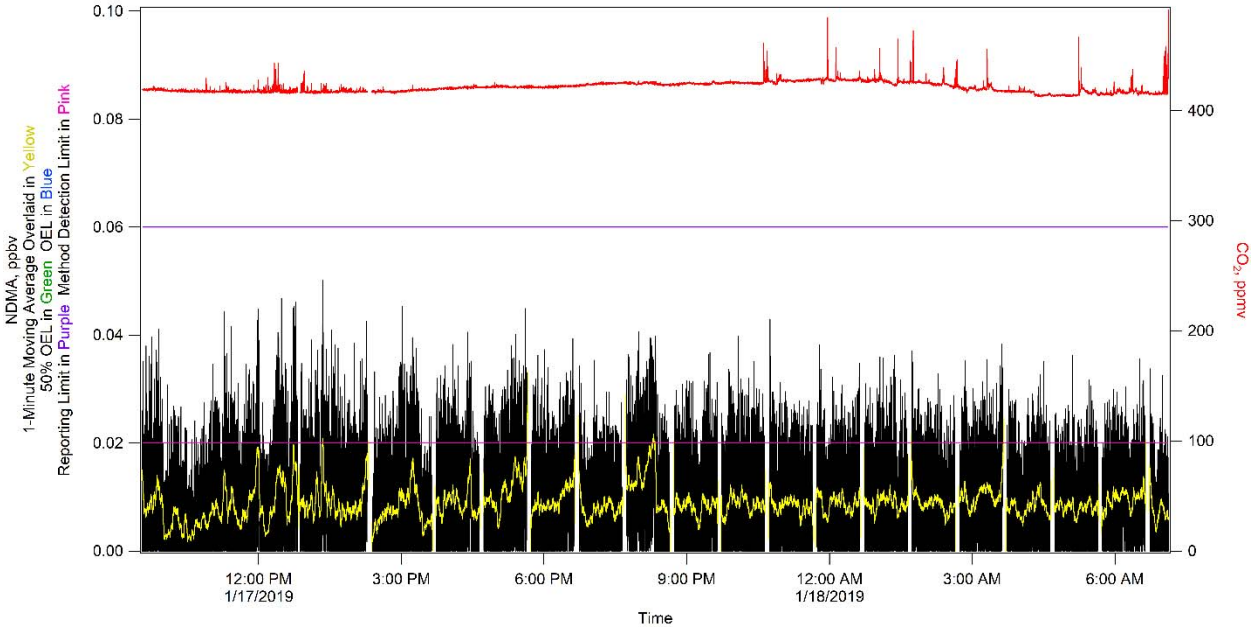

Figure 5-6. N-nitrosodimethylamine (NDMA).

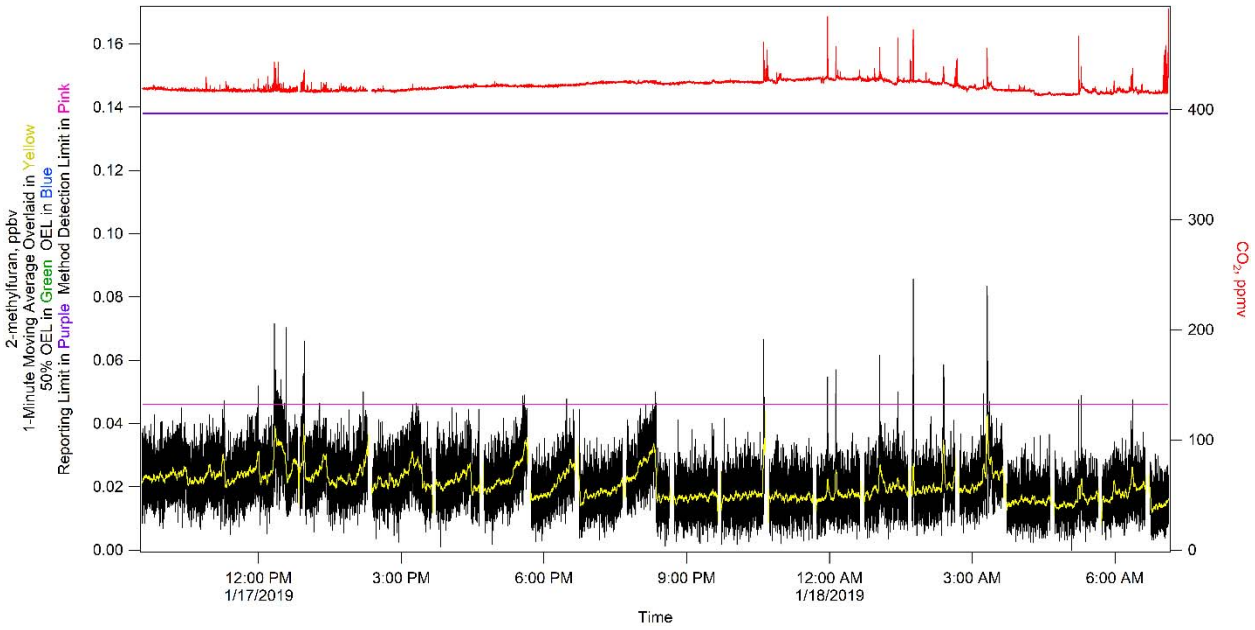

Figure 5-7. 2-methylfuran.

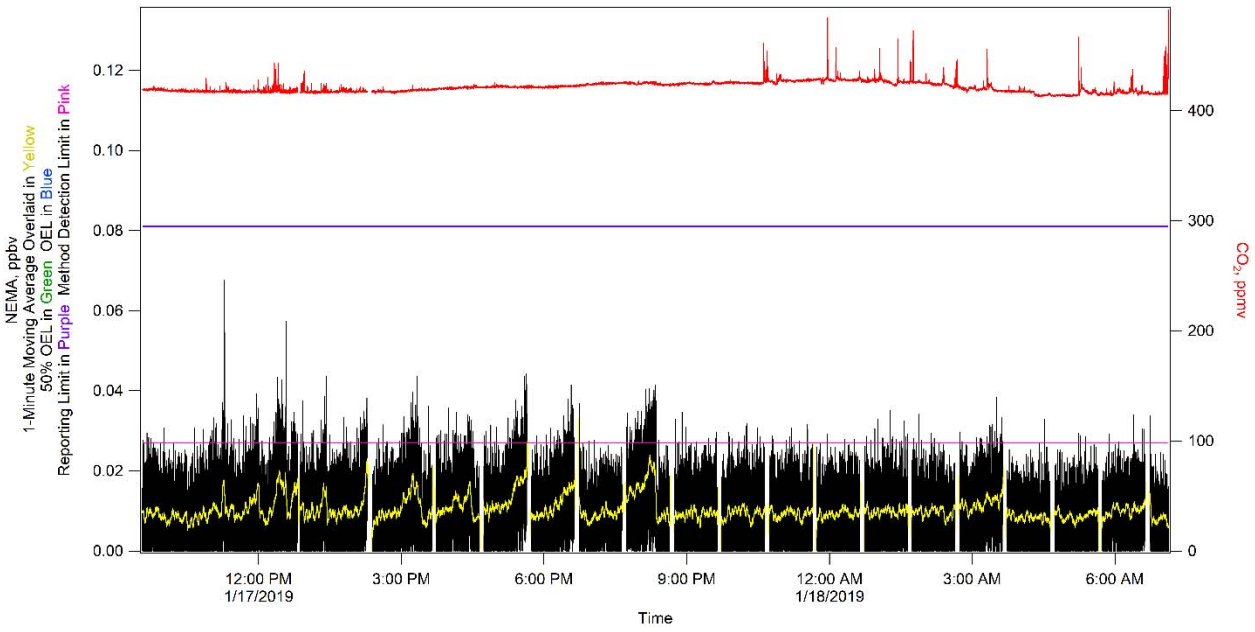

Figure 5-8. N-nitrosomethylethylamine (NEMA).

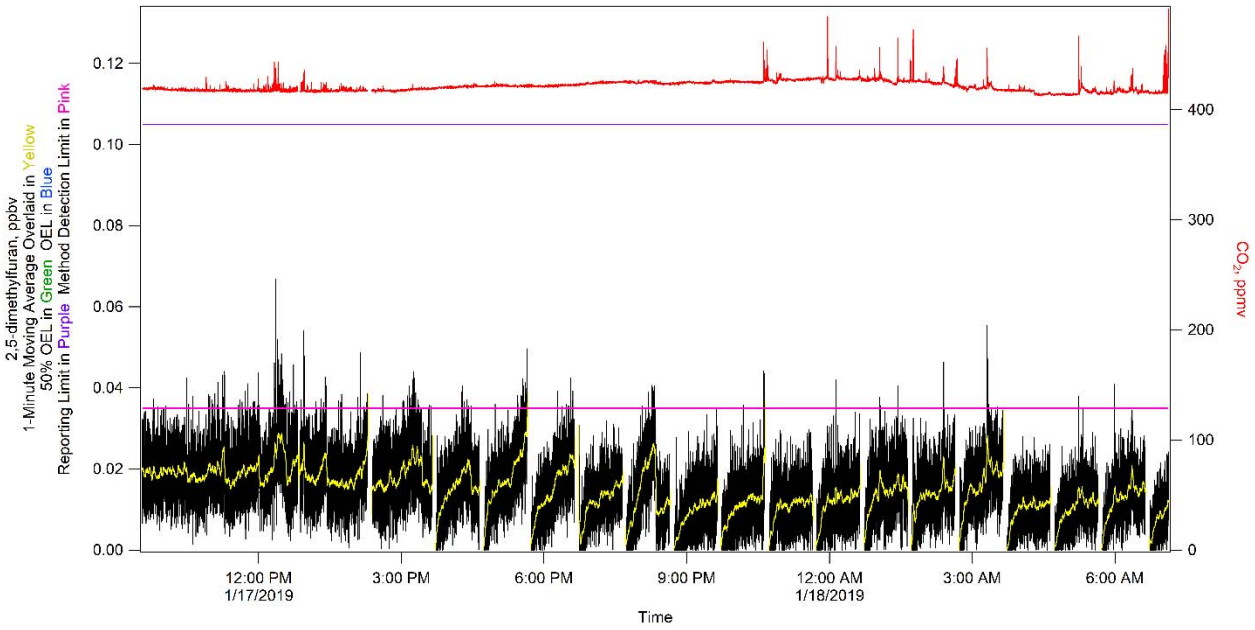

Figure 5-9. 2,5-dimethylfuran.

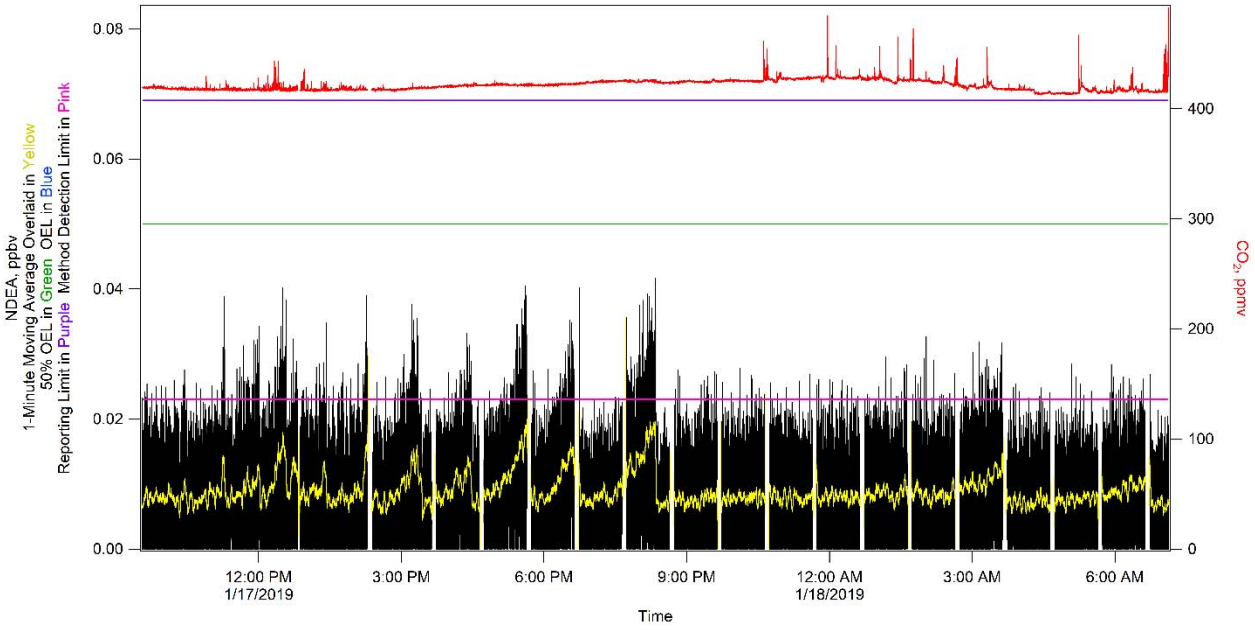

Figure 5-10. N-nitrosodiethylamine (NDEA).

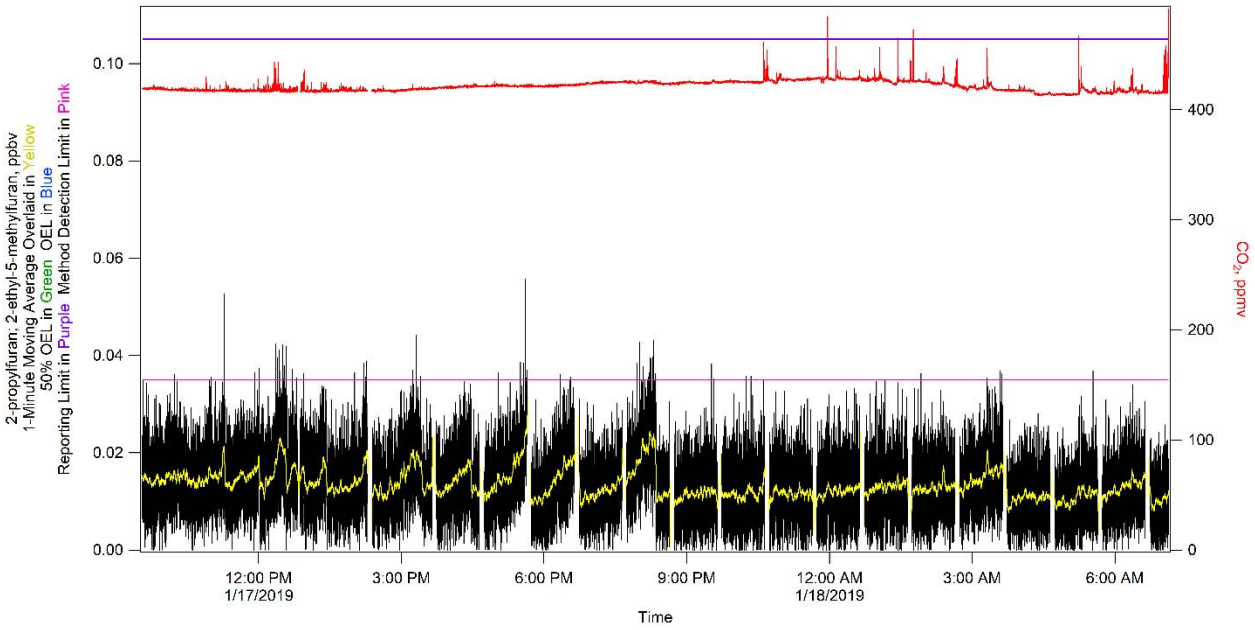

Figure 5-11. 2-propylfuran + 2-ethyl-5-methylfuran.

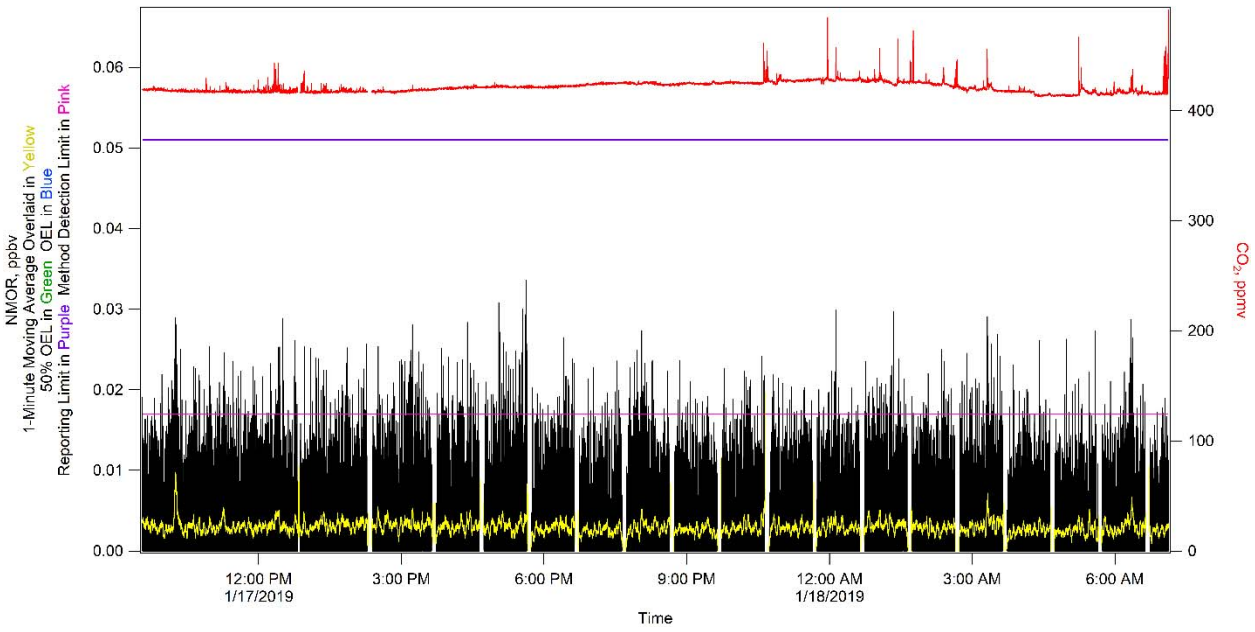

Figure 5-12. N-nitrosomorpholine (NMOR).

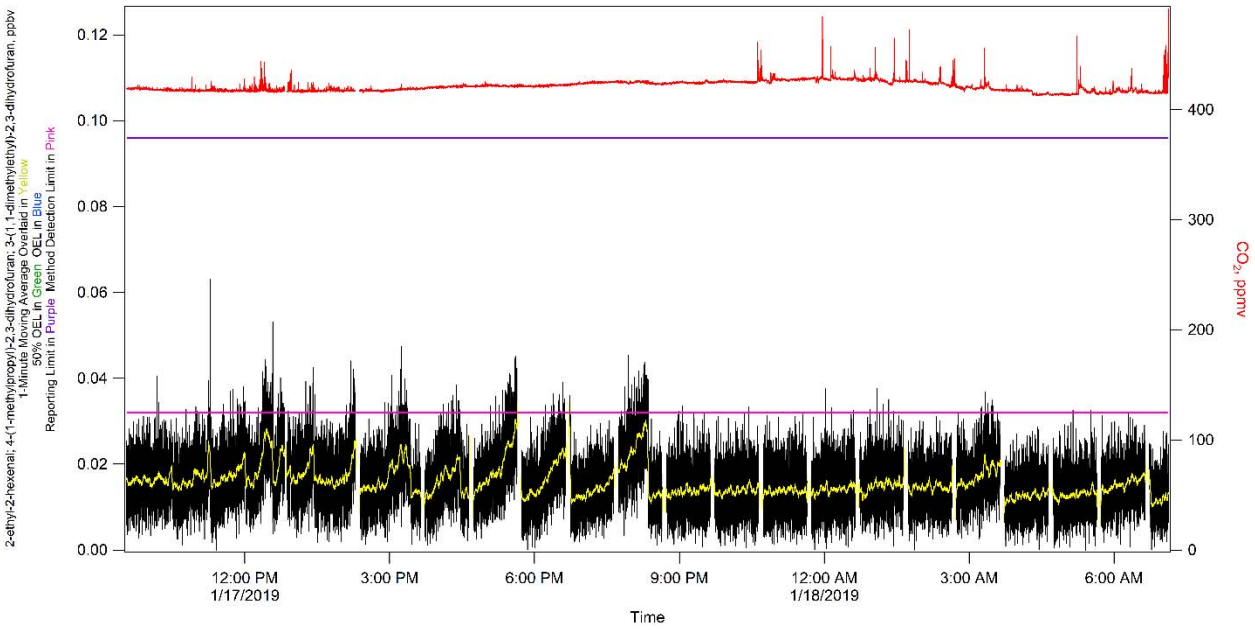

Figure 5-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran +3-(1-1-dimethylethyl)-2,3-dihydrofuran.

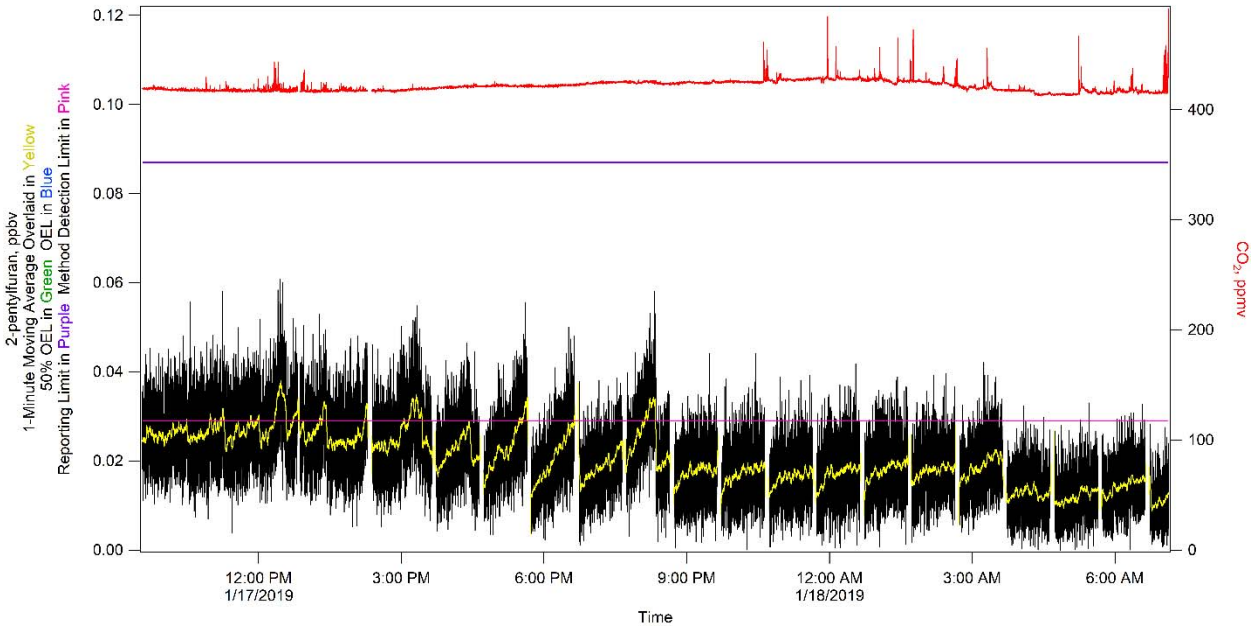

Figure 5-14. 2-pentylfuran.

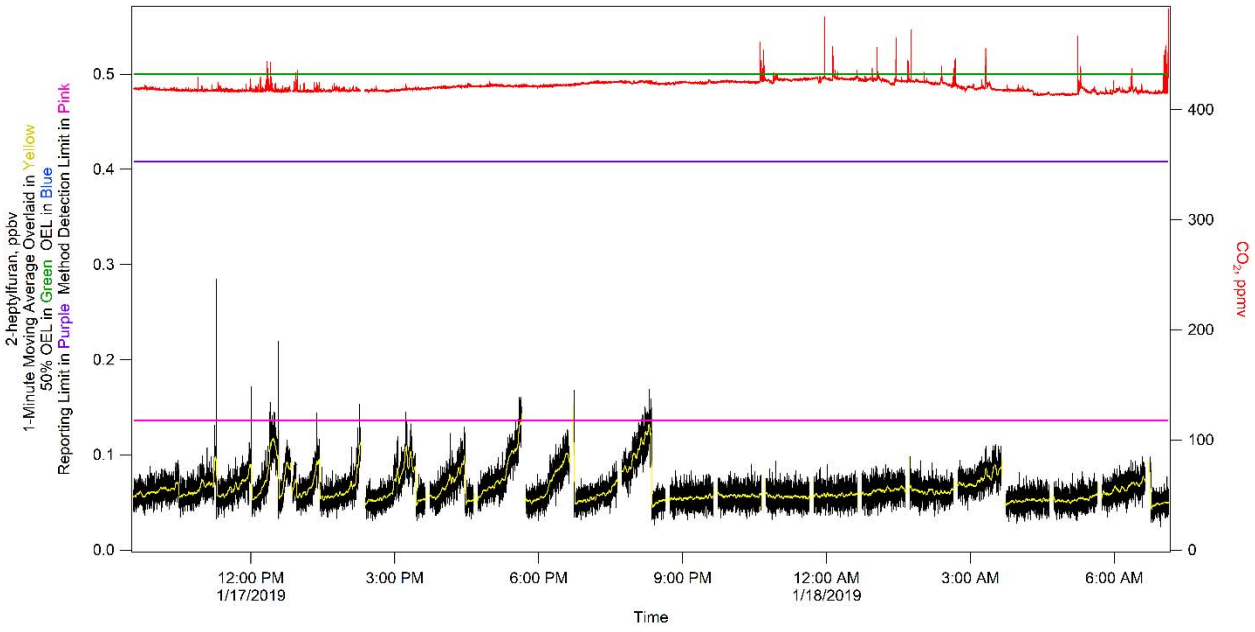

Figure 5-15. 2-heptylfuran.

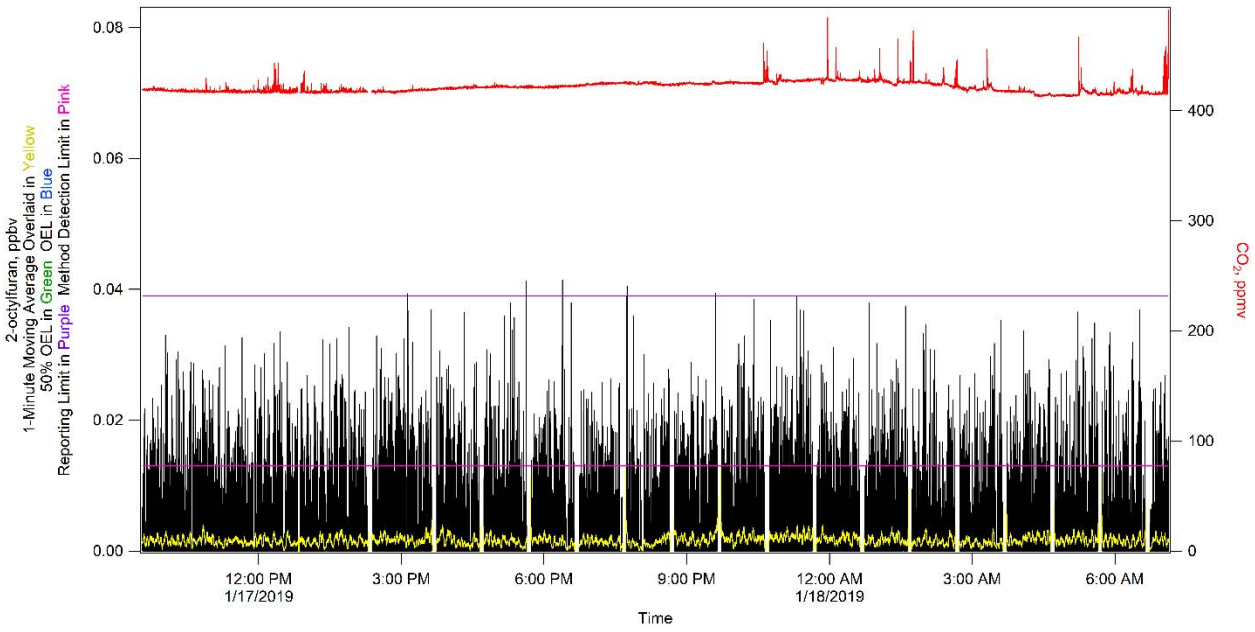

Figure 5-16. 2-octylfuran.

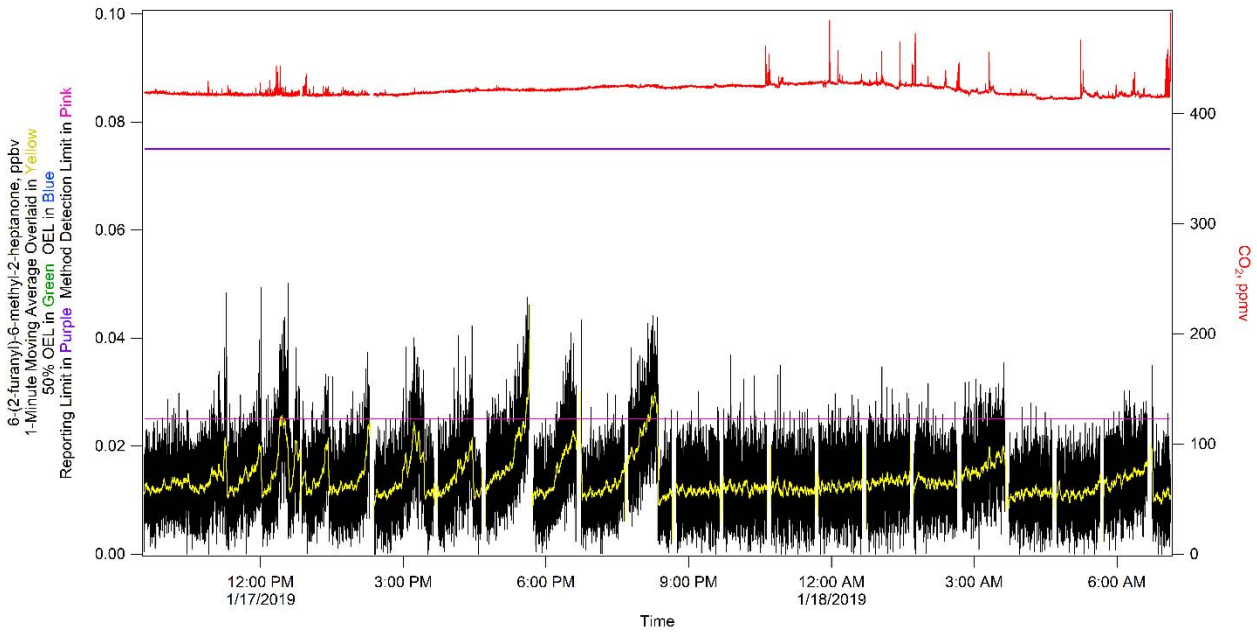

Figure 5-17. 6-(2-furanyl)-6-methyl-2-heptanone.

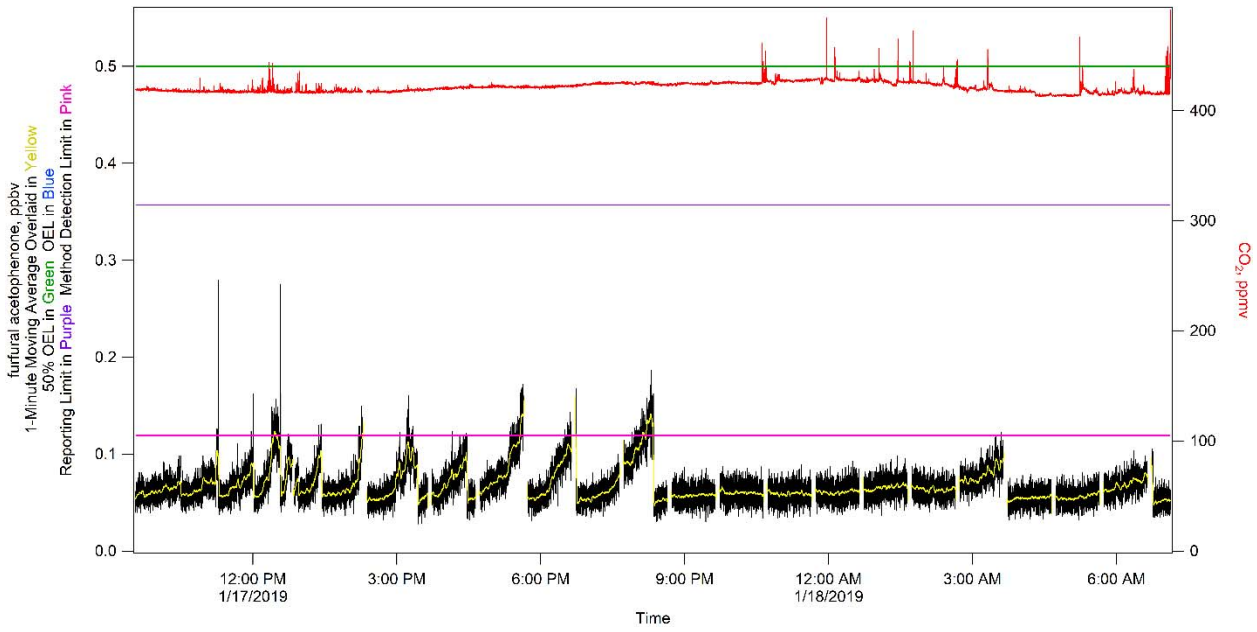

Figure 5-18. Furfural Acetophenone.

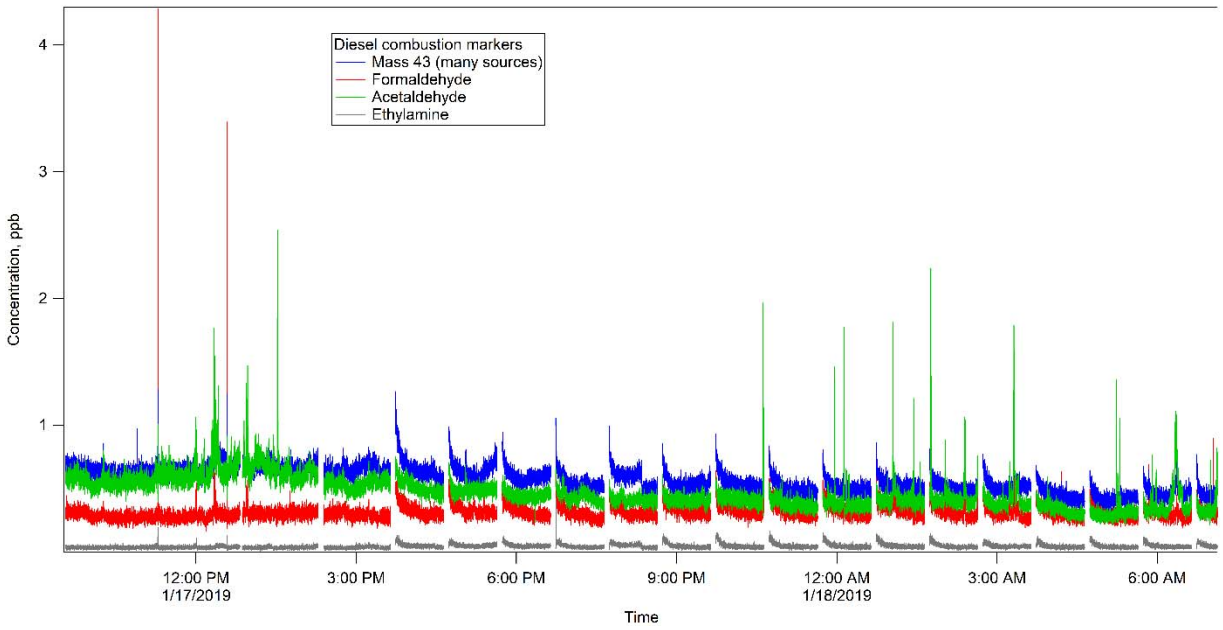

Figure 5-19. Diesel Combustion Markers.

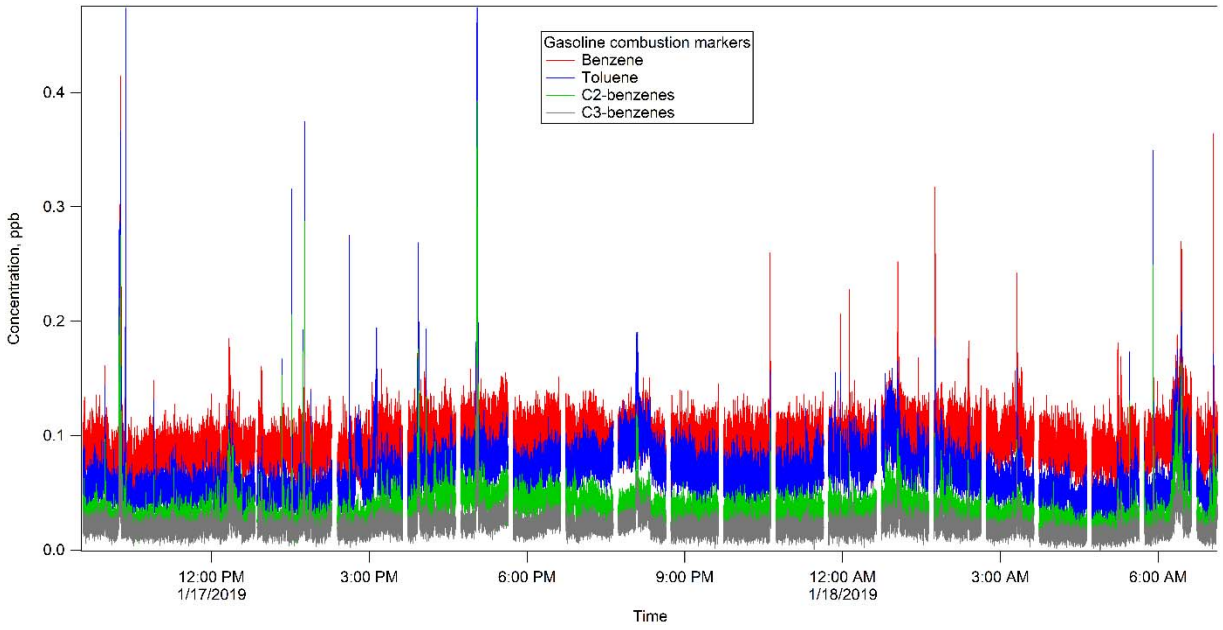

Figure 5-20. Gasoline Combustion Markers.

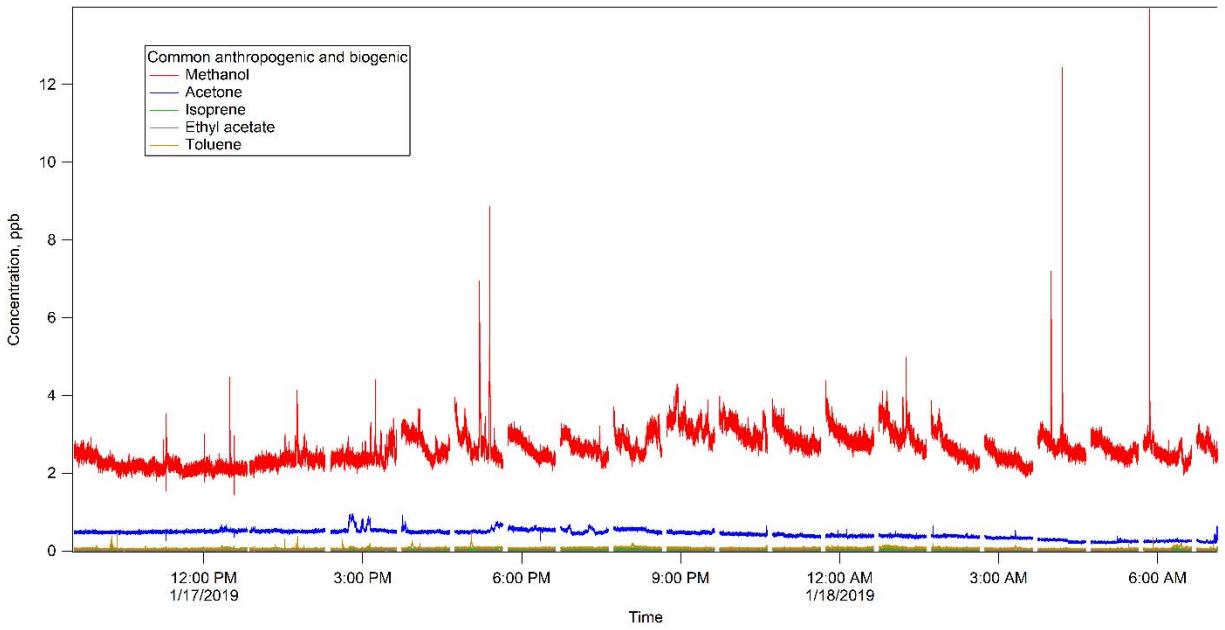

Figure 5-21. Plant and Human Markers.

6.0 JANUARY 18, 2019 – JANUARY 19, 2019 – STUDY SITE #5

6.1 Quality Assessment

Data from January 18, 2019, were assessed using Procedure 17124-DOE-HS-102. A Data Acceptance 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 from January 18, 2019, to January 19, 2019, at study Site 5. Site 5 is located southeast of the Waste Treatment Plant (Figure 6-1). 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 Plant begins operation. The ML arrived at Site 5 at 07:28 on January 18, 2019. The QA/QC zero-air/span checks were performed on the LI-COR CO_2 monitor, the Picarro NH_3 analyzer, and the PTR-MS beginning at 07:18. Collection of confirmatory sorbent samples began at 08:29.

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

The ML staff returned to Site 5 at 06:47 on January 19, 2019. At 06:50, the confirmatory sorbent samples were disconnected from the sampling station. The ML moved to Site 6 by 08:10.

Figure 6-2 provides meteorological information obtained from the ML mounted weather station for the time period of sampling at Site 5. Wind direction was initially from the south then migrated to become from a west-northwest direction at speeds between 0-6 miles per hour. Temperatures ranged between 39-52 degrees Fahrenheit with pressure steadily declining while at Site 5.

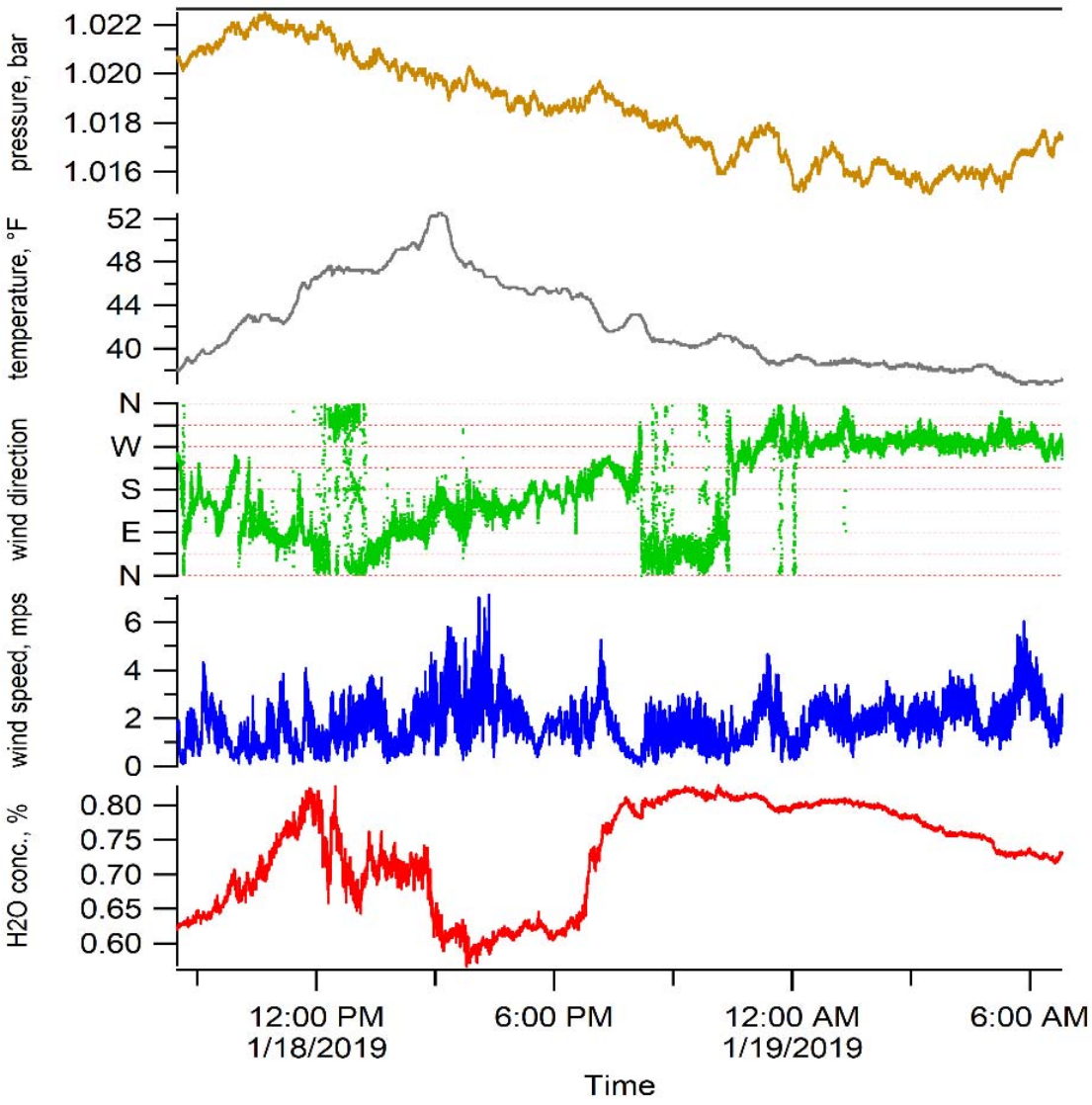

Figure 6-2. Weather Data.

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 on alternative media sources as shown in Table 6-1.

Table 6-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
5	01/18/2019	Thermosorb/N	EL33217	08:29	11:29	180
5	01/18/2019	Carbotrap-300	A060116	08:29	14:29	360
5	01/18/2019	LpDNPH	190118-A	08:29	11:29	180

Table 6-2 displays the statistical information for the monitoring period of January 18, 2019, to January 19, 2019.

Table 6-2. Statistical Information for the Monitoring Period of January 18, 2019 – January 19, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	ammonia	25000	0.010	7.210	2.817	39.071	18.289	5.824
2	formaldehyde	300	1.302	<1.302	N/A	N/A	15.062	<1.302
3	methanol	200000	1.839	2.383†	3.291	138.137	441.944	2.307
4	acetonitrile	20000	0.070	<0.070	N/A	N/A	2.439	<0.070
5	acetaldehyde	25000	2.070	<2.070	N/A	N/A	3.309	<2.070
6	ethylamine	5000	0.055	<0.055	N/A	N/A	0.284	<0.055
7	1,3-butadiene	1000	0.122	<0.122	N/A	N/A	0.510	<0.122
8	propanenitrile	6000	0.121	<0.121	N/A	N/A	0.189	<0.121
9	2-propenal	100	0.314	<0.314	N/A	N/A	0.936	<0.314
10	1-butanol + butenes	20000	0.149	<0.149	N/A	N/A	1.545	<0.149
11	methyl isocyanate	20	0.061	<0.061	N/A	N/A	0.133	<0.061
12	methyl nitrite	100	0.117	<0.117	N/A	N/A	0.499	<0.117
13	furan	1	0.053	<0.053	N/A	N/A	0.107	<0.053
14	butanenitrile	8000	0.040	<0.040	N/A	N/A	0.097	<0.040
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.034	<0.034	N/A	N/A	N/A*	N/A*
16	butanal	25000	0.063	<0.063	N/A	N/A	1.819	<0.063
17	NDMA**	0.3	0.020	<0.020	N/A	N/A	0.065	<0.020
18	benzene	500	0.230	<0.230	N/A	N/A	2.305	<0.230
19	2,4-pentadienenitrile + pyridine	300	0.084	<0.084	N/A	N/A	0.209	<0.084
20	2-methylene butanenitrile	300	0.050	<0.050	N/A	N/A	0.167	<0.050
21	2-methylfuran	1	0.046	<0.046	N/A	N/A	0.150	<0.046
22	pentanenitrile	6000	0.029	<0.029	N/A	N/A	0.090	<0.029
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.048	<0.048	N/A	N/A	0.181	<0.048
24	NEMA**	0.3	0.027	<0.027	N/A	N/A	0.071	<0.027
25	2,5-dimethylfuran	1	0.035	<0.035	N/A	N/A	0.112	<0.035
26	hexanenitrile	6000	0.029	<0.029	N/A	N/A	0.079	<0.029
27	2-hexanone (MBK)	5000	0.030	<0.030	N/A	N/A	0.264	<0.030
28	NDEA**	0.1	0.023	<0.023	N/A	N/A	0.071	<0.023
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.106	<0.106	N/A	N/A	0.231	<0.106
30	2,4-dimethylpyridine	500	0.031	<0.031	N/A	N/A	0.288	<0.031
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.035	<0.035	N/A	N/A	0.080	<0.035
32	heptanenitrile	6000	0.029	<0.029	N/A	N/A	0.078	<0.029

Table 6-2. Statistical Information for the Monitoring Period of January 18, 2019 – January 19, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
33	4-methyl-2-hexanone	500	0.032	<0.032	N/A	N/A	0.273	<0.032
34	NMOR**	0.6	0.017	<0.017	N/A	N/A	0.118	<0.017
35	butyl nitrate	2500	0.019	<0.019	N/A	N/A	0.067	<0.019
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.032	<0.032	N/A	N/A	0.082	<0.032
37	6-methyl-2-heptanone	8000	0.028	<0.028	N/A	N/A	0.075	<0.028
38	2-pentylfuran	1	0.029	<0.029	N/A	N/A	0.077	<0.029
39	biphenyl	200	0.031	<0.031	N/A	N/A	0.076	<0.031
40	2-heptylfuran	1	0.136	<0.136	N/A	N/A	0.305	<0.136
41	1,4-butanediol dinitrate	50	0.184	<0.184	N/A	N/A	0.115	<0.184
42	2-octylfuran	1	0.013	<0.013	N/A	N/A	0.049	<0.013
43	1,2,3-propanetriol 1,3-dinitrate	50	0.132	<0.132	N/A	N/A	0.048	<0.132
44	PCB	1000	0.139	<0.139	N/A	N/A	0.140	<0.139
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.025	<0.025	N/A	N/A	0.083	<0.025
46	furfural acetophenone	1	0.119	<0.119	N/A	N/A	0.353	<0.119
N/A*	The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.243 ppb and the median value was <0.034 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.].							
ND	COPC Averages below the MDL.							
†	COPC Averages between the RL and the MDL.							
	COPC Averages >100% of the OEL.							
	COPC Averages 50-100% of the OEL.							
	COPC Averages 10-50% of the OEL.							

Figure 6-3 through Figure 6-21 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 January 18, 2019, to January 19, 2019. 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.

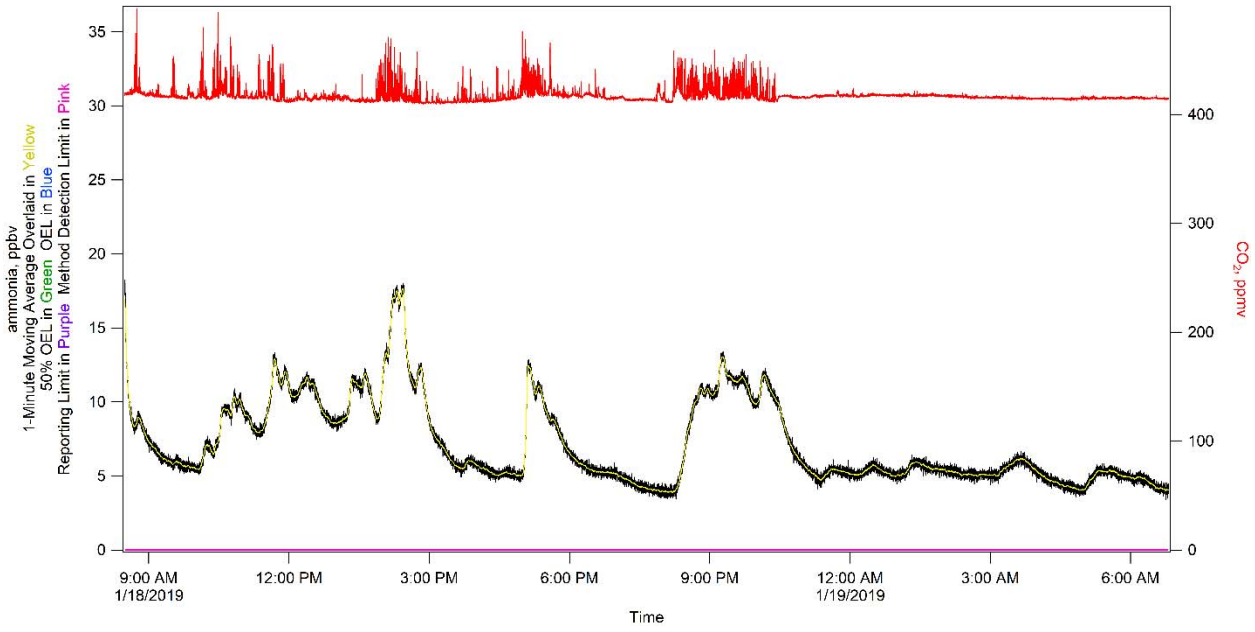

Figure 6-3. Ammonia.

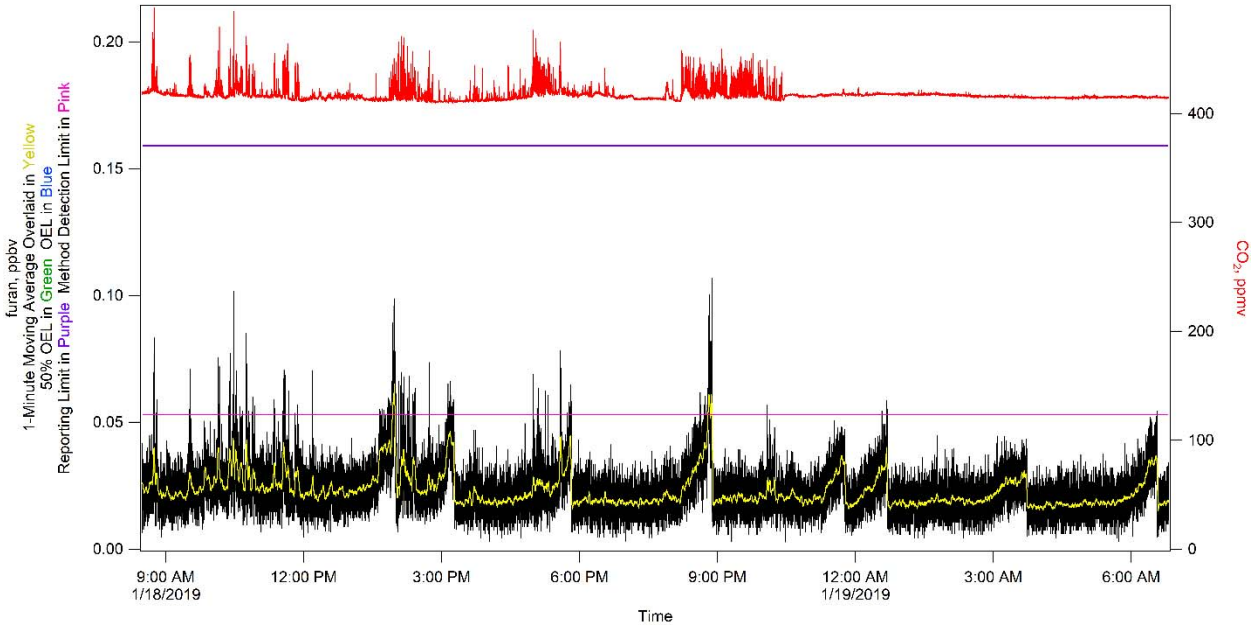

Figure 6-4. Furan.

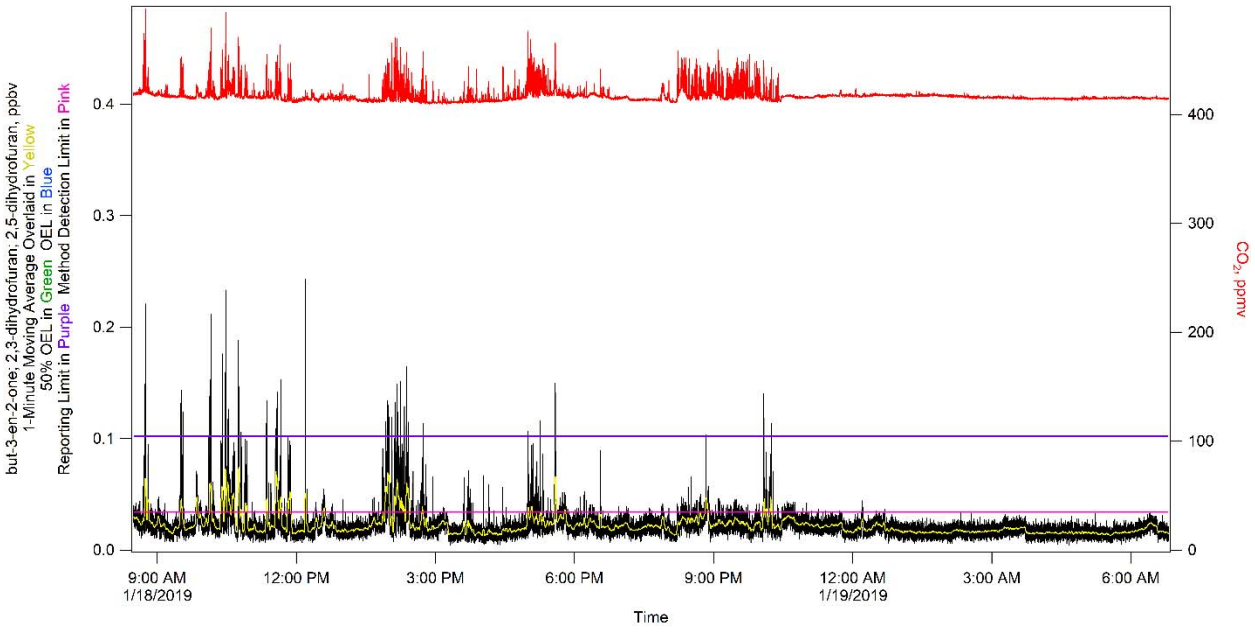

Figure 6-5. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

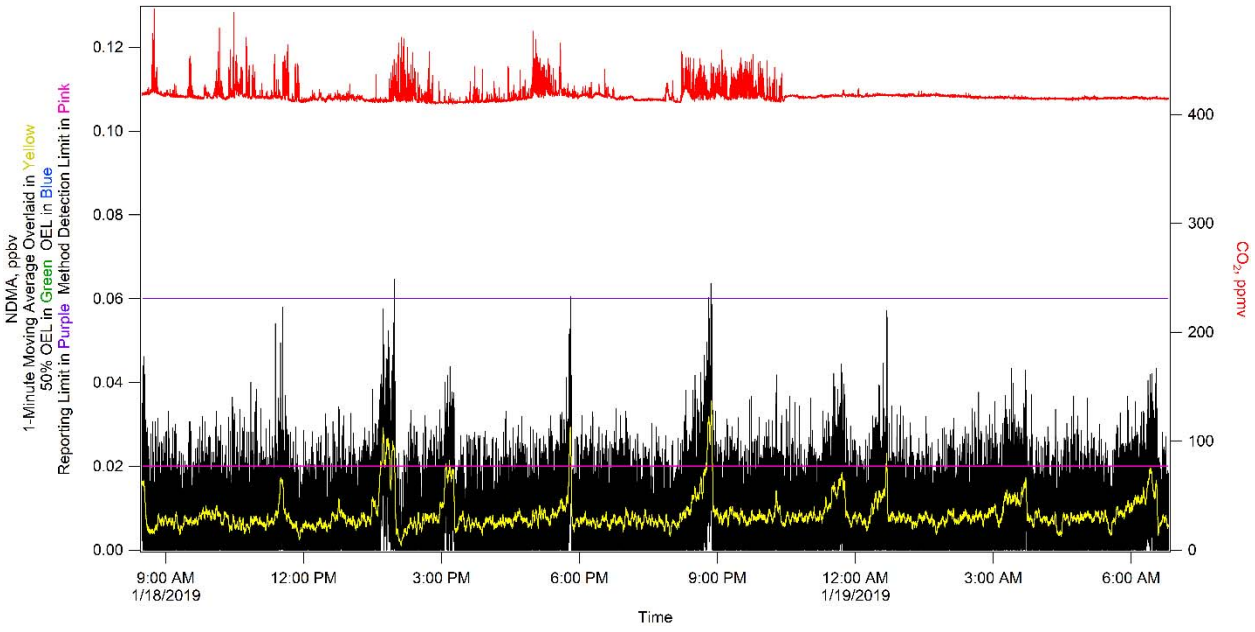

Figure 6-6. N-nitrosodimethylamine (NDMA).

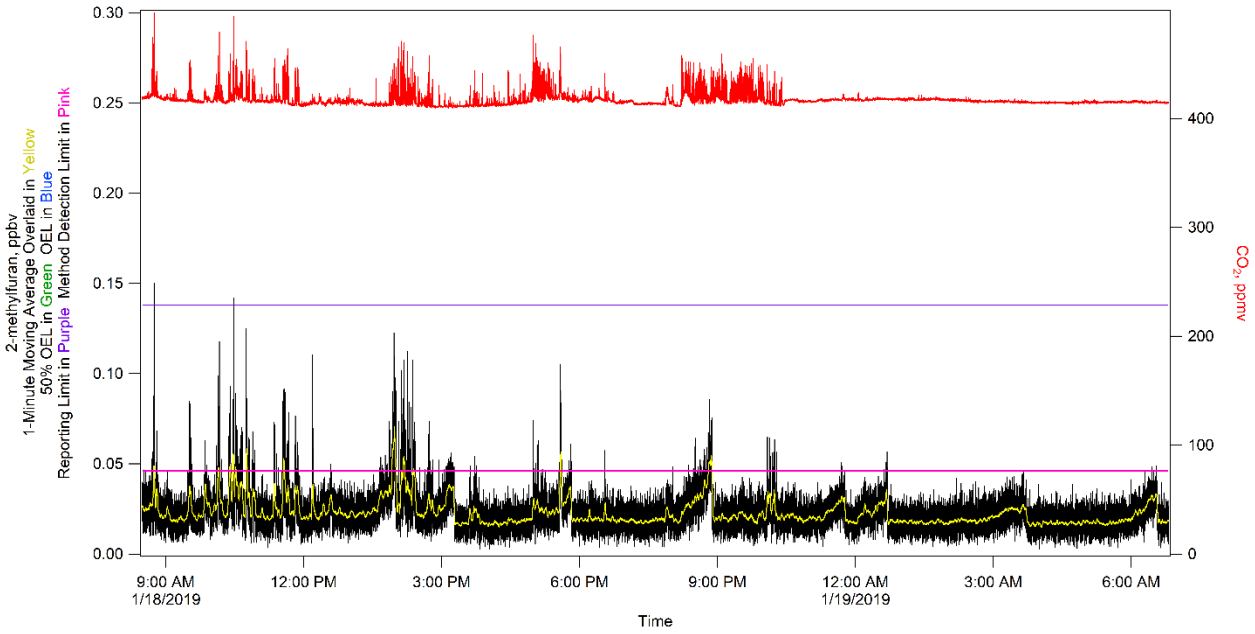

Figure 6-7. 2-methylfuran.

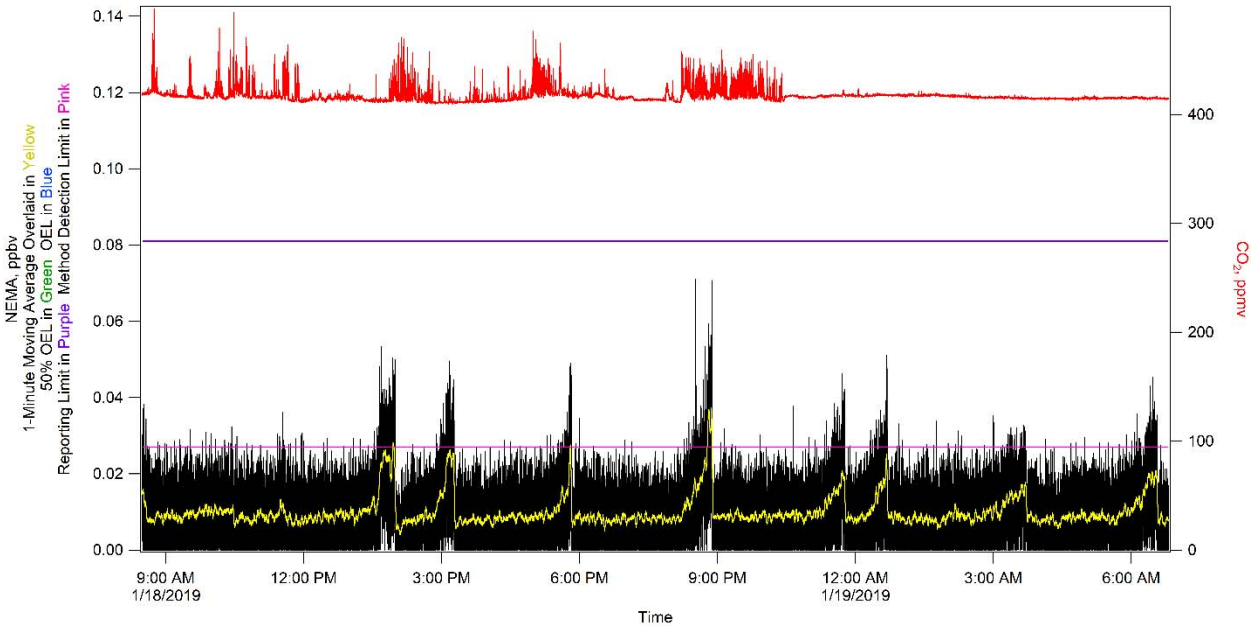

Figure 6-8. N-nitrosomethylethylamine (NEMA).

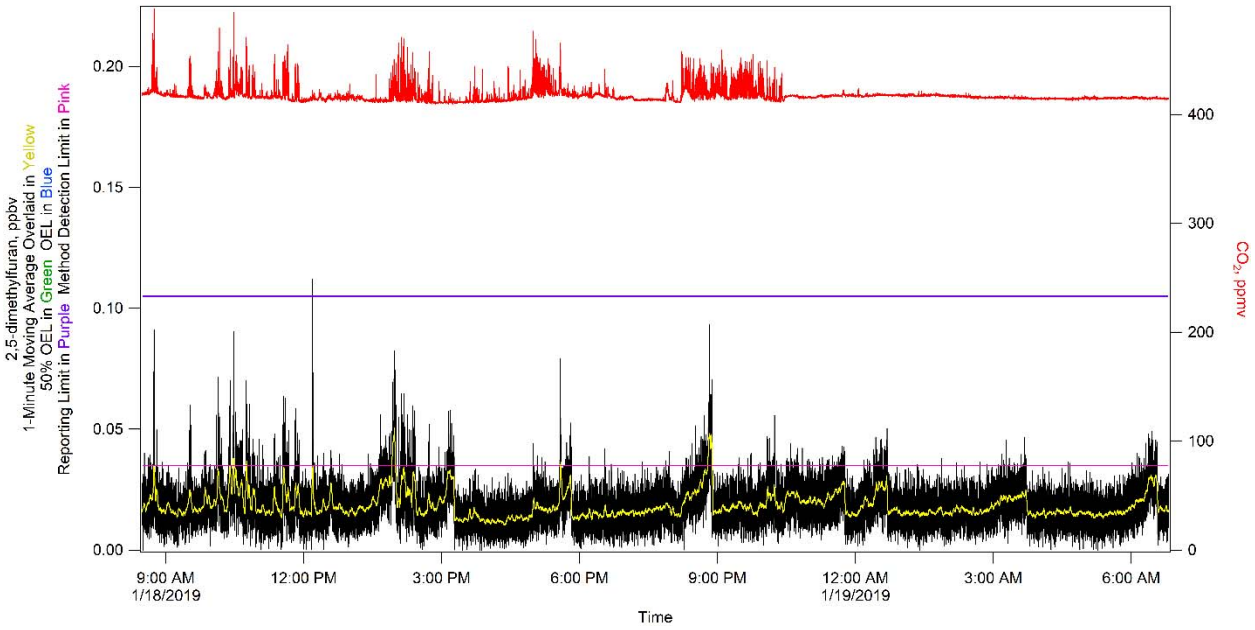

Figure 6-9. 2,5-dimethylfuran.

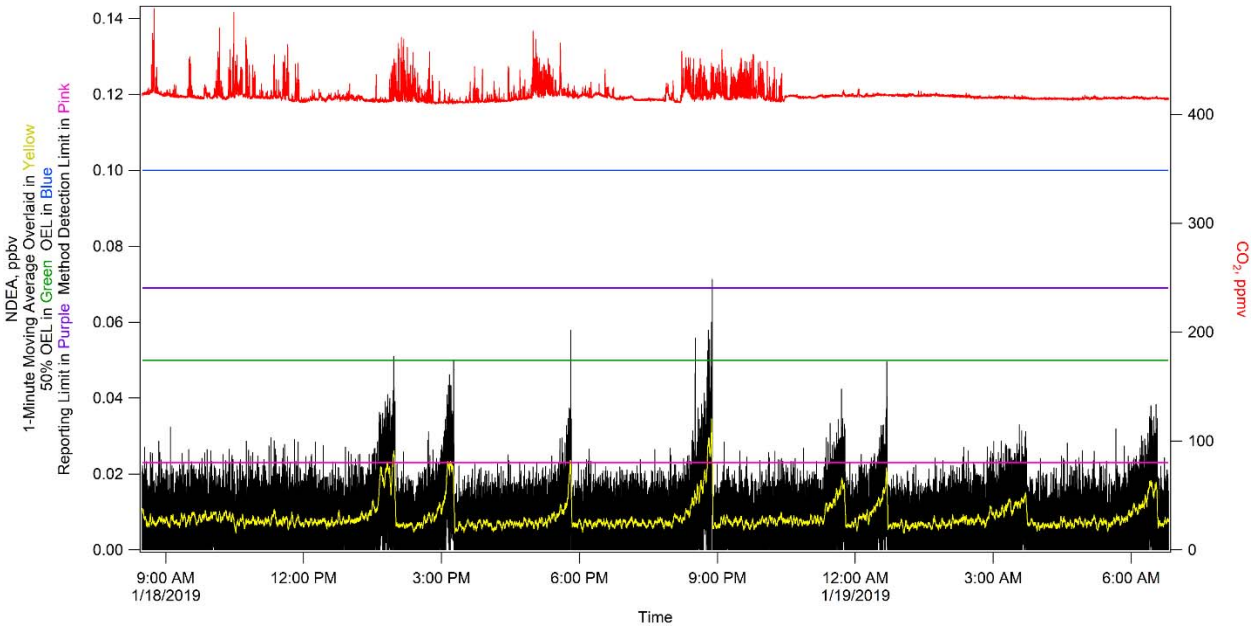

Figure 6-10. N-nitrosodiethylamine (NDEA).

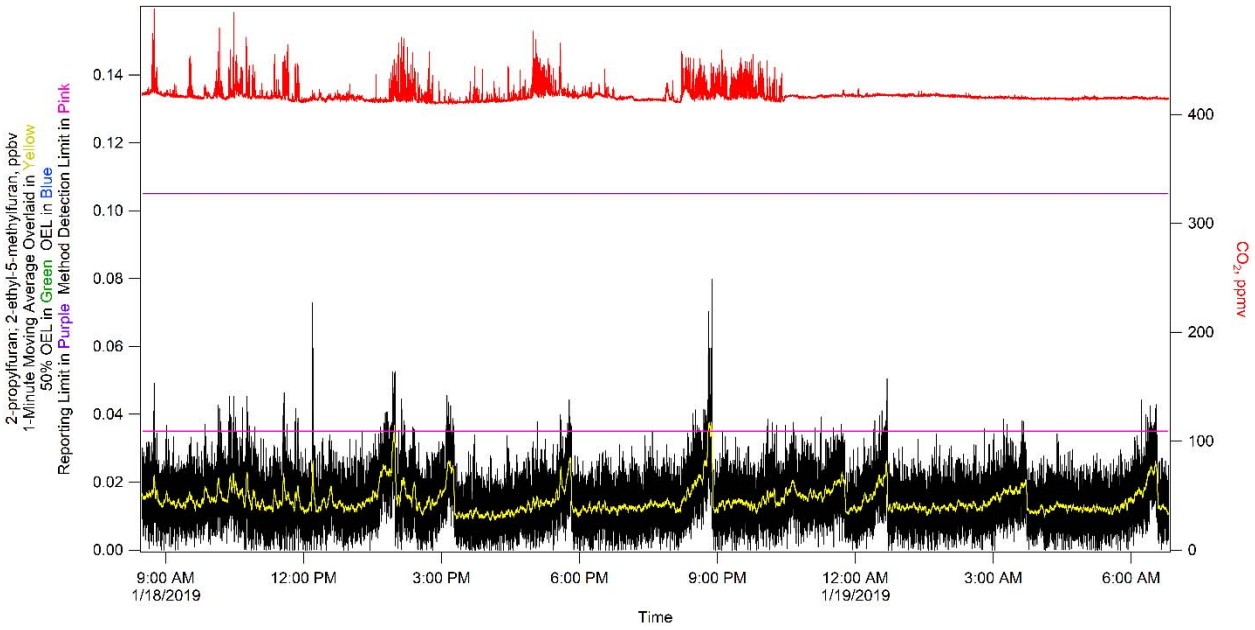

Figure 6-11. 2-propylfuran + 2-ethyl-5-methylfuran.

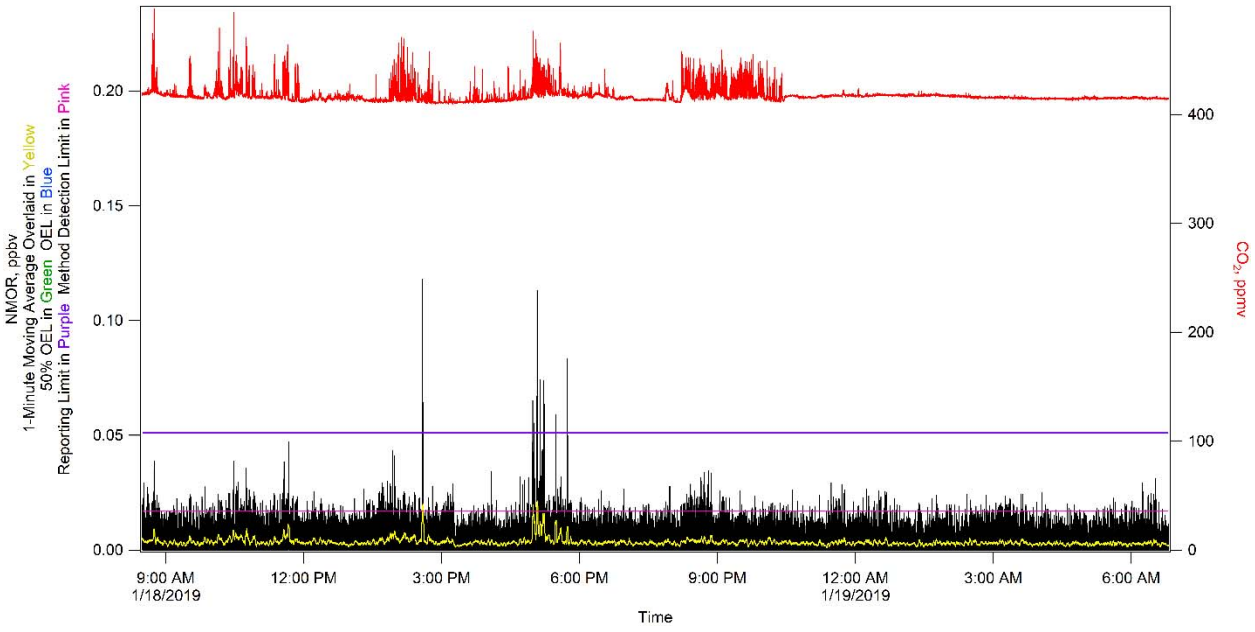

Figure 6-12. N-nitrosomorpholine (NMOR).

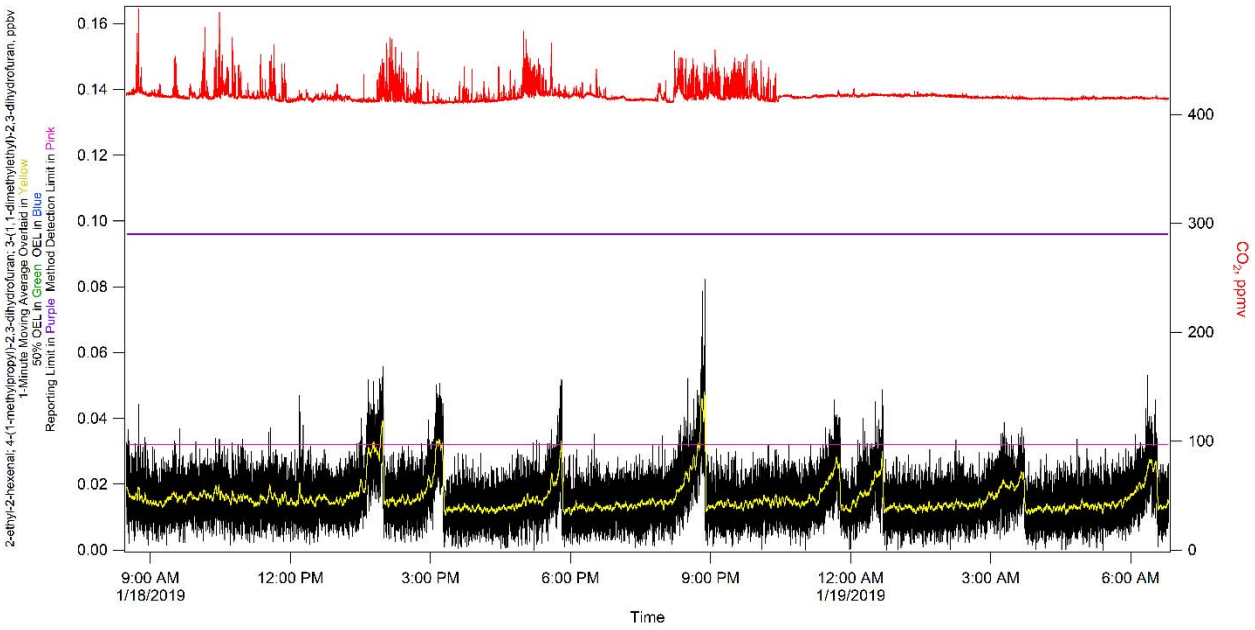

Figure 6-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran +3-(1-1-dimethylethyl)-2,3-dihydrofuran.

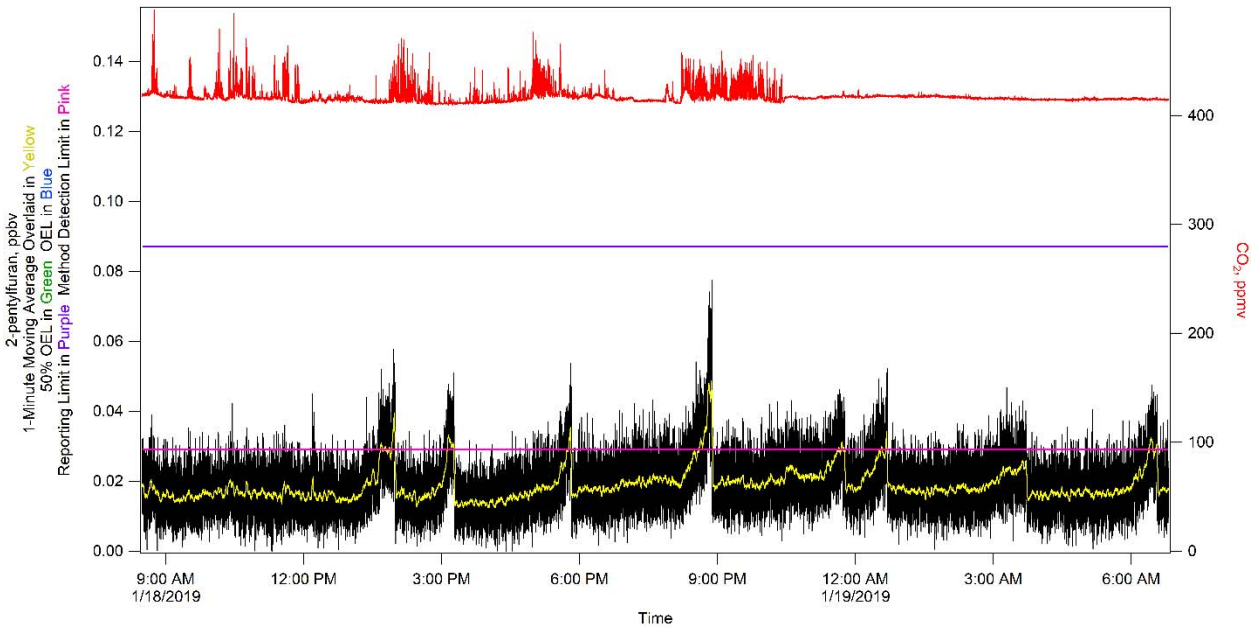

Figure 6-14. 2-pentylfuran.

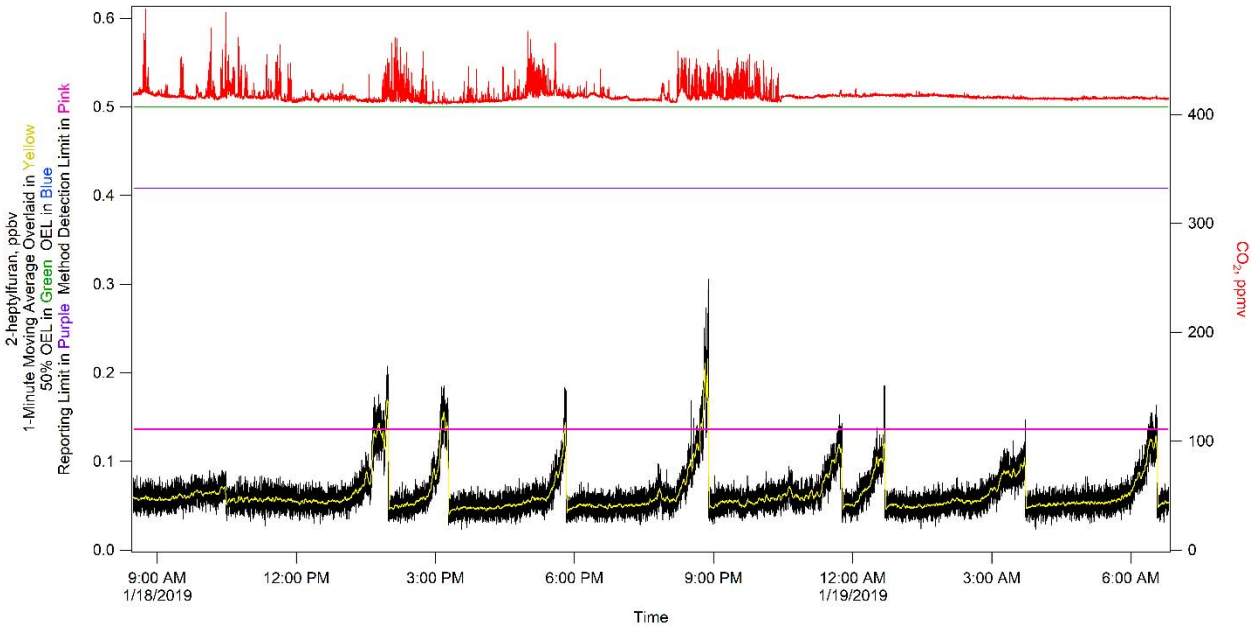

Figure 6-15. 2-heptylfuran.

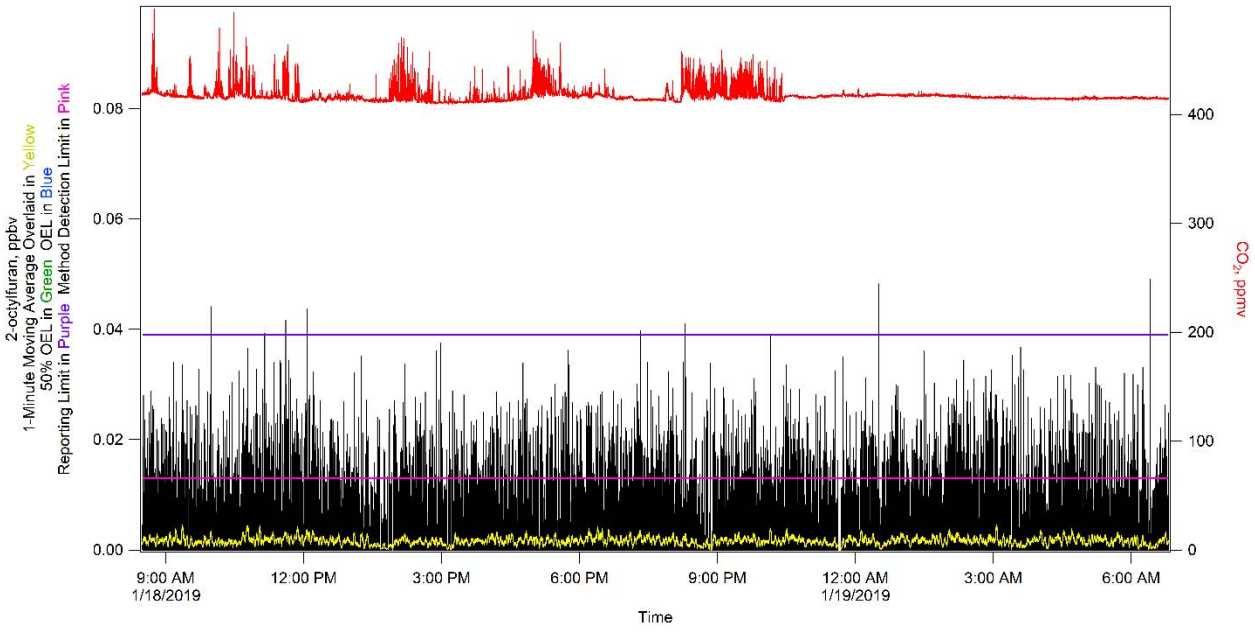

Figure 6-16. 2-octylfuran.

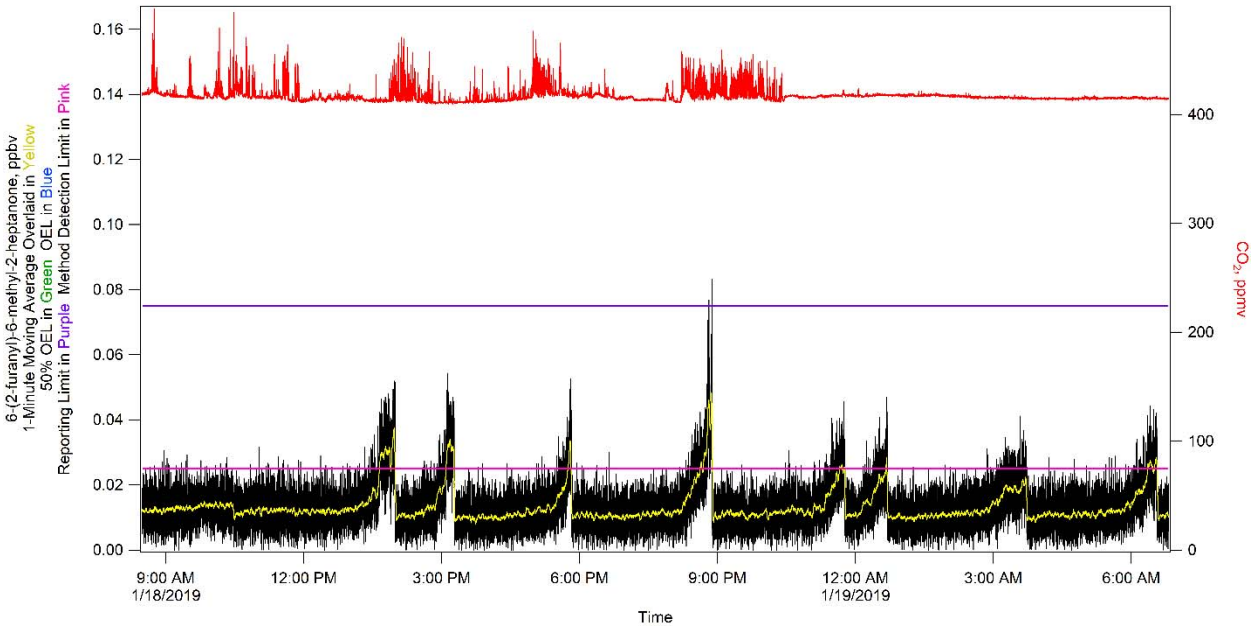

Figure 6-17. 6-(2-furanyl)-6-methyl-2-heptanone.

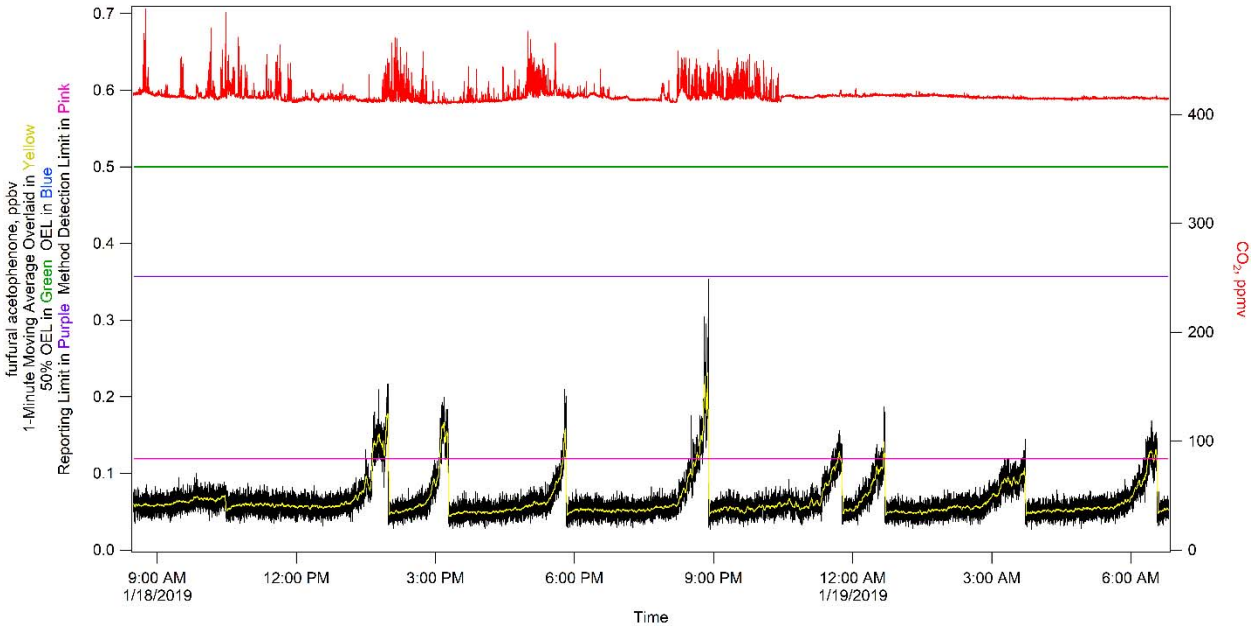

Figure 6-18. Furfural Acetophenone.

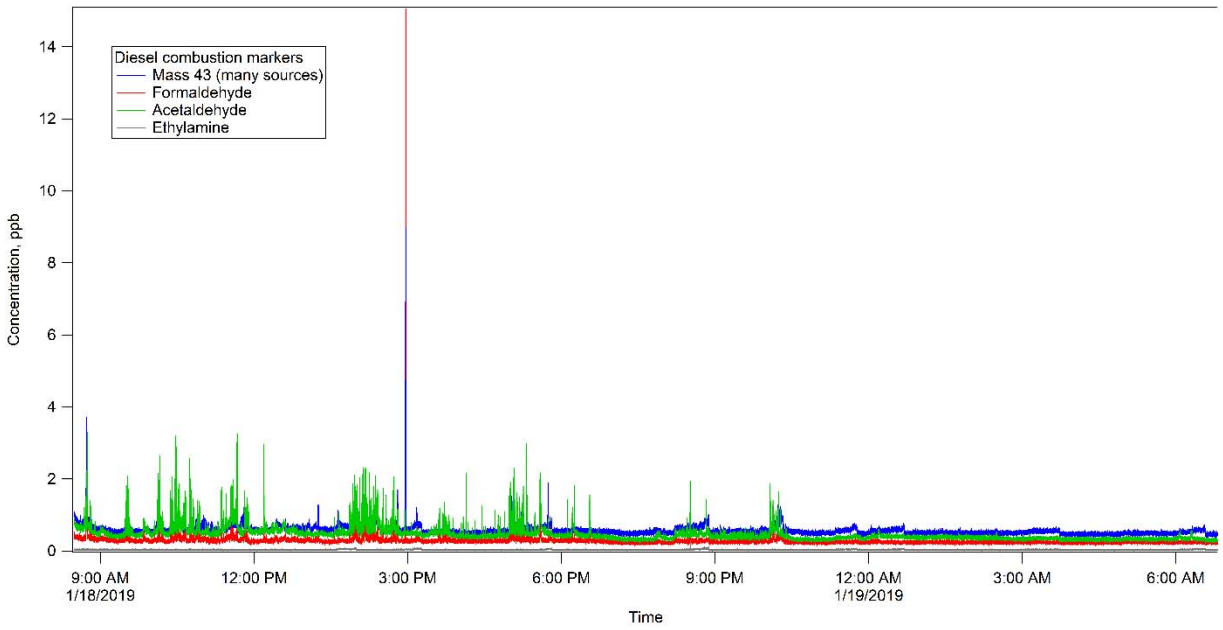

Figure 6-19. Diesel Combustion Markers.

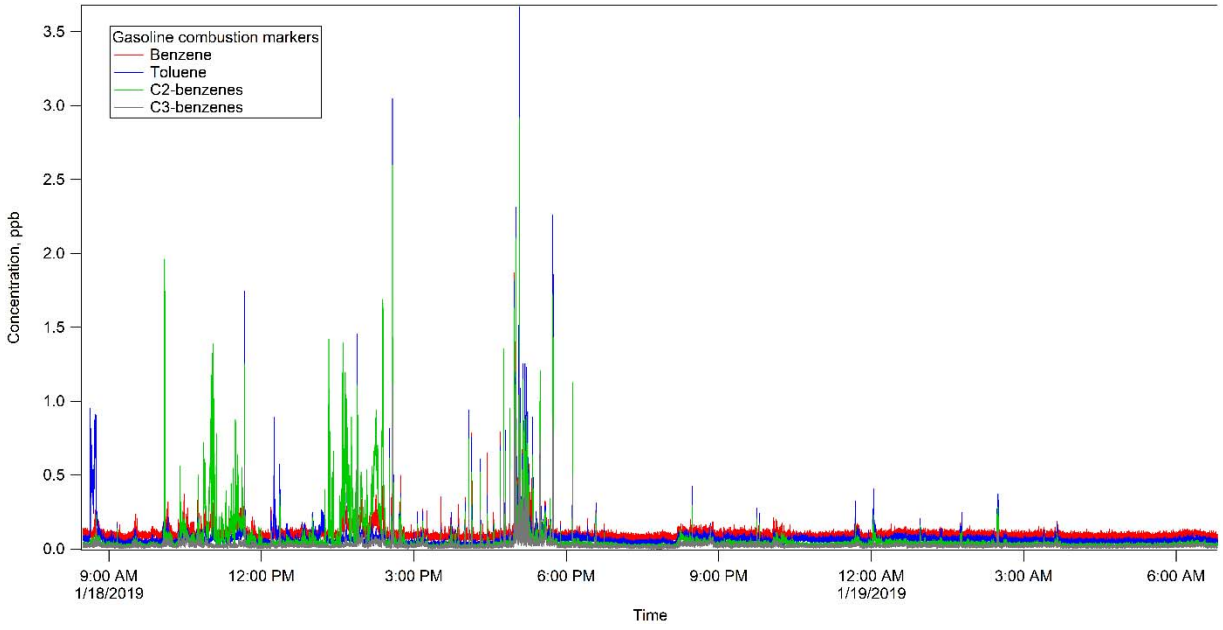

Figure 6-20. Gasoline Combustion Markers.

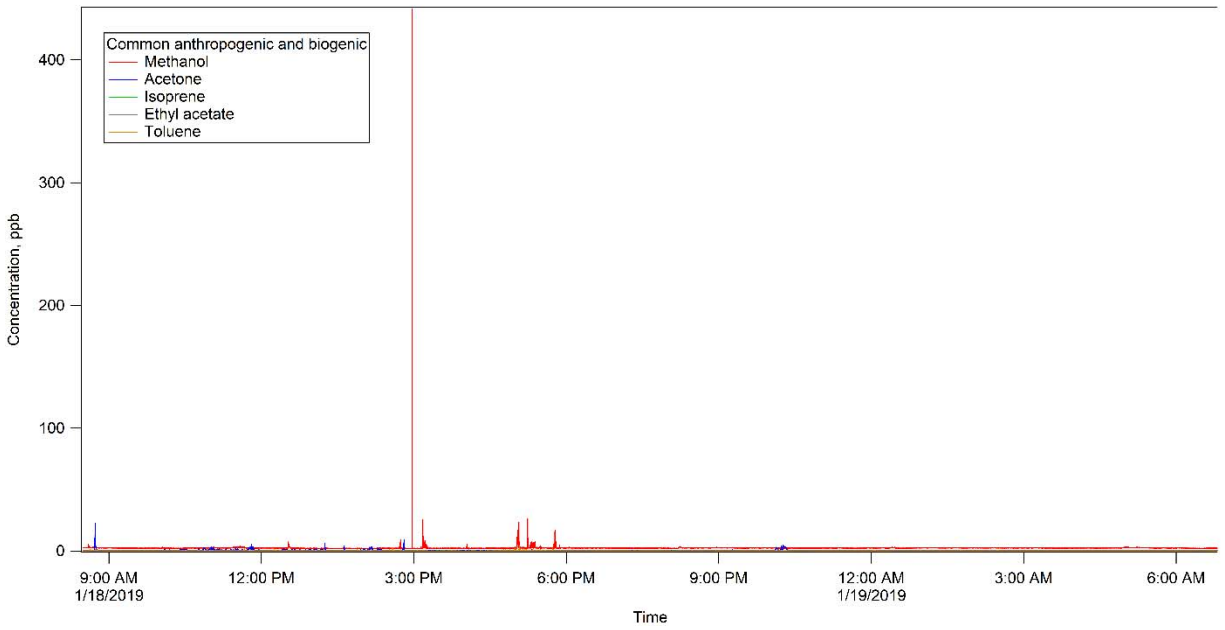

Figure 6-21. Plant and Human Markers.

7.0 JANUARY 19, 2019 – JANUARY 20, 2019 – STUDY SITE #6

7.1 Quality Assessment

Data from January 19, 2019, were assessed using Procedure 17124-DOE-HS-102. A Data Acceptance 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 from January 19, 2019, to January 20, 2019, at study Site 6. Site 6 is located near the intersection of US Highway 395 and Clearwater Avenue in Kennewick, WA (Figure 7-1). 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 08:10 on January 19, 2019. The QA/QC zero-air/span checks were performed on the LI-COR CO_2 monitor, the Picarro NH_3 analyzer, and the PTR-MS beginning at 07:03. Confirmatory sorbent samples were not collected during this monitoring period. The ML staff departed at 12:50. The SME performed a remote start of NO^+ automation mode at 23:49.

Figure 7-1. Mobile Laboratory Site #6 for the Duration of the Monitoring Period.

The ML staff returned to Site 6 at 06:06 on January 20, 2019. The ML moved to Site 1 by 07:26.

Figure 7-2 provides meteorological information obtained from the ML mounted weather station for the time period of sampling at Site 6. Wind direction was out of the south and west at speeds between 0-6 miles per hour. Temperatures ranged between 35-52 degrees Fahrenheit with pressure holding steady for the majority of the monitoring period with decreasing pressure during the final six hours at Site 6.

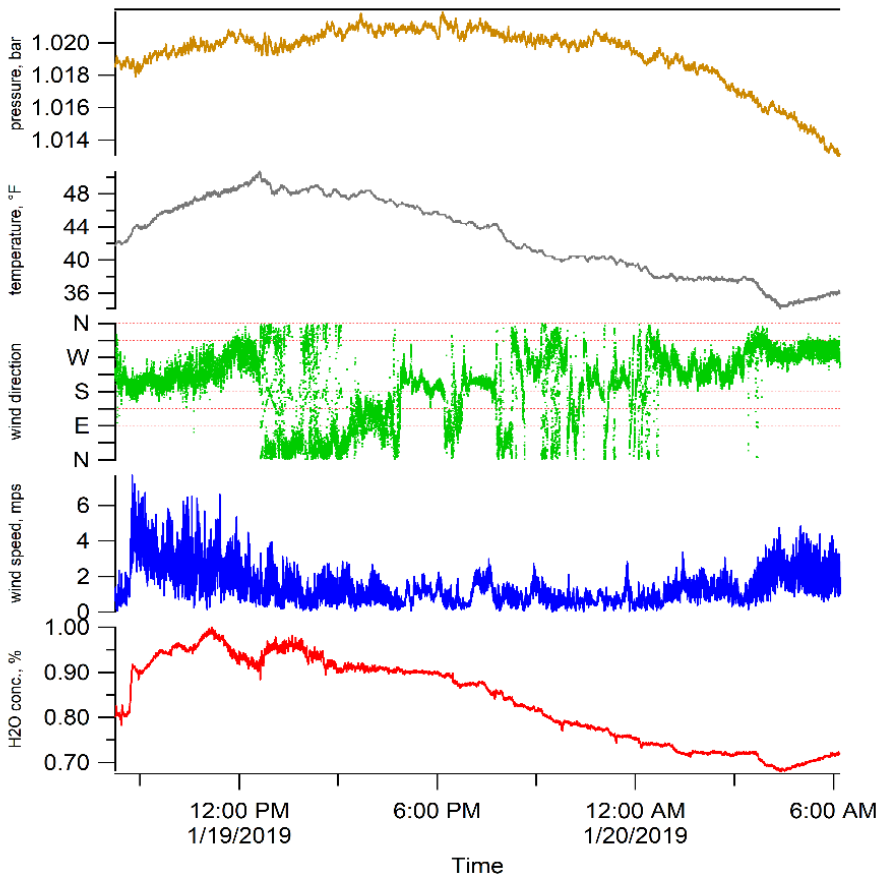

Figure 7-2. Weather Data.

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 not collected during this period. Table 7-1 displays the statistical information for the monitoring period of January 19, 2019, to January 20, 2019.

Table 7-1. Statistical Information for the Monitoring Period of January 19, 2019 – January 20, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	ammonia	25000	0.010	13.705	4.734	34.540	26.888	14.550
2	formaldehyde	300	1.302	<1.302	N/A	N/A	2.810	<1.302
3	methanol	200000	1.839	3.691†	2.526	68.442	101.029	3.362
4	acetonitrile	20000	0.070	<0.070	N/A	N/A	0.800	<0.070
5	acetaldehyde	25000	2.070	<2.070	N/A	N/A	22.739	<2.070
6	ethylamine	5000	0.055	<0.055	N/A	N/A	0.169	<0.055
7	1,3-butadiene	1000	0.122	<0.122	N/A	N/A	5.707	<0.122
8	propanenitrile	6000	0.121	<0.121	N/A	N/A	2.178	<0.121
9	2-propenal	100	0.314	<0.314	N/A	N/A	3.419	<0.314
10	1-butanol + butenes	20000	0.149	0.218†	0.325	148.931	22.676	0.173
11	methyl isocyanate	20	0.061	<0.061	N/A	N/A	0.235	<0.061
12	methyl nitrite	100	0.117	0.135†	0.118	87.397	2.332	0.120
13	furan	1	0.053	0.070†	0.041	58.031	0.308	0.061
14	butanenitrile	8000	0.040	<0.040	N/A	N/A	1.115	<0.040
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.034	0.043†	0.028	65.754	N/A*	N/A*
16	butanal	25000	0.063	0.091†	0.040	44.176	0.563	0.087
17	NDMA**	0.3	0.020	<0.020	N/A	N/A	0.086	<0.020
18	Benzene	500	0.230	0.367†	0.362	98.561	19.099	0.304
19	2,4-pentadienenitrile + pyridine	300, 100	0.084	<0.084	N/A	N/A	1.277	<0.084
20	2-methylene butanenitrile	300	0.050	<0.050	N/A	N/A	0.156	<0.050
21	2-methylfuran	1	0.046	0.069†	0.048	69.588	0.383	0.056
22	pentanenitrile	6000	0.029	<0.029	N/A	N/A	0.383	<0.029
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.048	<0.048	N/A	N/A	0.262	<0.048
24	NEMA**	0.3	0.027	<0.027	N/A	N/A	0.091	<0.027
25	2,5-dimethylfuran	1	0.035	0.040†	0.024	60.121	0.184	0.035
26	hexanenitrile	6000	0.029	<0.029	N/A	N/A	0.150	<0.029
27	2-hexanone (MBK)	5000	0.030	<0.030	N/A	N/A	0.092	<0.030
28	NDEA**	0.1	0.023	<0.023	N/A	N/A	0.064	<0.023
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.106	<0.106	N/A	N/A	0.169	<0.106
30	2,4-dimethylpyridine	500	0.031	0.051†	0.072	141.287	5.089	0.042
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.035	<0.035	N/A	N/A	0.103	<0.035

Table 7-1. Statistical Information for the Monitoring Period of January 19, 2019 – January 20, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
32	heptanenitrile	6000	0.029	<0.029	N/A	N/A	0.087	<0.029
33	4-methyl-2-hexanone	500	0.032	<0.032	N/A	N/A	0.086	<0.032
34	NMOR**	0.6	0.017	<0.017	N/A	N/A	0.409	<0.017
35	butyl nitrate	2500	0.019	<0.019	N/A	N/A	0.056	<0.019
36	2-ethyl-2-hexenal +4-(1-methylpropyl)-2,3-dihydrofuran+3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.032	<0.032	N/A	N/A	0.095	<0.032
37	6-methyl-2-heptanone	8000	0.028	<0.028	N/A	N/A	0.081	<0.028
38	2-pentylfuran	1	0.029	<0.029	N/A	N/A	0.072	<0.029
39	biphenyl	200	0.031	<0.031	N/A	N/A	0.066	<0.031
40	2-heptylfuran	1	0.136	<0.136	N/A	N/A	0.223	<0.136
41	1,4-butanediol dinitrate	50	0.184	<0.184	N/A	N/A	0.099	<0.184
42	2-octylfuran	1	0.013	<0.013	N/A	N/A	0.051	<0.013
43	1,2,3-propanetriol 1,3-dinitrate	50	0.132	<0.132	N/A	N/A	0.054	<0.132
44	PCB	1000	0.139	<0.139	N/A	N/A	0.105	<0.139
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.025	<0.025	N/A	N/A	0.066	<0.025
46	furfural acetophenone	1	0.119	<0.119	N/A	N/A	0.240	<0.119
N/A*	The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.469 ppb and the median value was <0.034 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.].							
ND	COPC Averages below the MDL.							
†	COPC Averages between the RL and the MDL.							
	COPC Averages >100% of the OEL.							
	COPC Averages 50-100% of the OEL.							
	COPC Averages 10-50% of the OEL.							

Figure 7-3 through Figure 7-21 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 January 19, 2019, to January 20, 2019. 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.

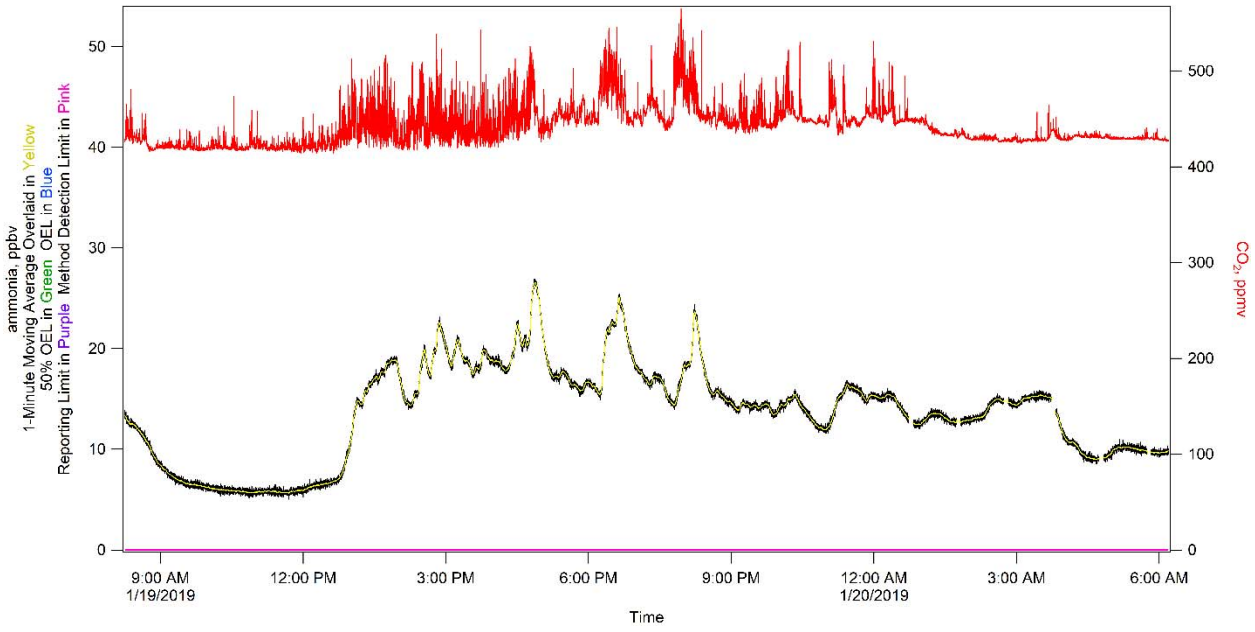

Figure 7-3. Ammonia.

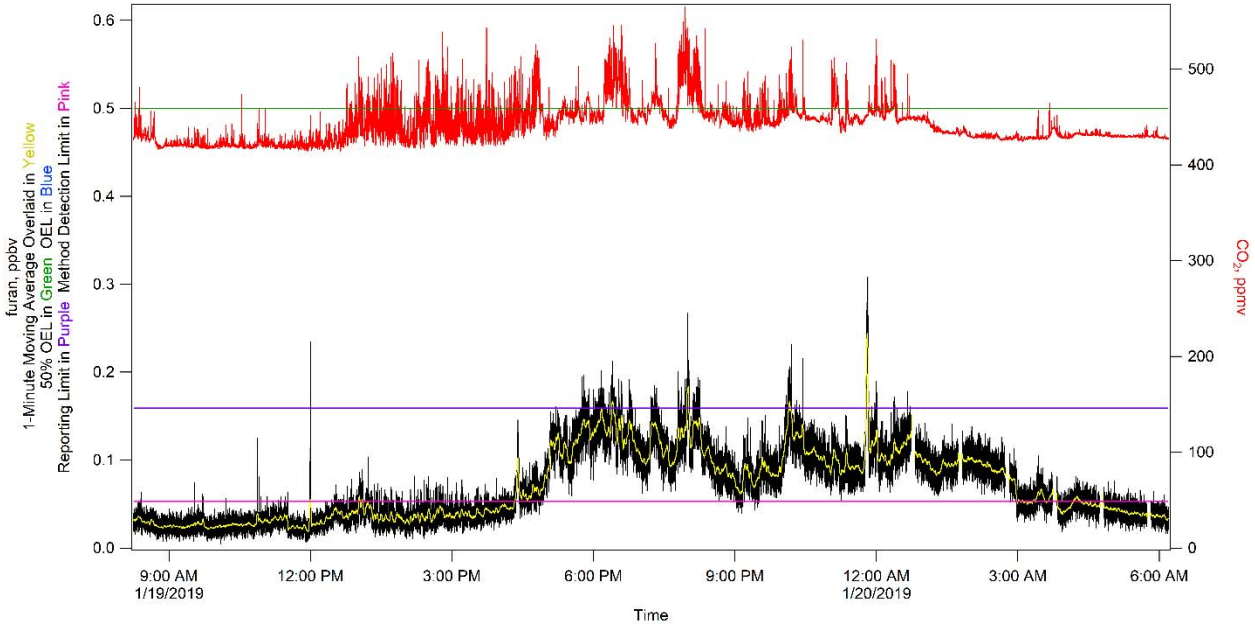

Figure 7-4. Furan.

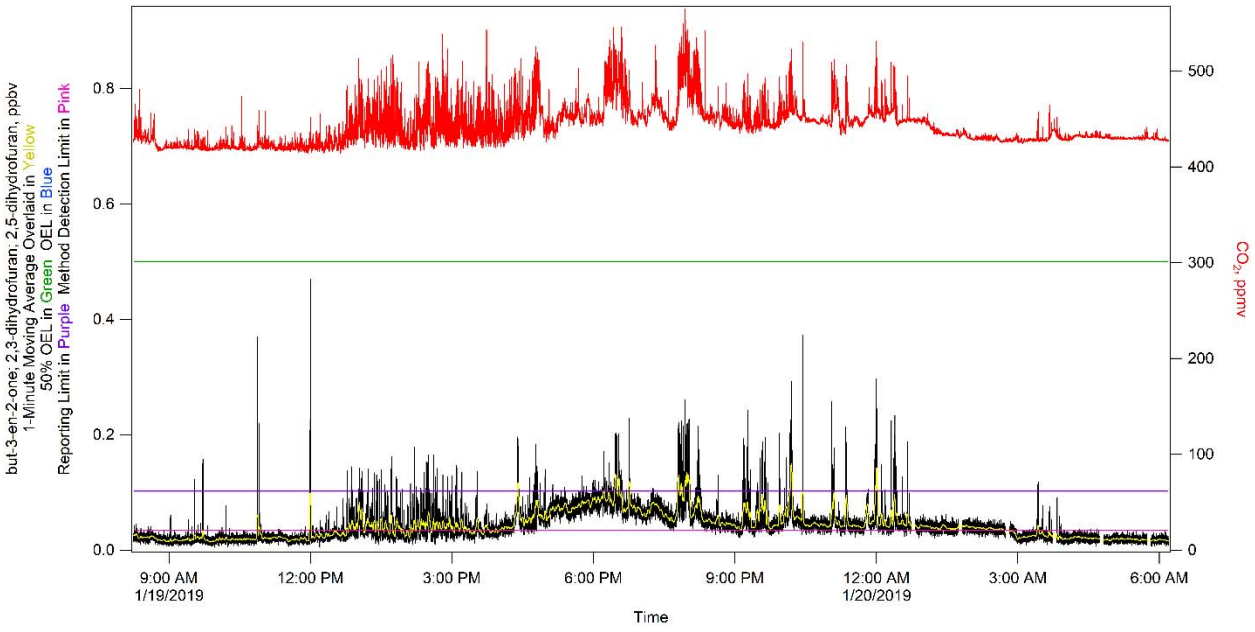

Figure 7-5. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

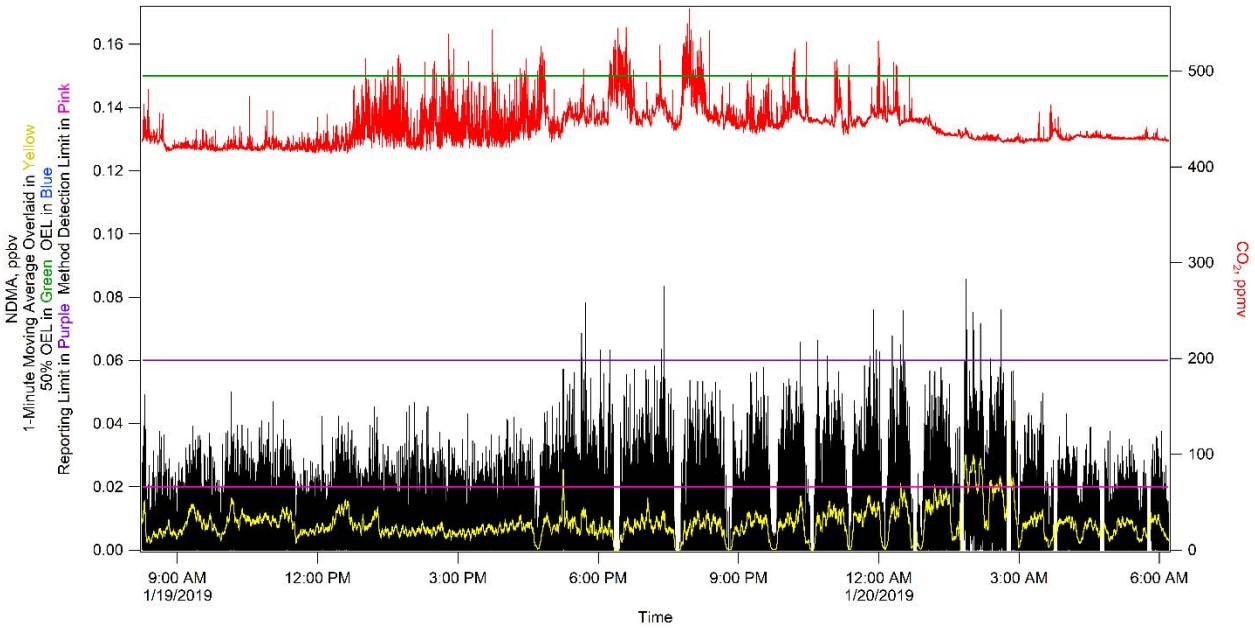

Figure 7-6. N-nitrosodimethylamine (NDMA).

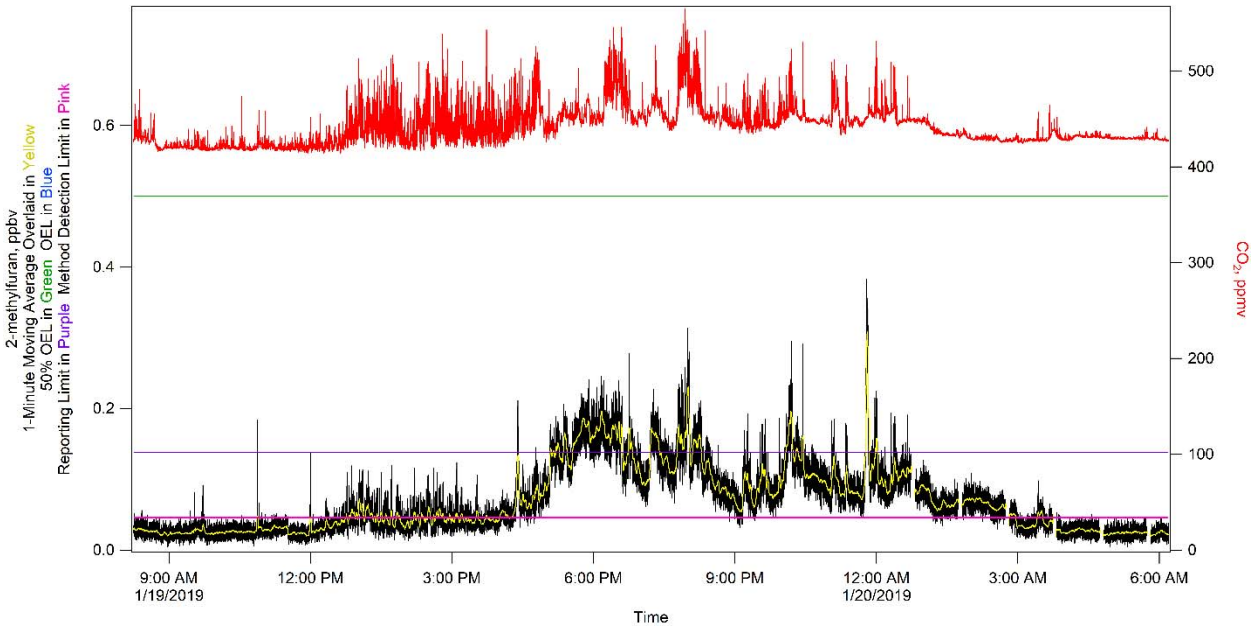

Figure 7-7. 2-methylfuran.

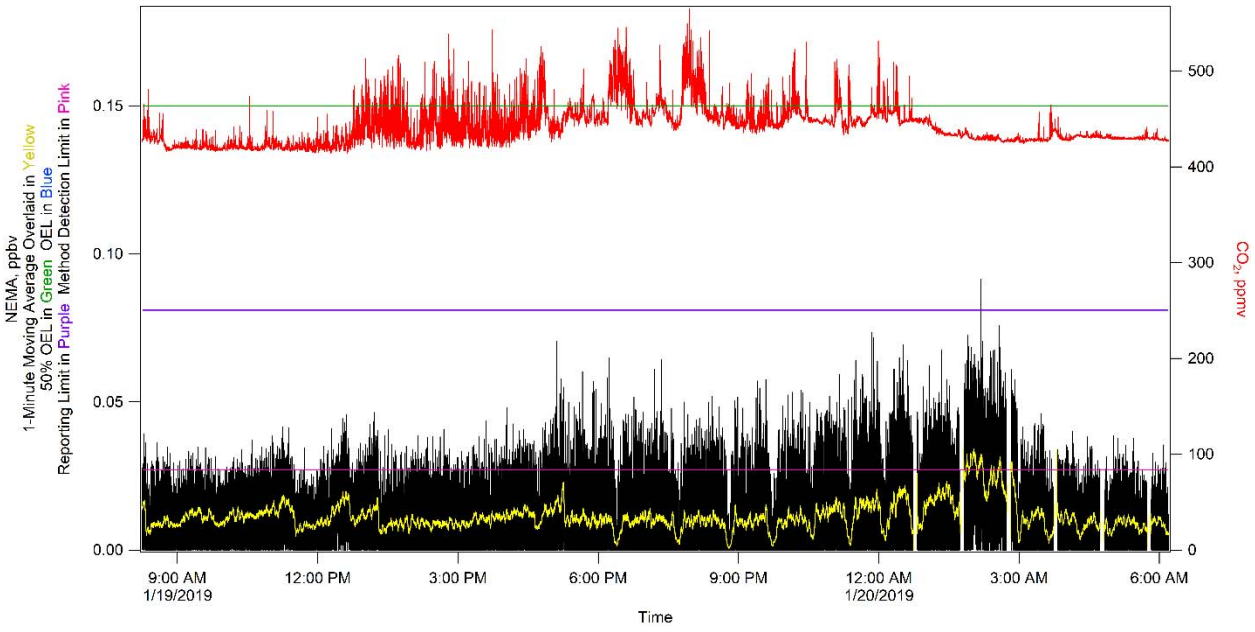

Figure 7-8. N-nitrosomethylethylamine (NEMA).

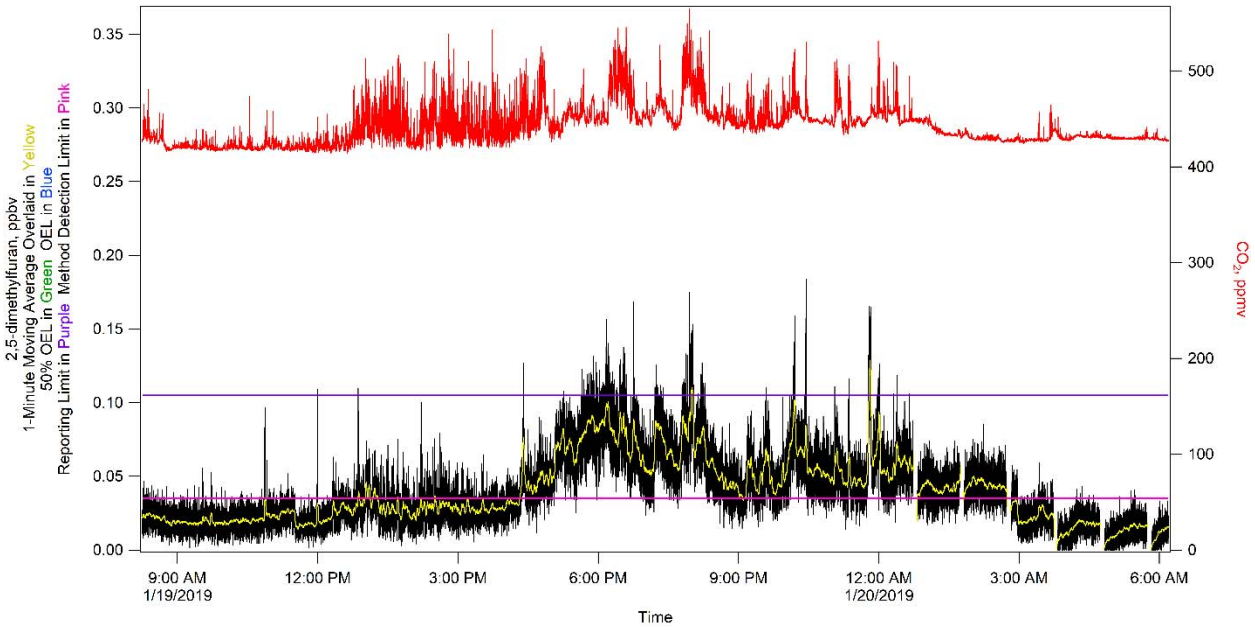

Figure 7-9. 2,5-dimethylfuran.

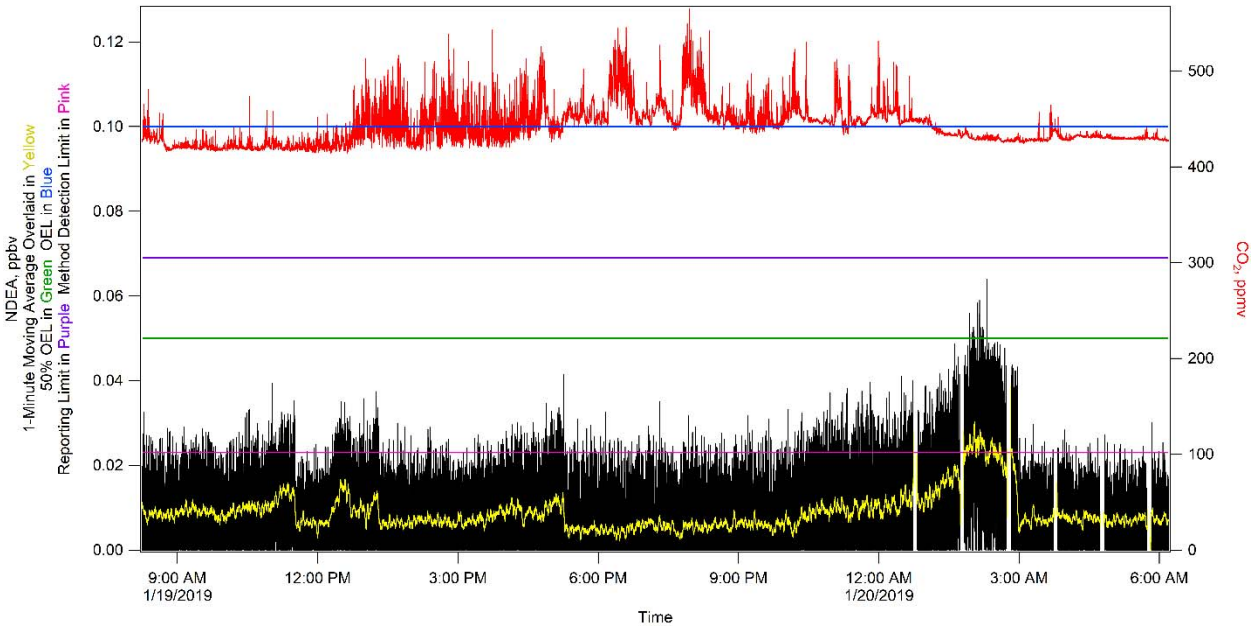

Figure 7-10. N-nitrosodiethylamine (NDEA).

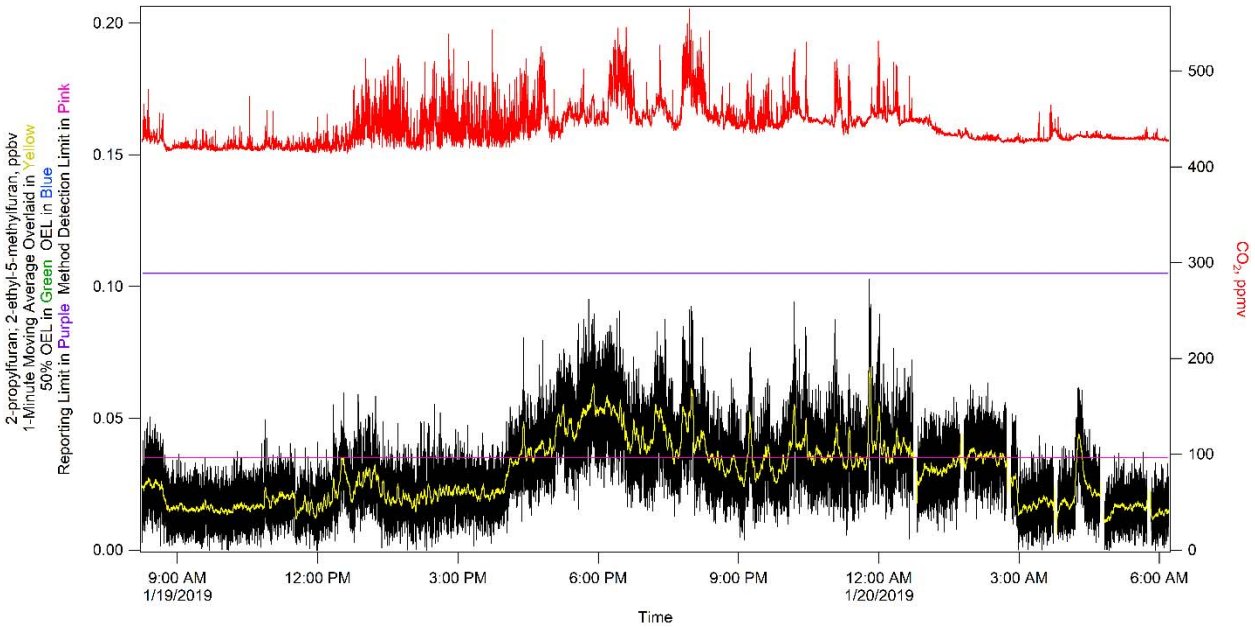

Figure 7-11. 2-propylfuran + 2-ethyl-5-methylfuran.

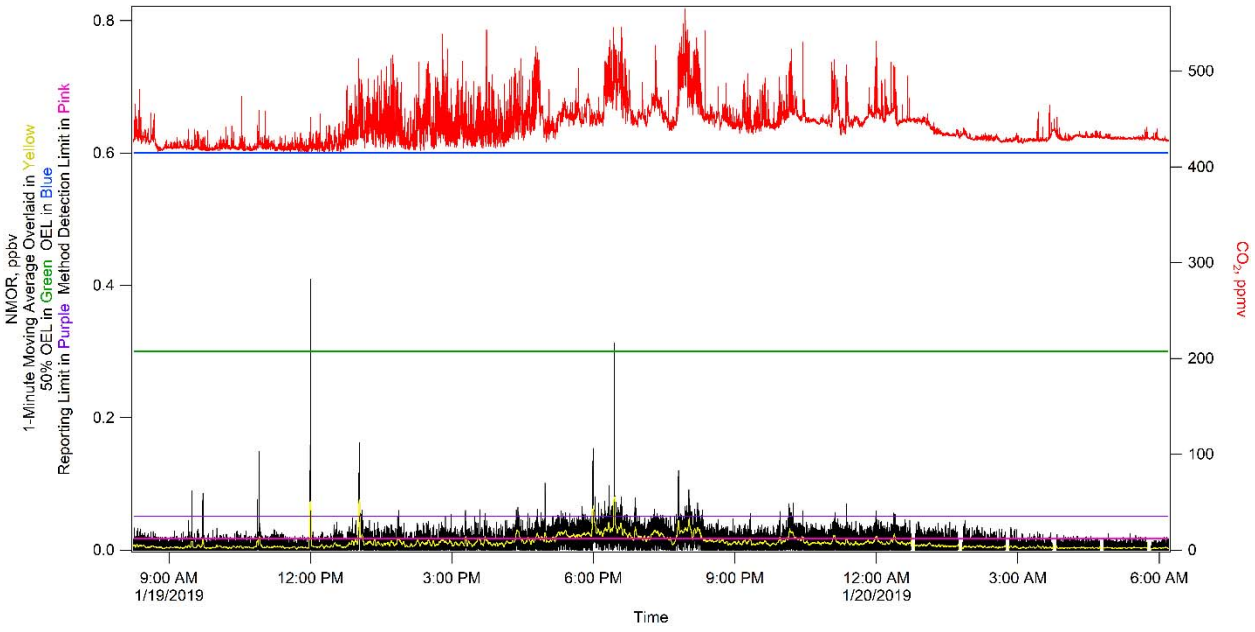

Figure 7-12. N-nitrosomorpholine (NMOR).

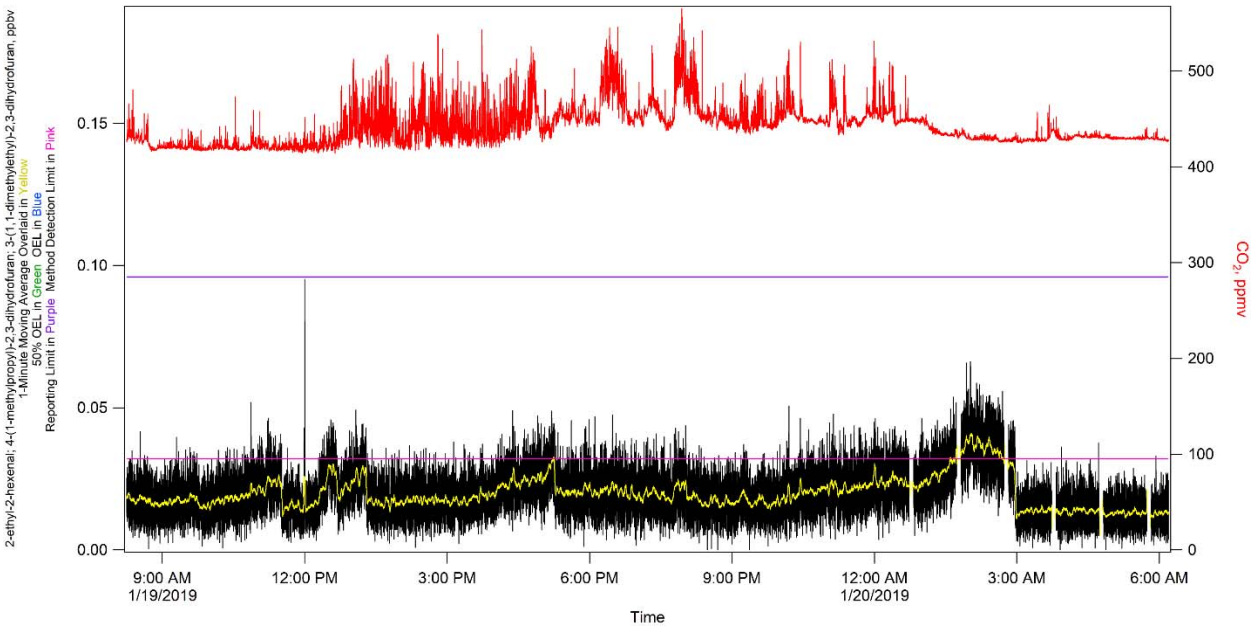

Figure 7-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran +3-(1-1-dimethylethyl)-2,3-dihydrofuran.

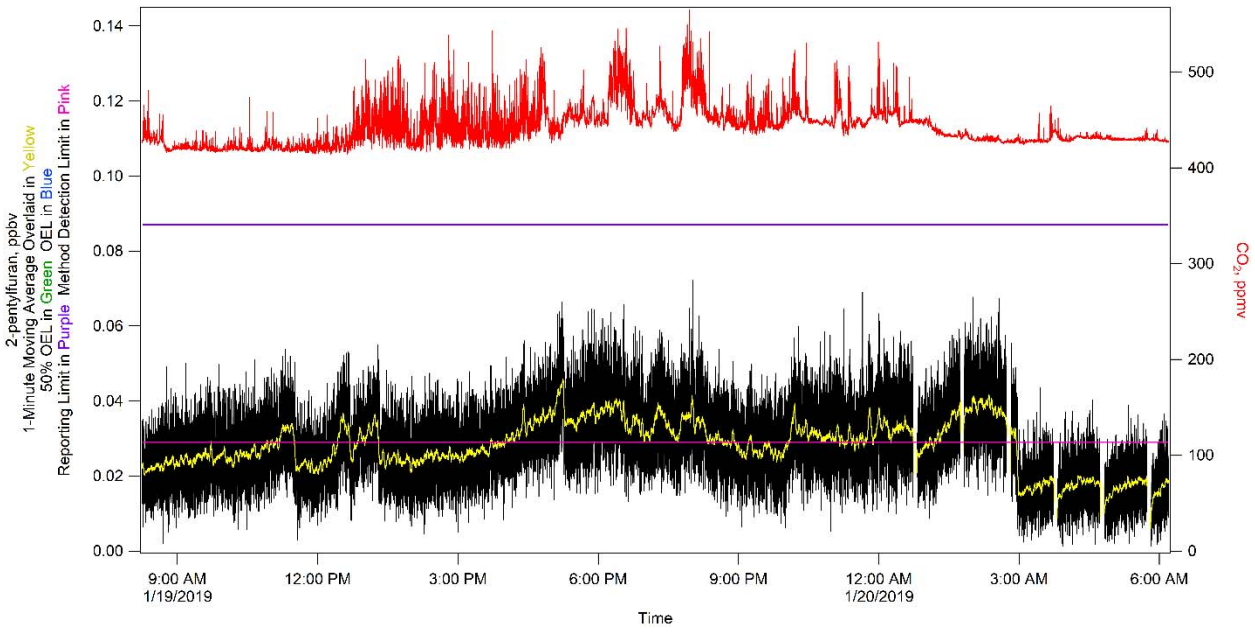

Figure 7-14. 2-pentylfuran.

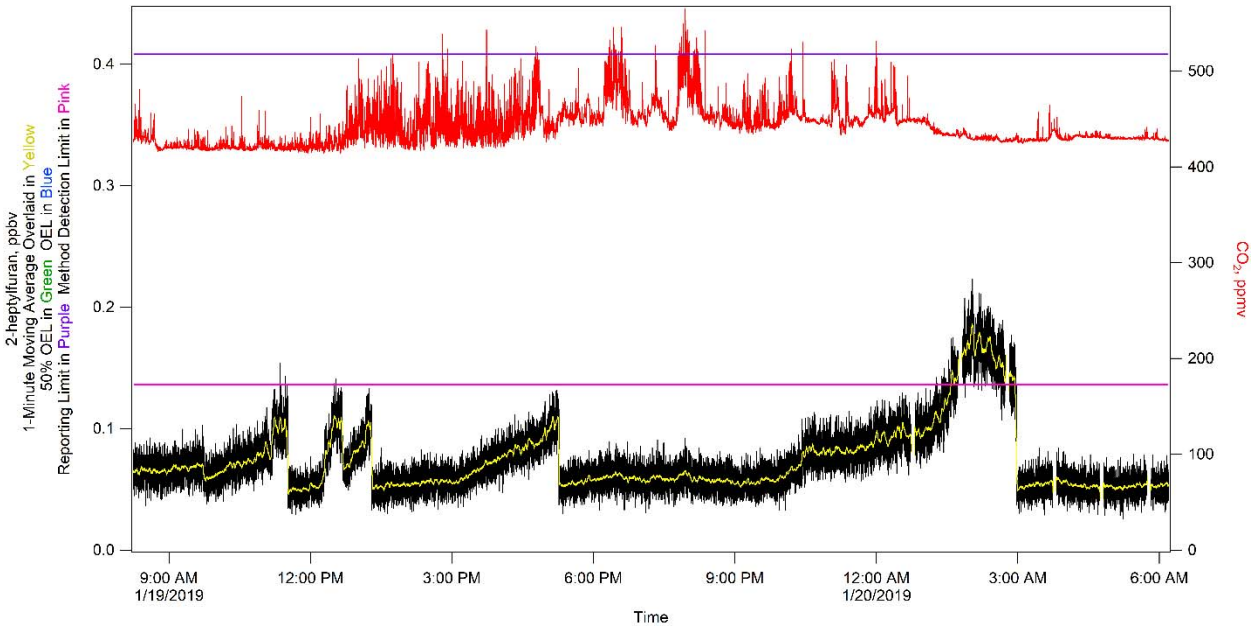

Figure 7-15. 2-heptylfuran.

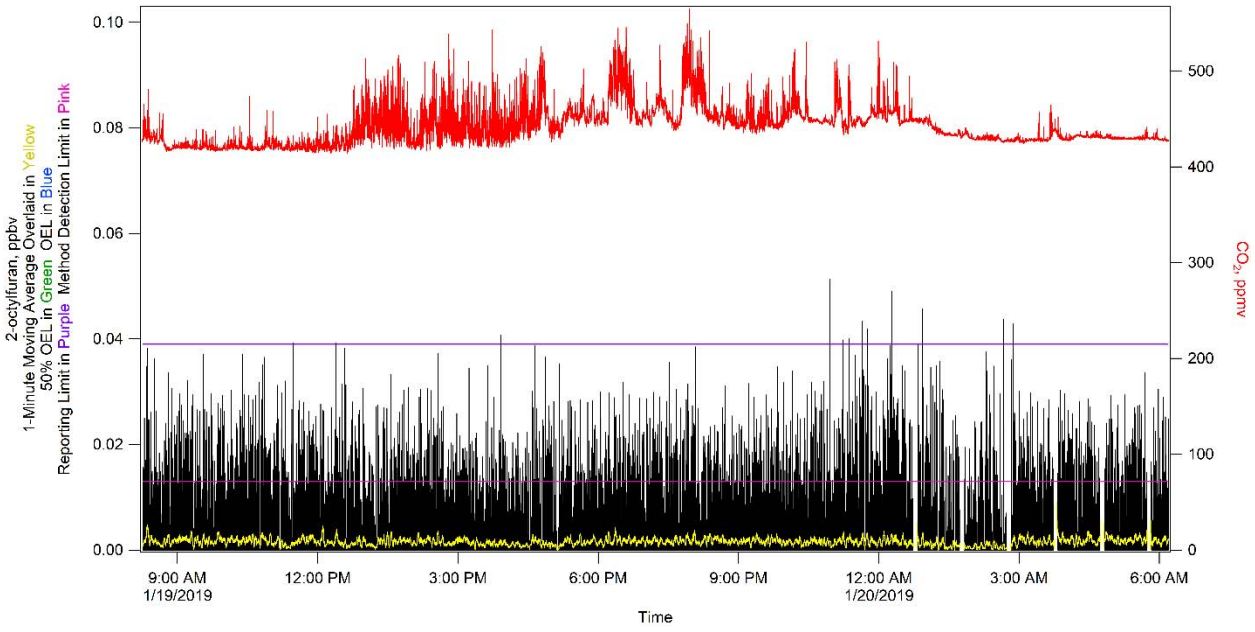

Figure 7-16. 2-octylfuran.

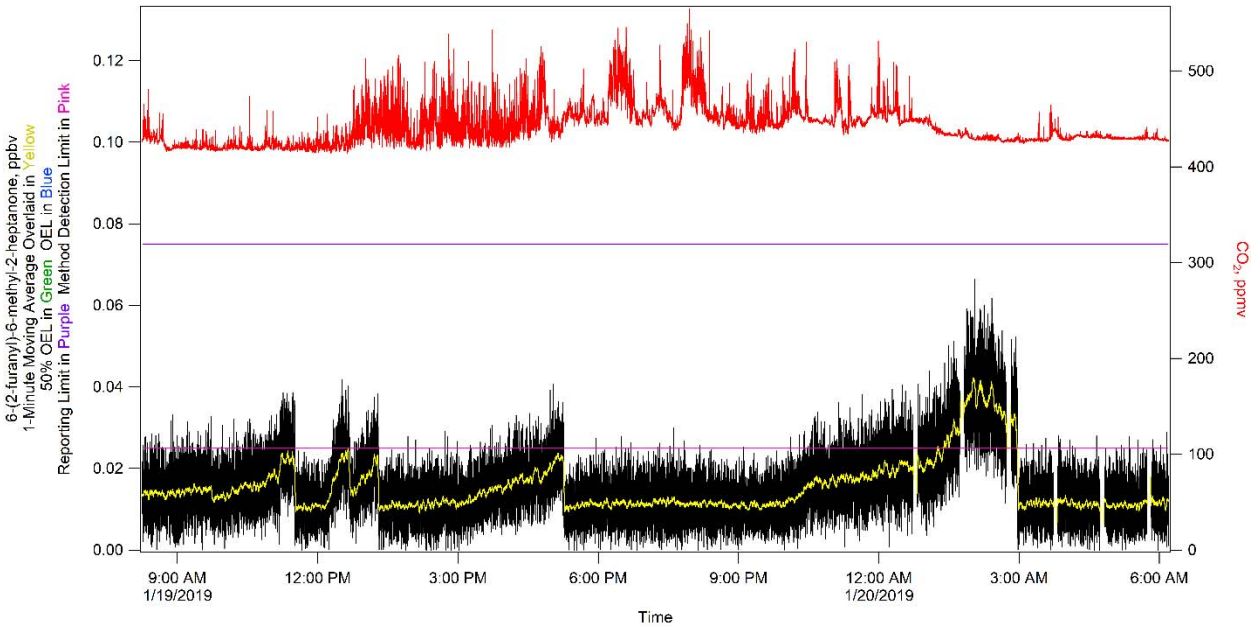

Figure 7-17. 6-(2-furanyl)-6-methyl-2-heptanone.

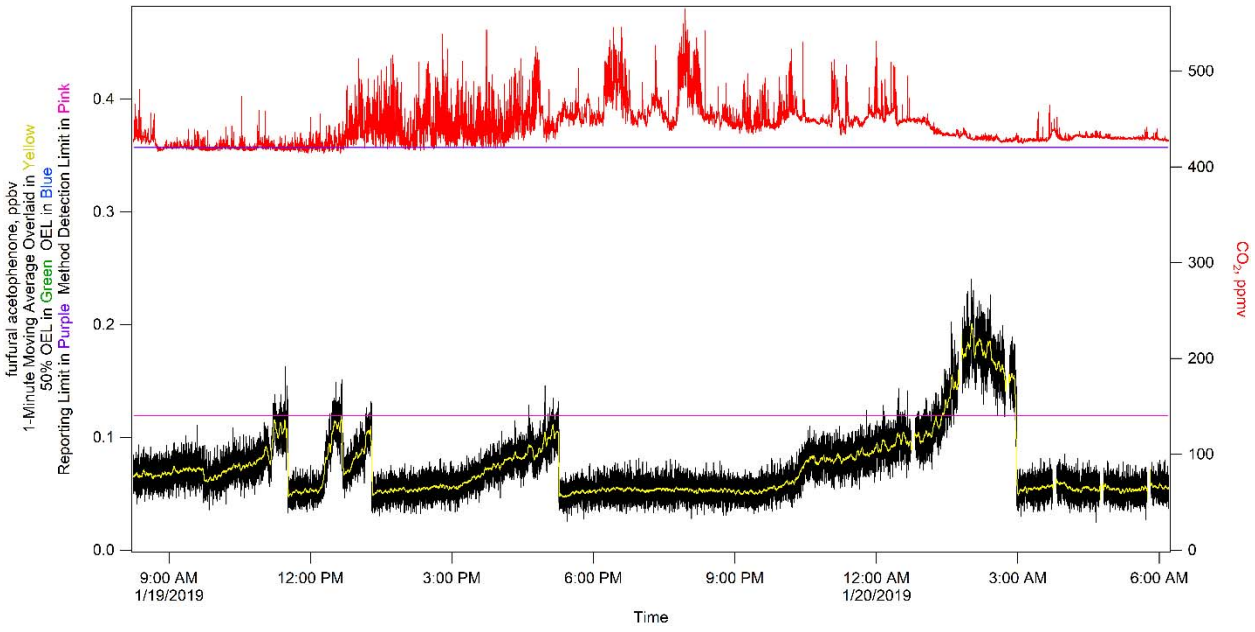

Figure 7-18. Furfural Acetophenone.

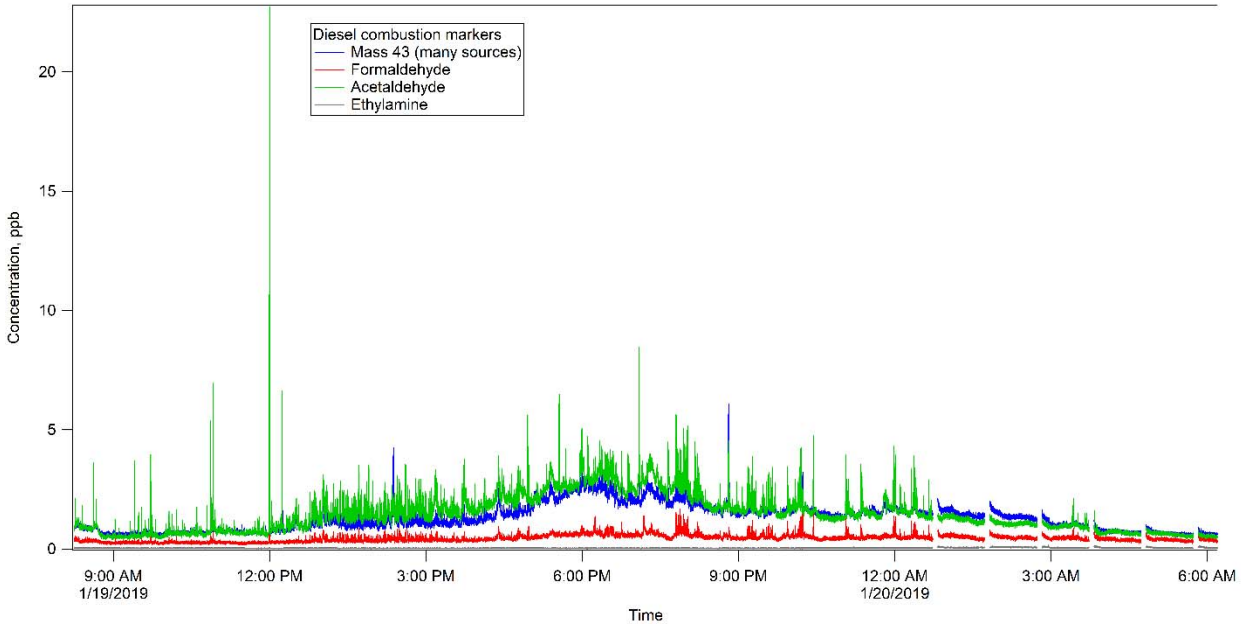

Figure 7-19. Diesel Combustion Markers.

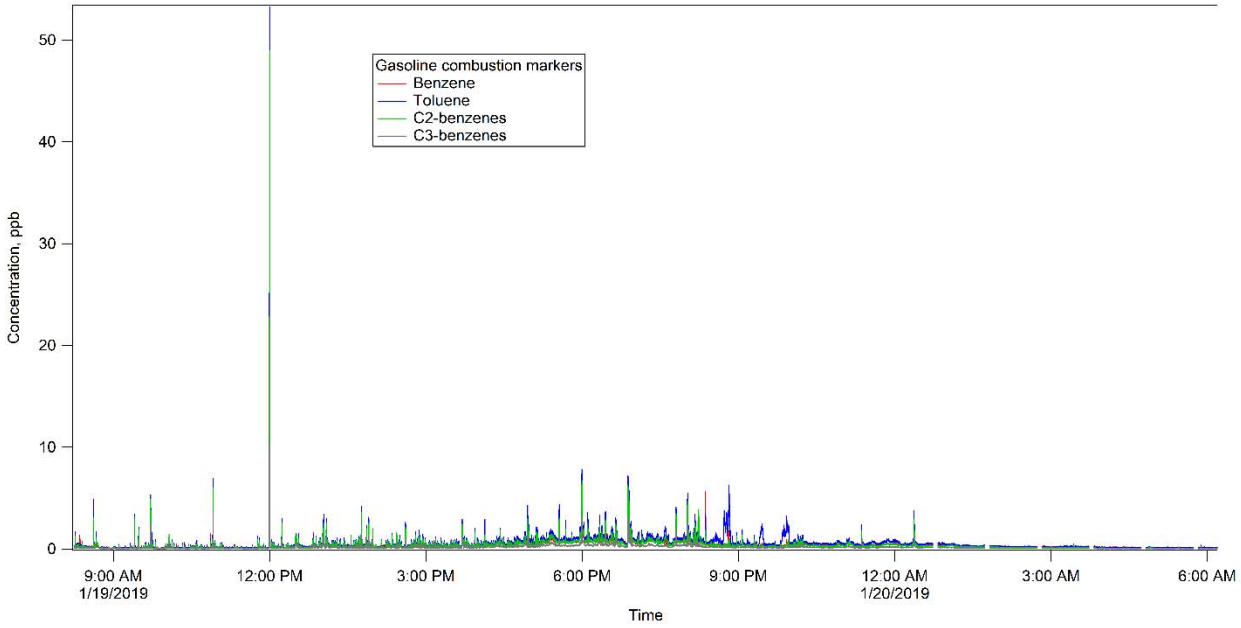

Figure 7-20. Gasoline Combustion Markers.

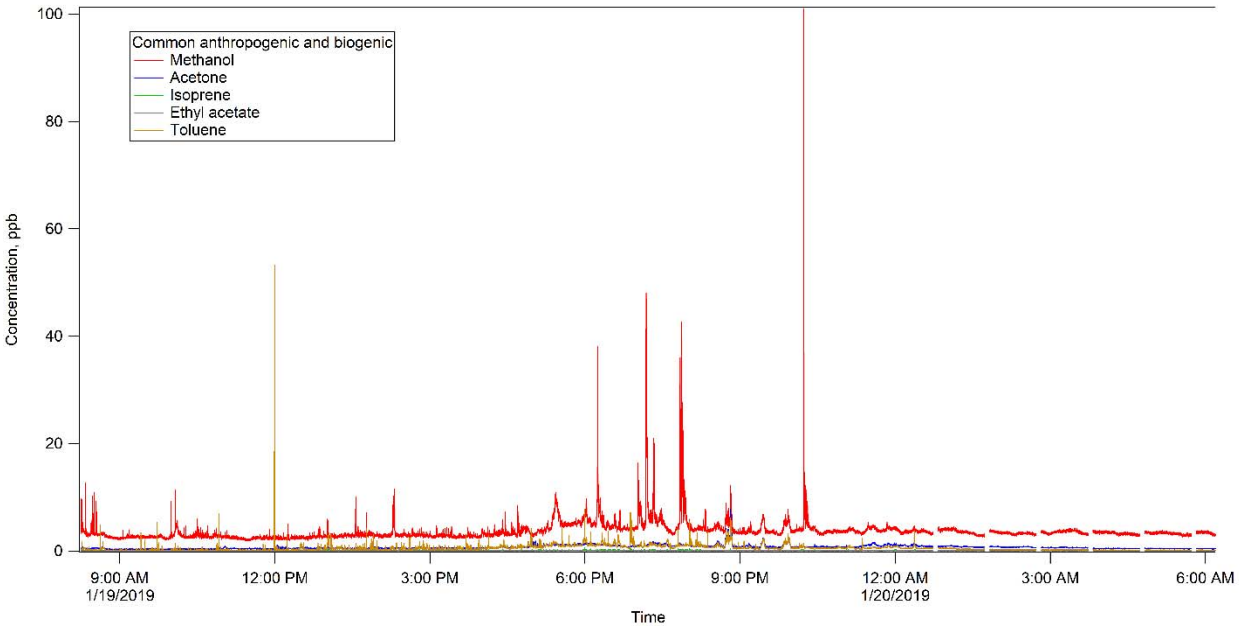

Figure 7-21. Plant and Human Markers.

8.0 JANUARY 20, 2019 – JANUARY 21, 2019 – STUDY SITE #1

8.1 Quality Assessment

Data from January 20, 2019, were assessed using Procedure 17124-DOE-HS-102. A Data Acceptance 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.

8.2 Summary

The ML personnel performed background sampling using the ML from January 20, 2019, to January 21, 2019, at Study Site 1. Site 1 is located on the plateau northwest of the 200W Tank Farm operations (Figure 8-1). The ML arrived at Site 1 at 07:26 on January 20, 2019. The initial QA/QC zero-air/span checks were performed on the LI-COR CO_2 monitor, the Picarro NH_3 analyzer, and the PTR-MS beginning at 08:24. No confirmatory samples were taken during this monitoring period. The ML staff departed the monitoring site at 12:20. The SME performed a remote start of NO^+ automation mode at 14:22.

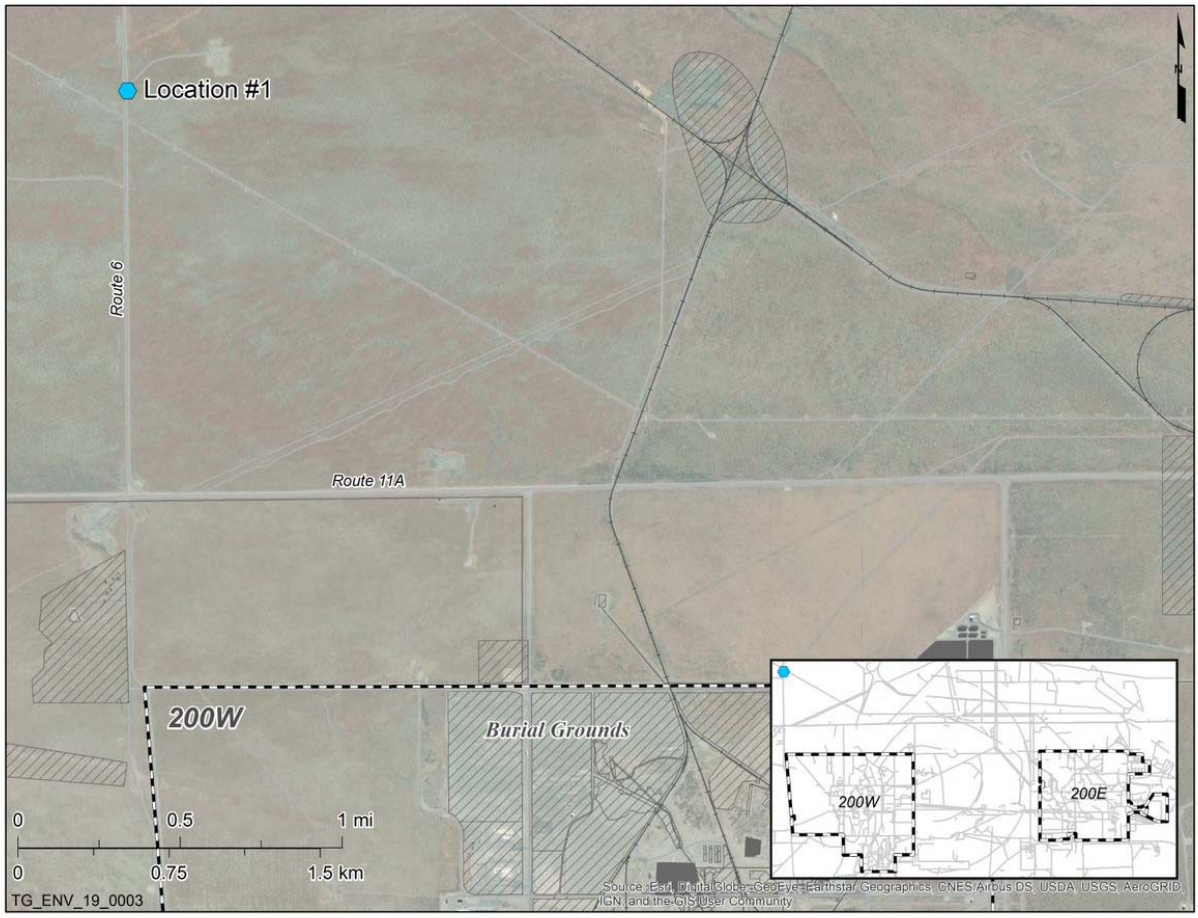

Figure 8-1. Mobile Laboratory Site #1 for the Duration of the Monitoring Period.

The ML staff returned to Site 1 at 07:20 on January 21, 2019, and moved to Site 2 by 08:12.

Figure 8-2 provides meteorological information obtained from the ML mounted weather station for the time period of sampling at Site 1. Wind direction was typical of prevailing winds from the west-northwest at speeds nominally between 5-10 with a period of gusts up to 40 miles per hour. Temperatures ranged between 29-38 degrees Fahrenheit with pressure increasing during the last half of monitoring at Site 1.

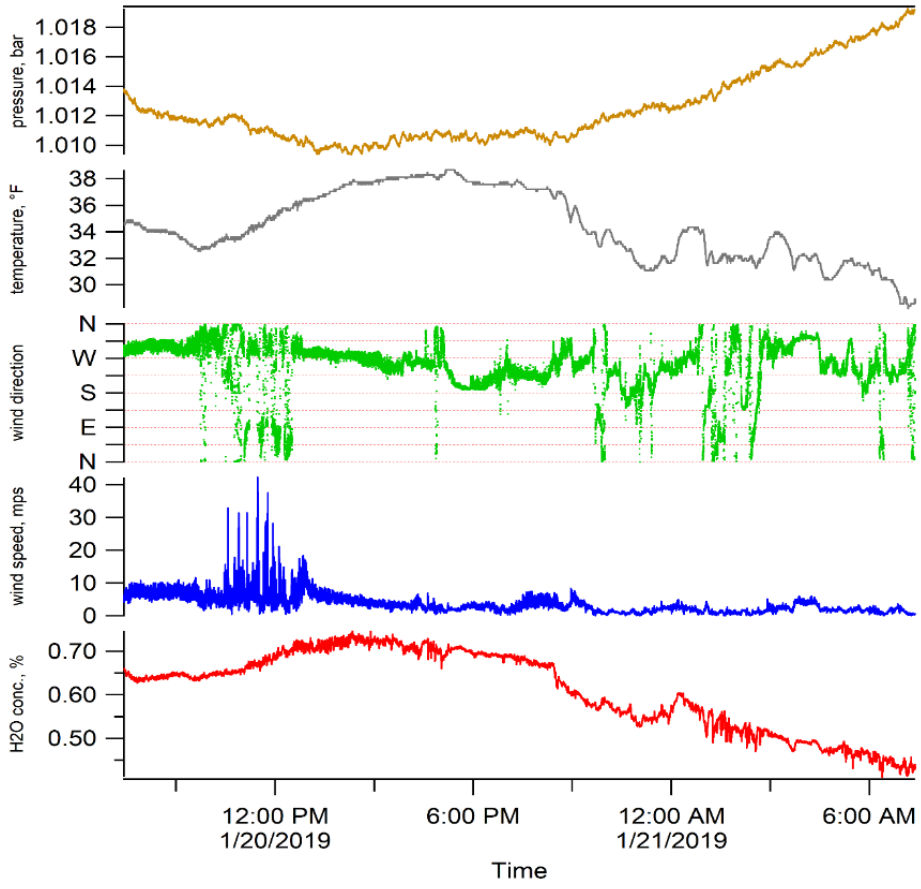

Figure 8-2. Weather Data.

8.3 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 not collected during this monitoring period. Table 8-1 displays the statistical information for the monitoring period of January 20, 2019, to January 21, 2019.

Table 8-1. Statistical Information for the Monitoring Period of January 20, 2019 – January 21, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
1	ammonia	25000	0.010	2.667	1.301	48.763	10.248	2.347
2	formaldehyde	300	1.302	<1.302	N/A	N/A	1.861	<1.302
3	methanol	200000	1.839	2.741†	0.257	9.390	9.316	2.787
4	acetonitrile	20000	0.070	<0.070	N/A	N/A	0.086	<0.070
5	acetaldehyde	25000	2.070	<2.070	N/A	N/A	2.797	<2.070
6	ethylamine	5000	0.055	0.060†	0.021	35.676	0.220	0.058
7	1,3-butadiene	1000	0.122	<0.122	N/A	N/A	0.375	<0.122
8	propanenitrile	6000	0.121	<0.121	N/A	N/A	0.178	<0.121
9	2-propenal	100	0.314	<0.314	N/A	N/A	0.817	<0.314
10	1-butanol + butenes	20000	0.149	<0.149	N/A	N/A	0.200	<0.149
11	methyl isocyanate	20	0.061	<0.061	N/A	N/A	0.126	<0.061
12	methyl nitrite	100	0.117	<0.117	N/A	N/A	0.466	<0.117
13	furan	1	0.053	<0.053	N/A	N/A	0.088	<0.053
14	butanenitrile	8000	0.040	<0.040	N/A	N/A	0.096	<0.040
15	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	200, 1, 1	0.034	<0.034	N/A	N/A	N/A*	N/A*
16	butanal	25000	0.063	<0.063	N/A	N/A	0.101	<0.063
17	NDMA**	0.3	0.020	<0.020	N/A	N/A	0.068	<0.020
18	Benzene	500	0.230	<0.230	N/A	N/A	0.356	<0.230
19	2,4-pentadienenitrile + pyridine	300	0.084	<0.084	N/A	N/A	0.180	<0.084
20	2-methylene butanenitrile	300	0.050	0.054†	0.026	47.739	0.140	0.052
21	2-methylfuran	1	0.046	<0.046	N/A	N/A	0.118	<0.046
22	pentanenitrile	6000	0.029	<0.029	N/A	N/A	0.081	<0.029
23	3-methyl-3-buten-2-one + 2-methyl-2-butenal	20, 30	0.048	<0.048	N/A	N/A	0.104	<0.048
24	NEMA**	0.3	0.027	<0.027	N/A	N/A	0.067	<0.027
25	2,5-dimethylfuran	1	0.035	<0.035	N/A	N/A	0.078	<0.035
26	Hexanenitrile	6000	0.029	<0.029	N/A	N/A	0.089	<0.029
27	2-hexanone (MBK)	5000	0.030	<0.030	N/A	N/A	0.074	<0.030
28	NDEA**	0.1	0.023	<0.023	N/A	N/A	0.068	<0.023
29	butyl nitrite + 2-nitro-2-methylpropane	100, 300	0.106	<0.106	N/A	N/A	0.199	<0.106
30	2,4-dimethylpyridine	500	0.031	<0.031	N/A	N/A	0.075	<0.031
31	2-propylfuran + 2-ethyl-5-methylfuran	1	0.035	<0.035	N/A	N/A	0.073	<0.035

Table 8-1. Statistical Information for the Monitoring Period of January 20, 2019 – January 21, 2019. (2 Sheets)

COPC #	COPC Name	OEL (ppb)	MDL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel St. Dev. (%)	Max. (ppb)	Median (ppb)
32	heptanenitrile	6000	0.029	<0.029	N/A	N/A	0.078	<0.029
33	4-methyl-2-hexanone	500	0.032	<0.032	N/A	N/A	0.071	<0.032
34	NMOR**	0.6	0.017	<0.017	N/A	N/A	0.054	<0.017
35	butyl nitrate	2500	0.019	<0.019	N/A	N/A	0.063	<0.019
36	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	100, 1, 1	0.032	<0.032	N/A	N/A	0.071	<0.032
37	6-methyl-2-heptanone	8000	0.028	<0.028	N/A	N/A	0.075	<0.028
38	2-pentylfuran	1	0.029	<0.029	N/A	N/A	0.074	<0.029
39	biphenyl	200	0.031	<0.031	N/A	N/A	0.073	<0.031
40	2-heptylfuran	1	0.136	<0.136	N/A	N/A	0.262	<0.136
41	1,4-butanediol dinitrate	50	0.184	<0.184	N/A	N/A	0.110	<0.184
42	2-octylfuran	1	0.013	<0.013	N/A	N/A	0.071	<0.013
43	1,2,3-propanetriol 1,3-dinitrate	50	0.132	<0.132	N/A	N/A	0.090	<0.132
44	PCB	1000	0.139	<0.139	N/A	N/A	0.116	<0.139
45	6-(2-furanyl)-6-methyl-2-heptanone	1	0.025	<0.025	N/A	N/A	0.081	<0.025
46	furfural acetophenone	1	0.119	<0.119	N/A	N/A	0.272	<0.119
N/A*	The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.229 ppb and the median value was <0.034 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.].							
ND	COPC Averages below the MDL.							
†	COPC Averages between the RL and the MDL.							
	COPC Averages >100% of the OEL.							
	COPC Averages 50-100% of the OEL.							
	COPC Averages 10-50% of the OEL.							

Figure 8-3 through Figure 8-21 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 January 20, 2019, to January 21, 2019. 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.

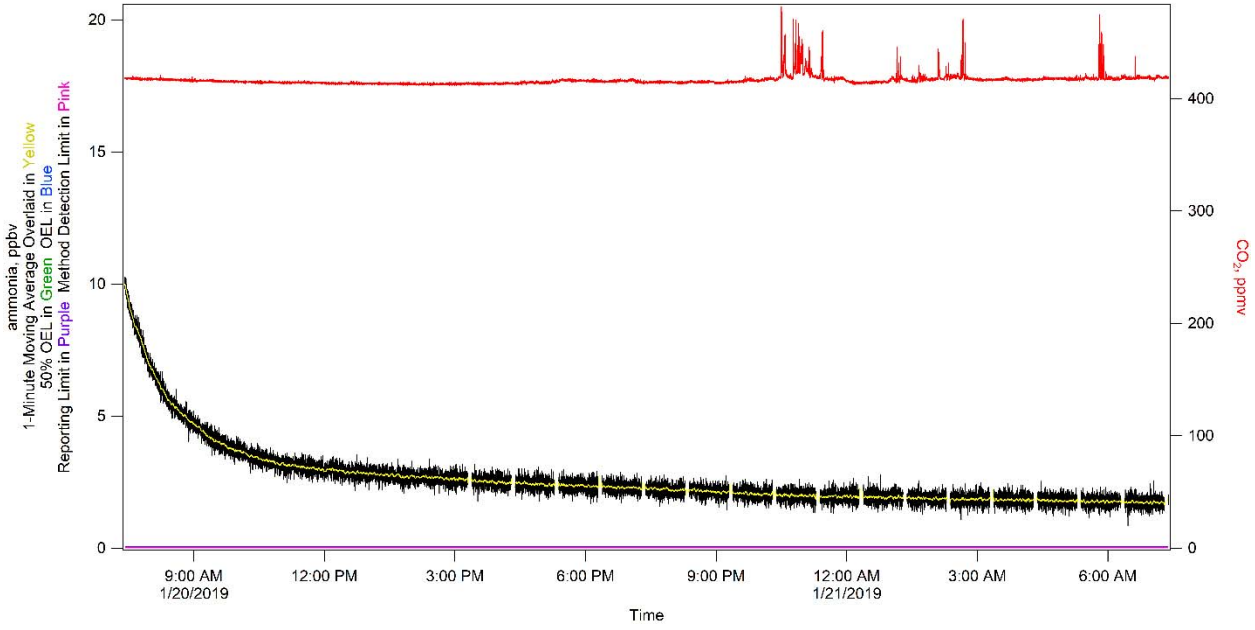

Figure 8-3. Ammonia.

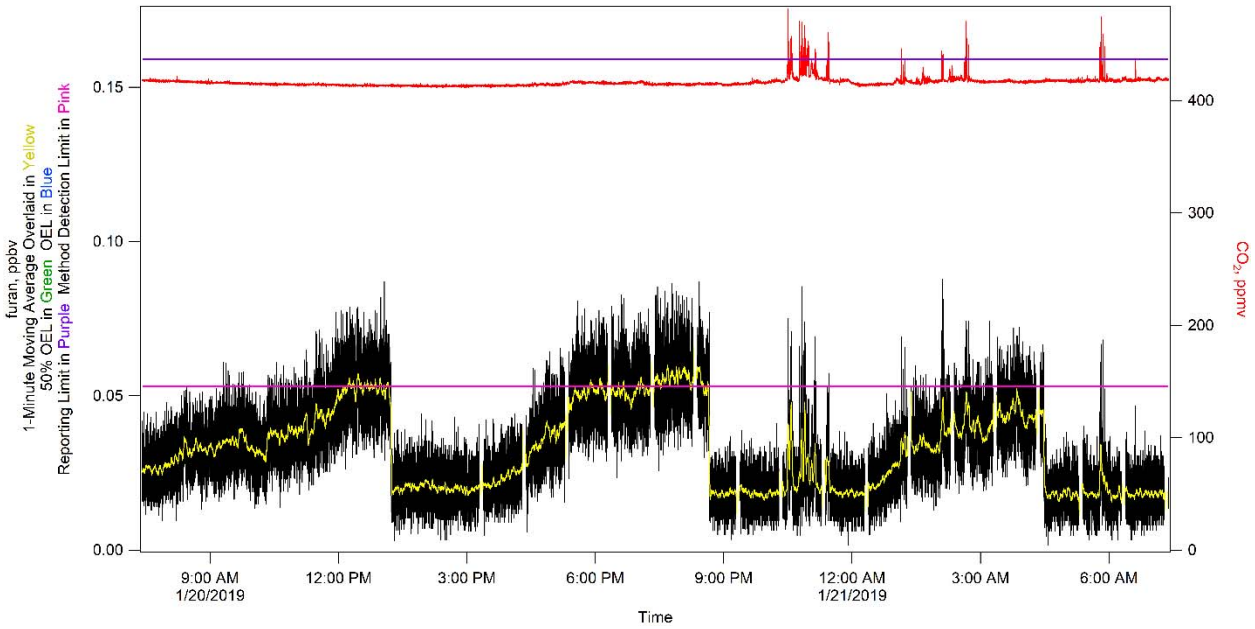

Figure 8-4. Furan.

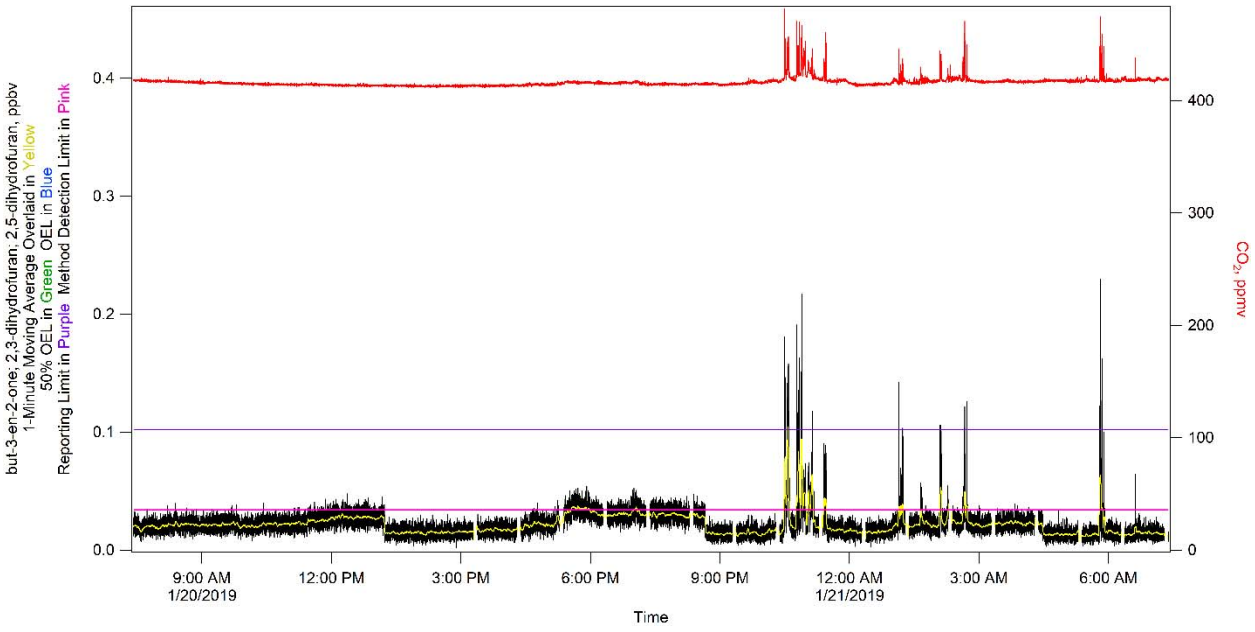

Figure 8-5. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

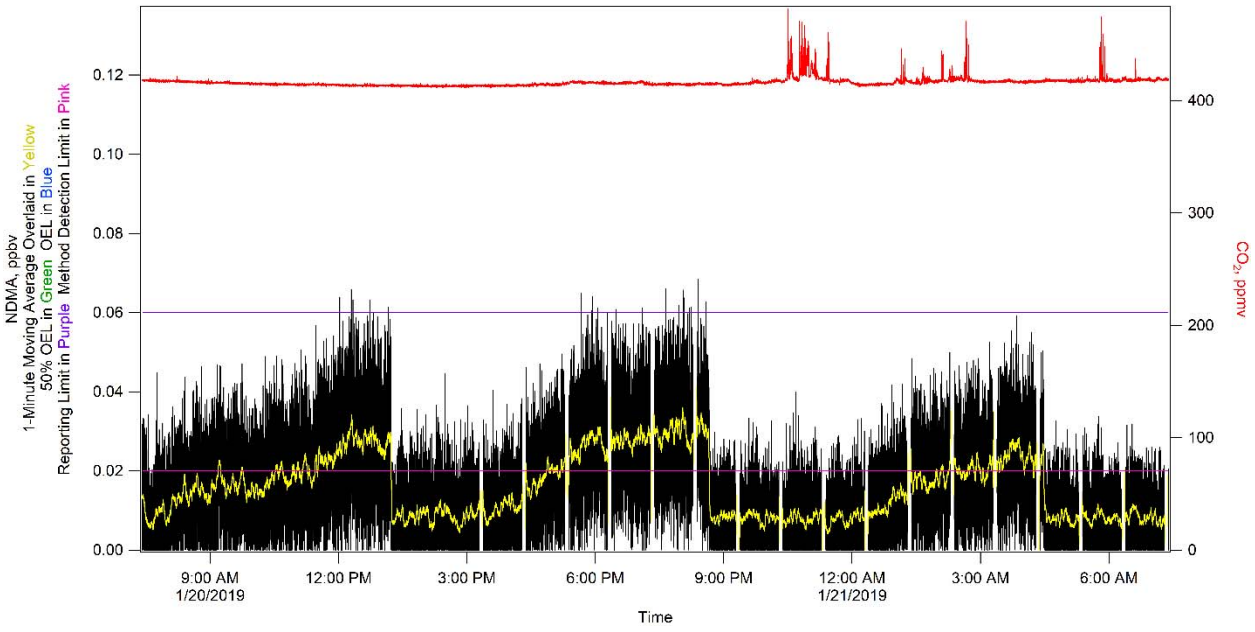

Figure 8-6. N-nitrosodimethylamine (NDMA).

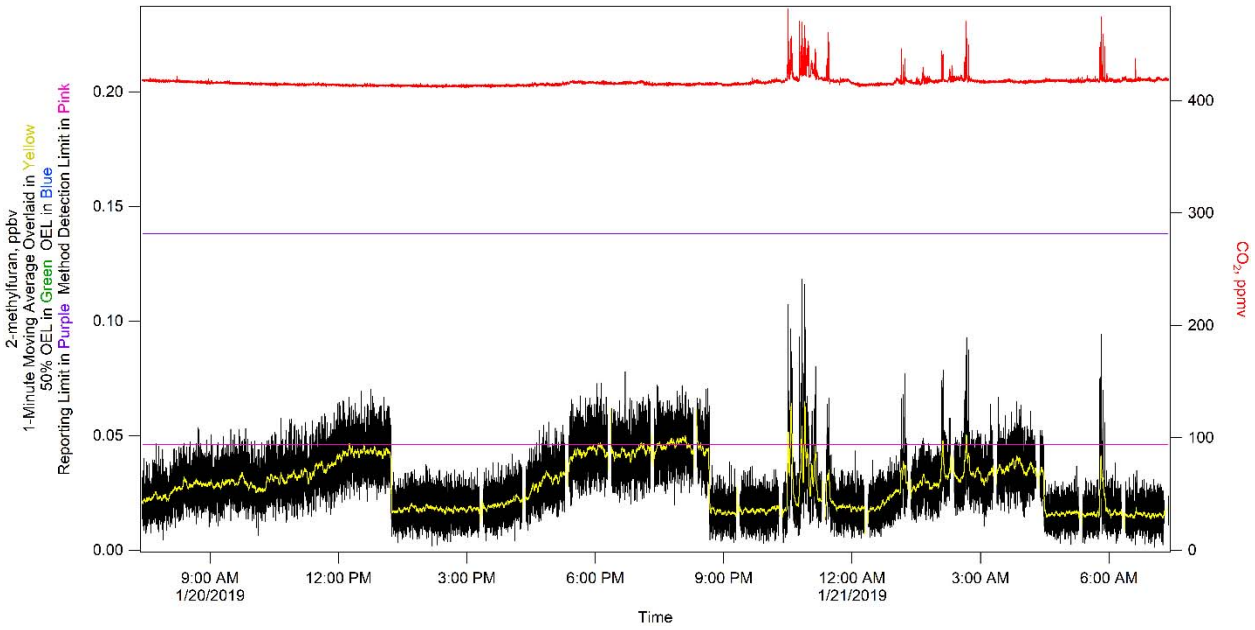

Figure 8-7. 2-methylfuran.

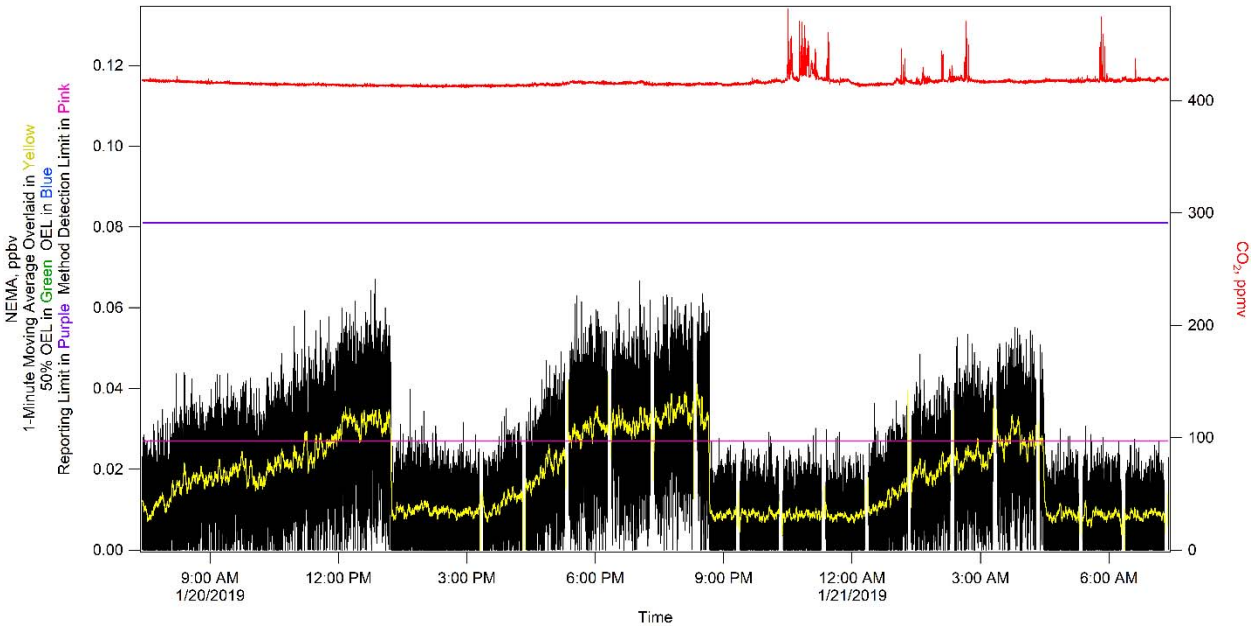

Figure 8-8. N-nitrosomethylethylamine (NEMA).

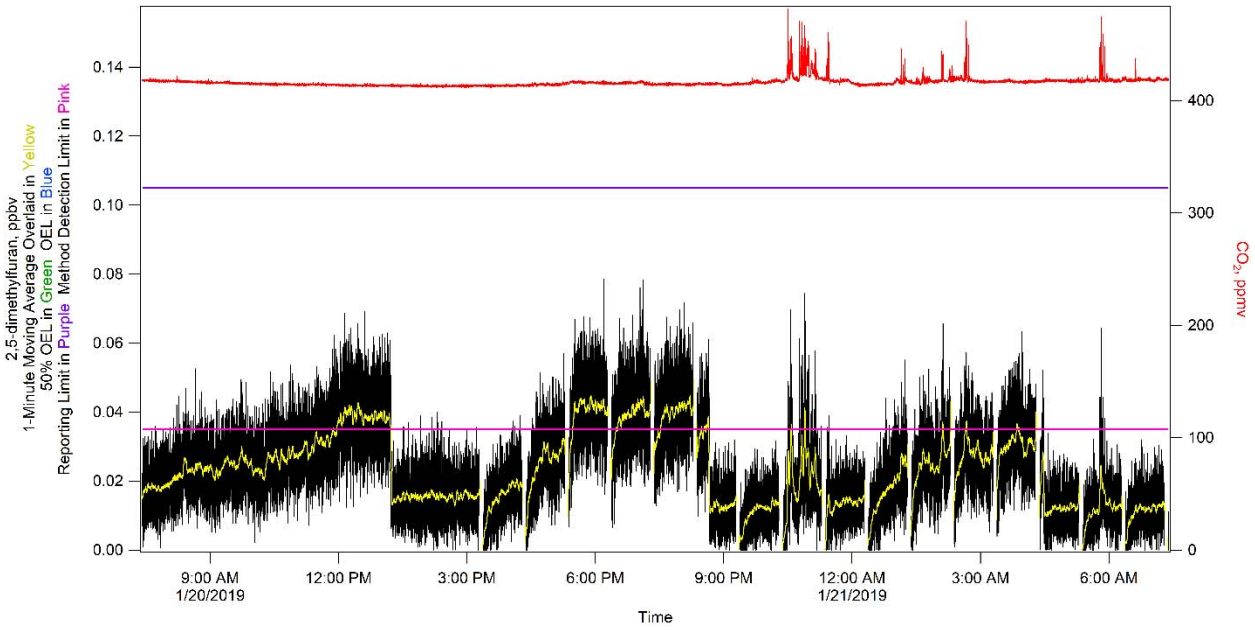

Figure 8-9. 2,5-dimethylfuran.

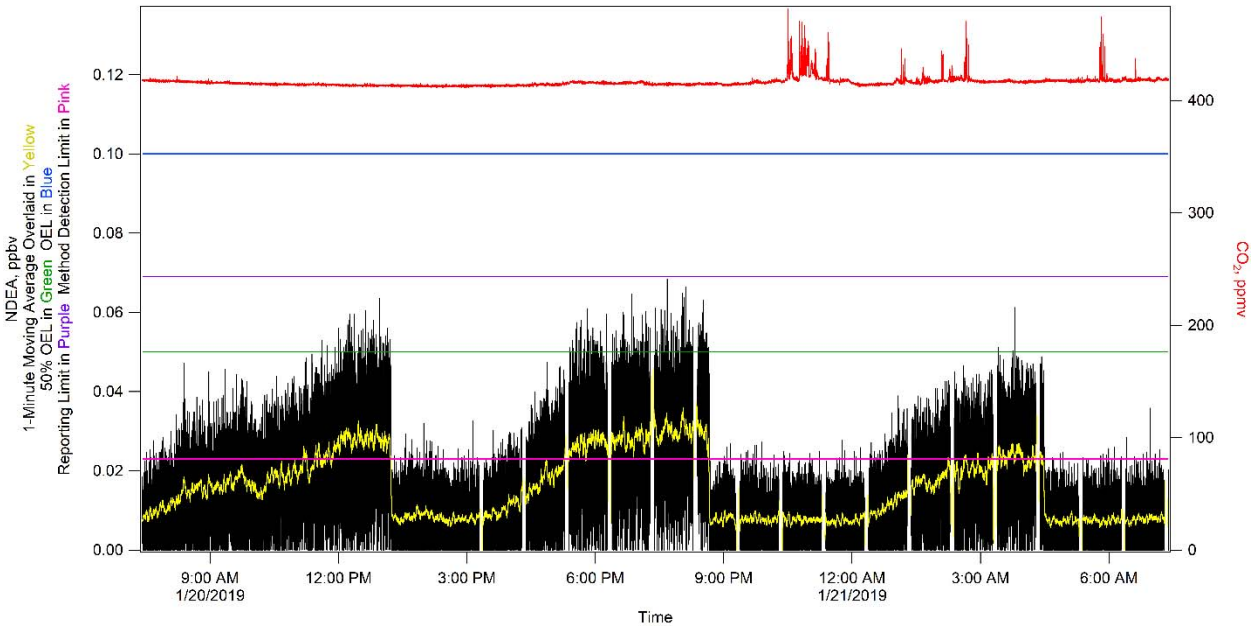

Figure 8-10. N-nitrosodiethylamine (NDEA).

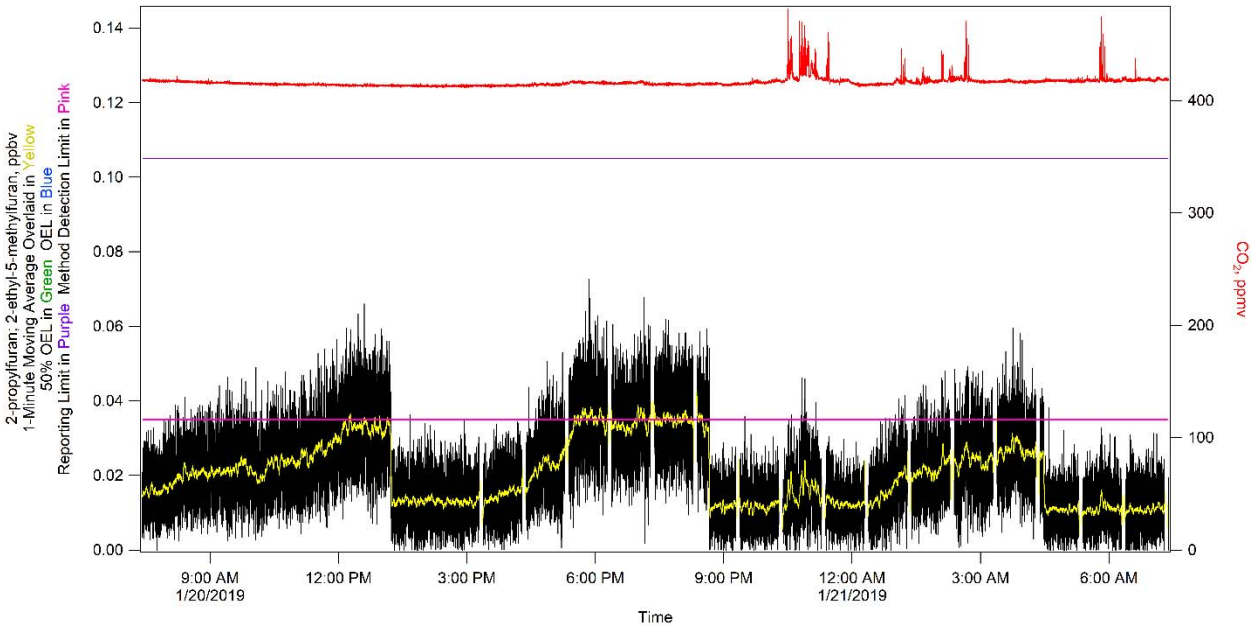

Figure 8-11. 2-propylfuran + 2-ethyl-5-methylfuran.

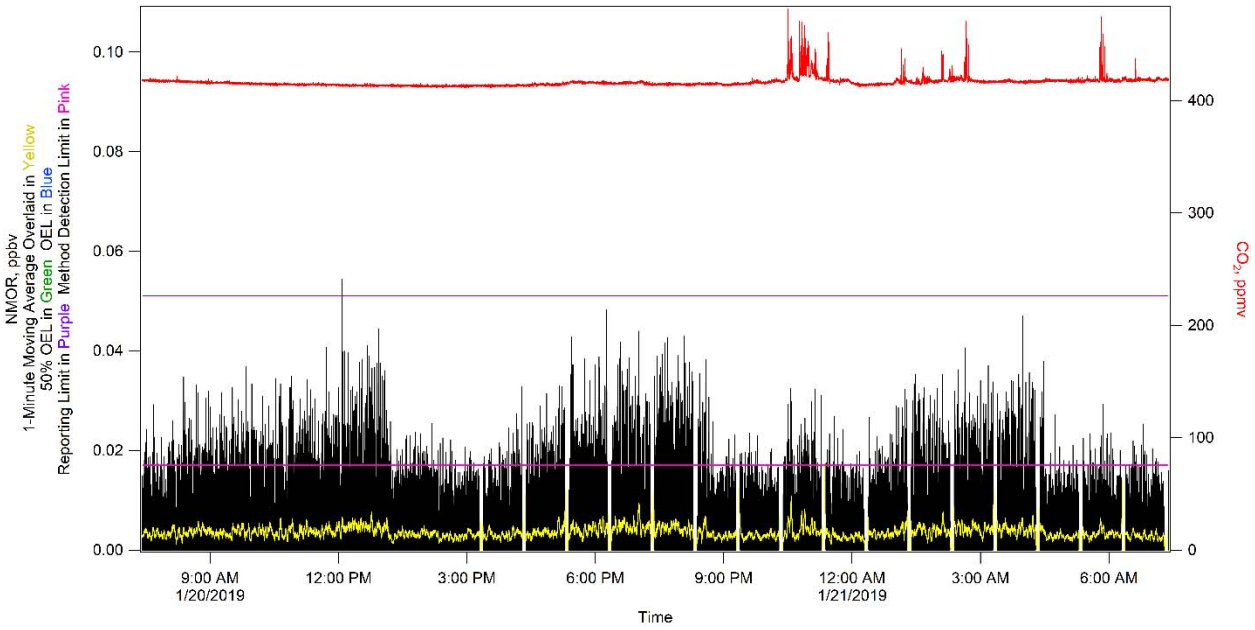

Figure 8-12. N-nitrosomorpholine (NMOR).

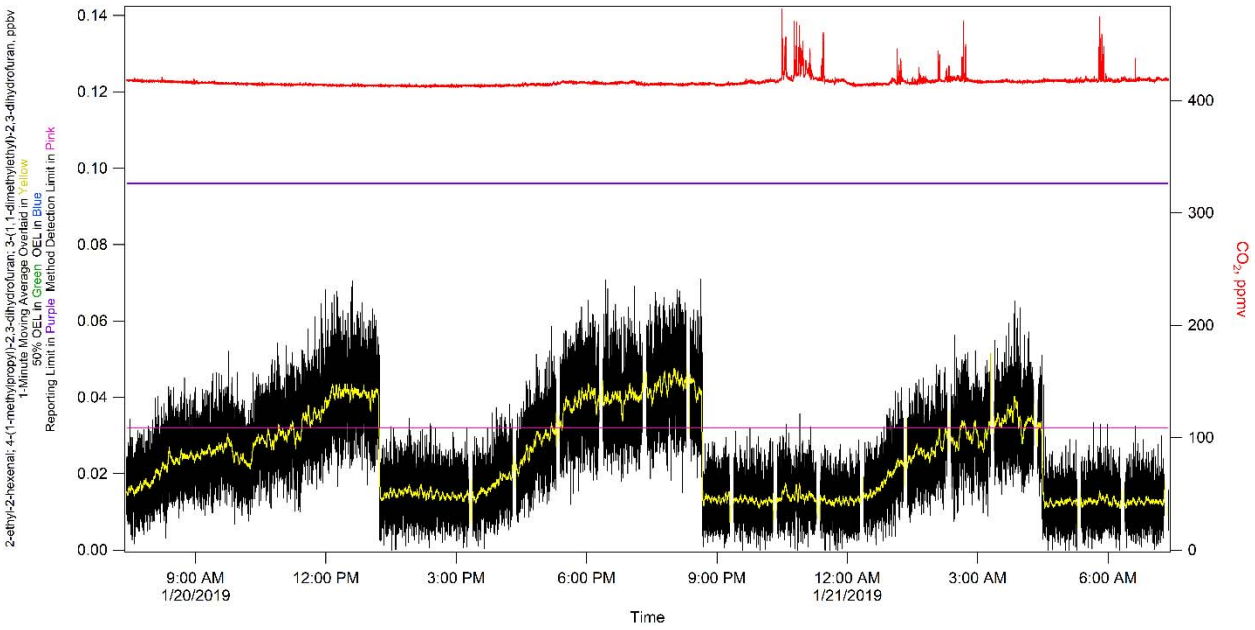

Figure 8-13. 2-ethyl-2-hexenal; 4-(1-methylpropyl)-2,3-dihydrofuran +3-(1-1-dimethylethyl)-2,3-dihydrofuran.

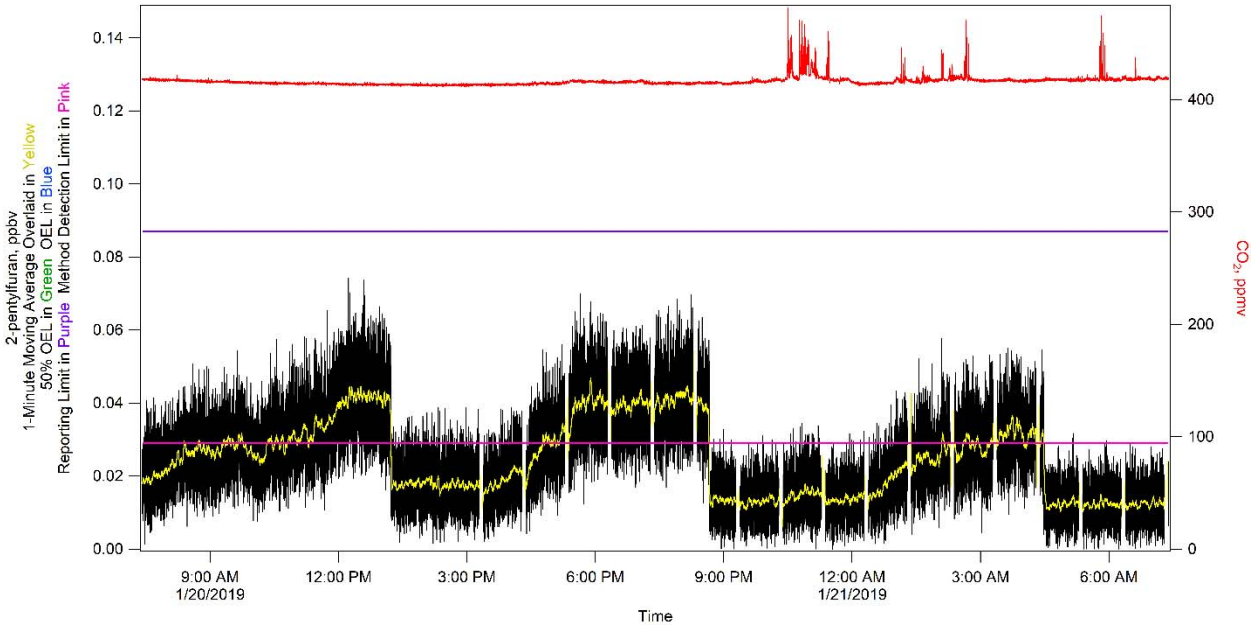

Figure 8-14. 2-pentylfuran.

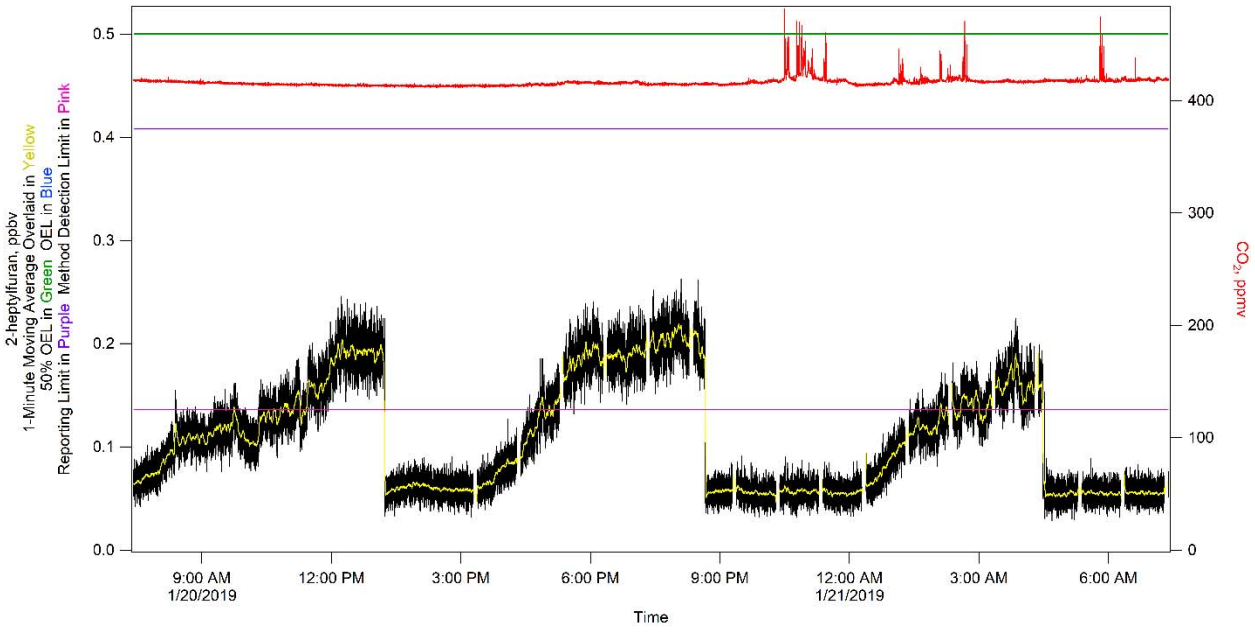

Figure 8-15. 2-heptylfuran.

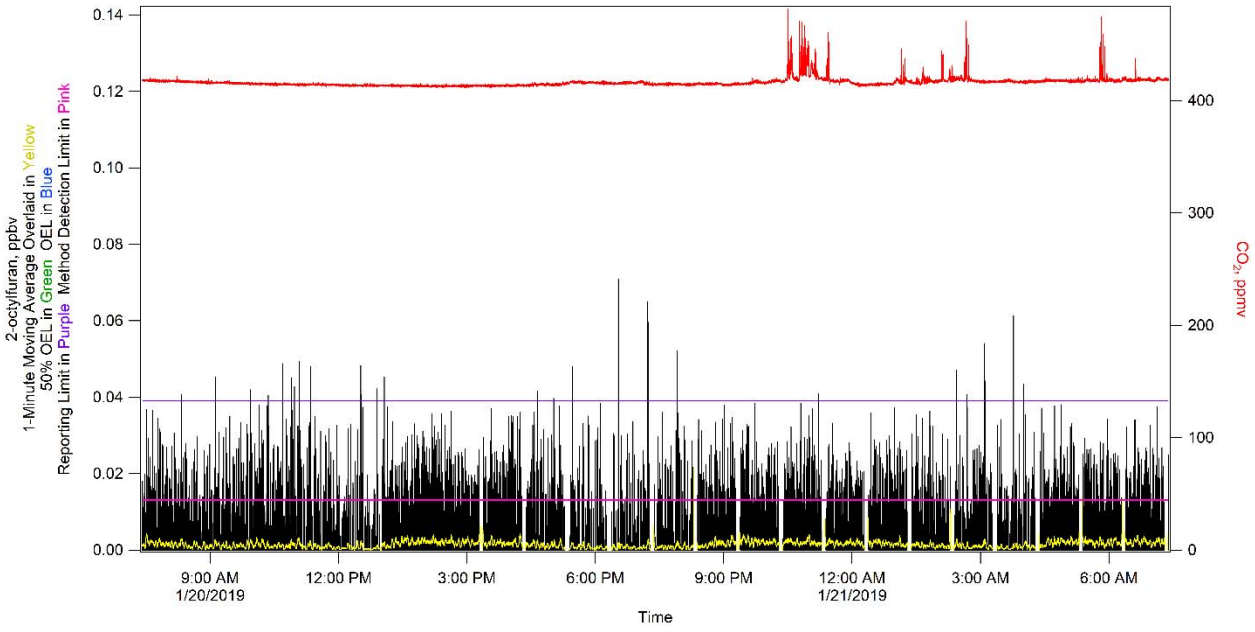

Figure 8-16. 2-octylfuran.

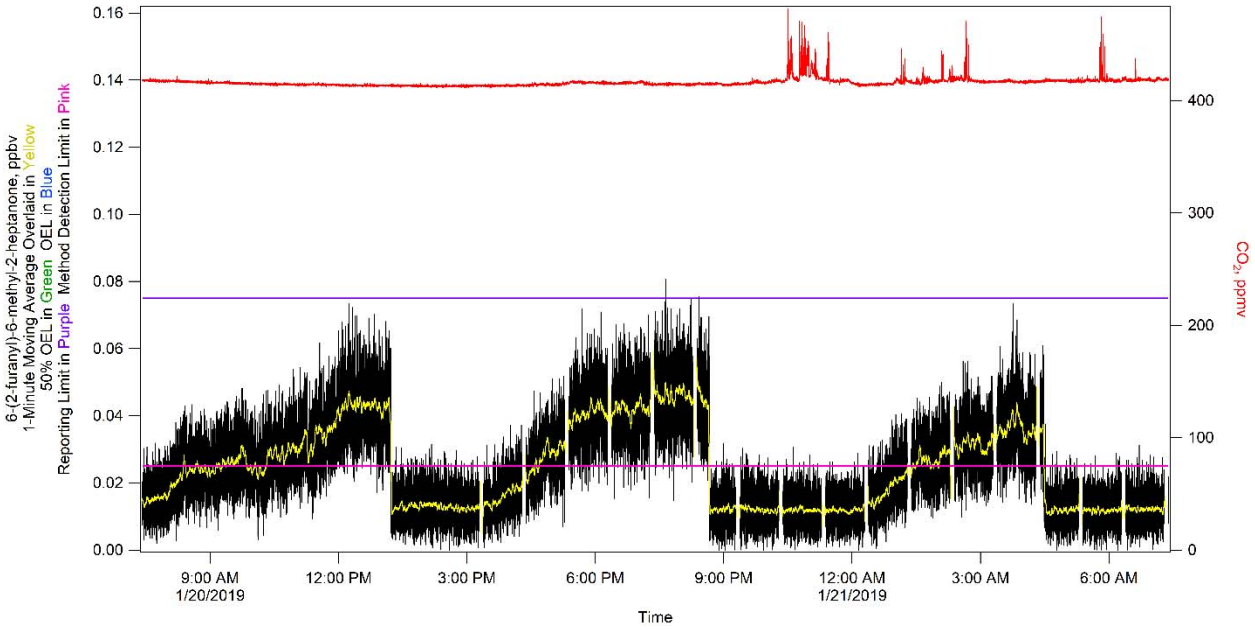

Figure 8-17. 6-(2-furanyl)-6-methyl-2-heptanone.

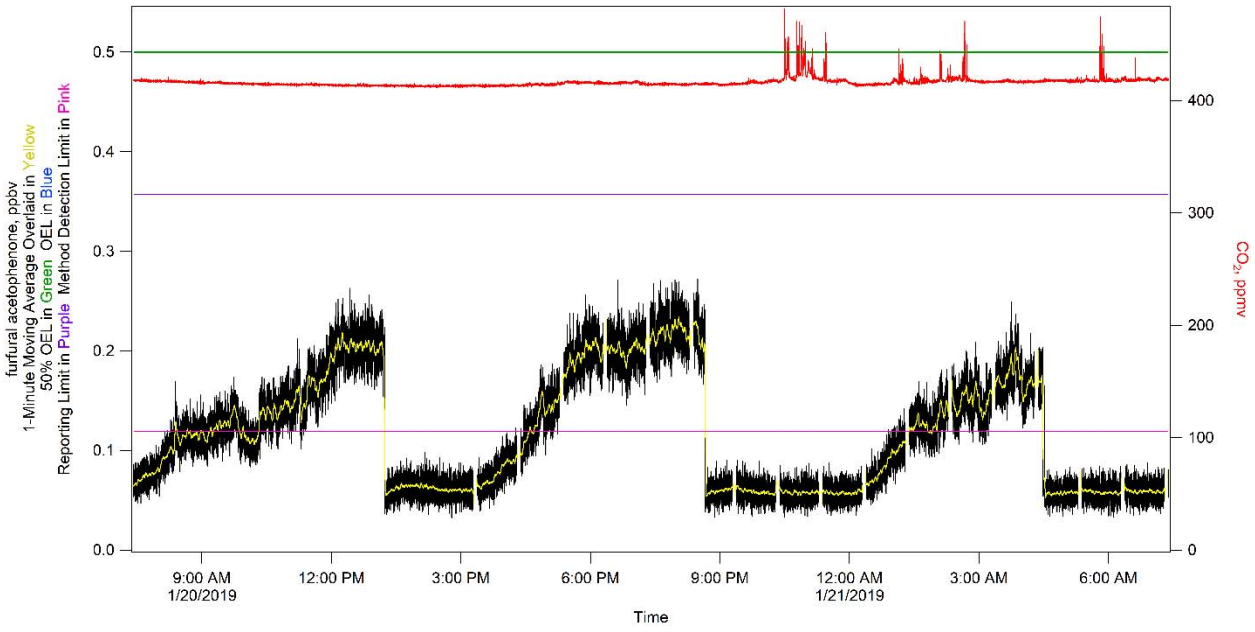

Figure 8-18. Furfural Acetophenone.

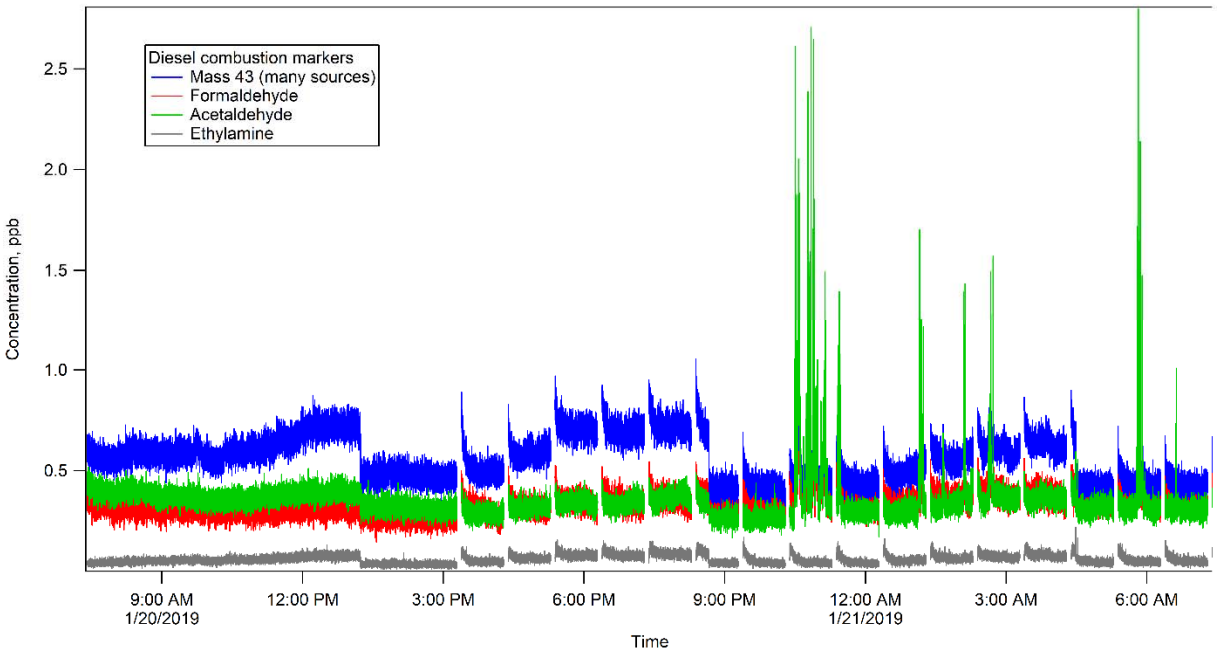

Figure 8-19. Diesel Combustion Markers.

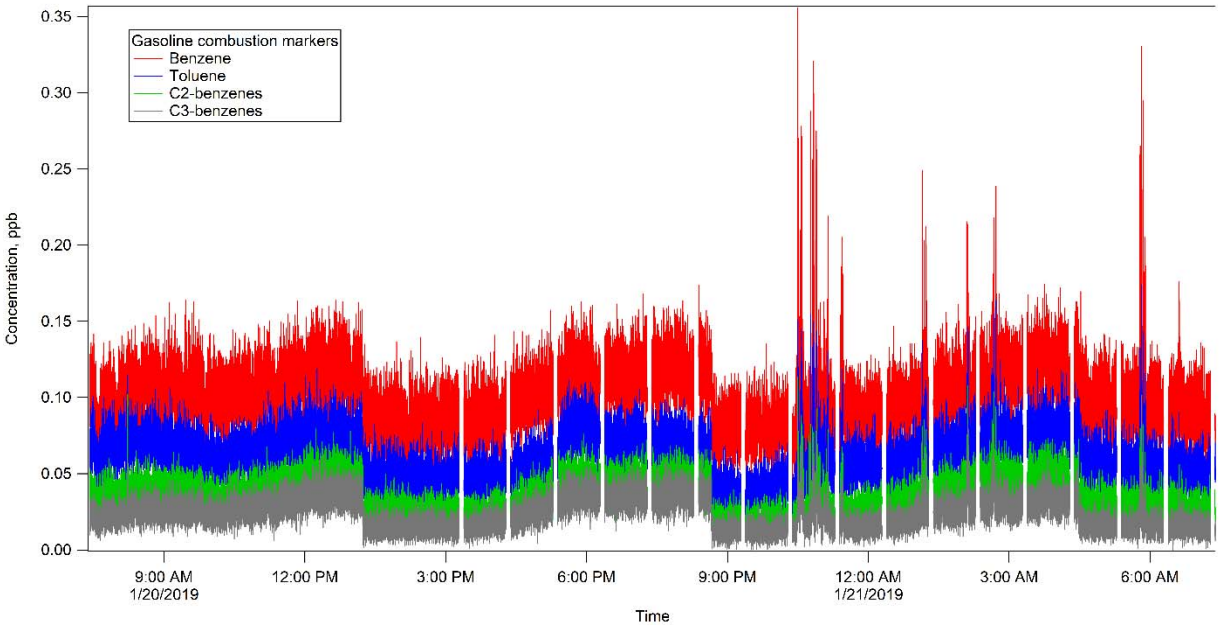

Figure 8-20. Gasoline Combustion Markers.

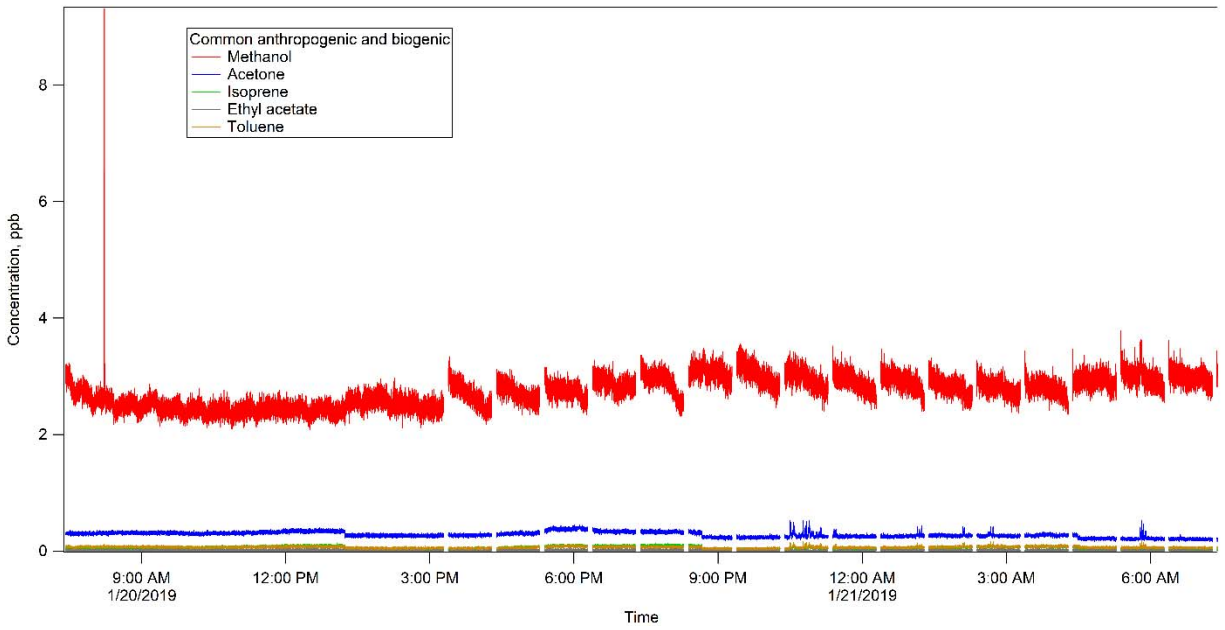

Figure 8-21. Plant and Human Markers.

9.0 WEEK 24 NO^+ MODE TESTING

The PTR-MS was deployed in multiple reagent ion modes during the course of monitoring. The SME set up an automation sequence on the PTR-MS which, when initiated, would sample for roughly 55 minutes in H_3O^+ mode, followed by sampling for roughly 5 minutes in NO^+ mode, thereby ensuring that about 5 minutes of NO^+ data are collected every hour. Due to the time needed for NO^+ mode to reach steady state, this window is shortened by approximately a minute. This mode was typically initiated after the end of a shift and sorbent collection is complete. The reagent ion switching continued overnight and was stopped at the beginning of the next shift. The automatic mode switching did not interfere with routine operations, checks, and verifications performed to validate H_3O^+ data.

Prior to producing typical H_3O^+ plots and deliverables, the collected PTR-MS data had to be separated into their respective modes and processed separately. The plots shown above in this report show slivers of data missing every hour throughout the latter halves of the datasets as a result of this separation. From a qualitative standpoint, looking at just the H_3O^+ data, most analytes of interest are not affected by switching out of and then back into this mode of operation. There appear to be few lingering effects from the transition, with the notable exceptions of a few traces in the marker plots, including methanol, formaldehyde, acetaldehyde, and the sum of fragment ions that appear at m/z 43. In those cases, further testing is being done to determine the extent of the effect on the H_3O^+ data, and what steps can be taken to improve the reportable data. This behavior is not noted in any COPCs with sensitive OELs, such as the list commonly used for Background Study analysis.

In an ongoing effort to understand and characterize PTR-MS performance in NO^+ mode, the 5-minute slices of NO^+ data were processed separately. Testing was performed for the analytes present in currently available standards to produce calibration factors. These factors were calculated using standards run in December 2018, then applied to the 5-minute NO^+ data collected over the course of the Winter Fiscal Year 2019 Background Study, which began on January 14, 2019. Further testing is required in order to obtain calibration factors that appropriately account for ion mode switching. Ultimately, once adequate factors are obtained, the NO^+ data can be validated by comparison to the already well-understood H_3O^+ data, and routine NO^+ reporting can begin. A full writeup of Background Study NO^+ analysis will be provided with the results of 53005-81-RPT-048, *PTR-MS Mobile Laboratory Vapor Monitoring Monthly Report – Month 5*.

10.0 REFERENCES

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53005-81-RPT-048, *PTR-MS Mobile Laboratory Vapor Monitoring Monthly Report – Month 5*, Revision A, TerraGraphics Environmental Engineering, Inc., Pasco, Washington.

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