TOC INCOMING LETTER OF TRANSMITTAL (ILOT)

Vendor/Company Name and address:
TerraGraphics, 428 W. Shoshone Street, Pasco, Washington 99301

Date:	Subcontract Release Number/Purchase Order:	Transmittal Number:	Project Number:	Project/Contract Title:
5/4/2018	53005-081	53005-81-COM-0518-003	N/A	Mobile Lab Data Analysis

Check the applicable designation:

Hard Copy Submittals:	**Electronic Submittals:**
☐ Submittals	☒ Submittals
Vendor is Off-Site: c/o Mission Support Alliance, ATTN: Document Control Mail Stop H4-35, P.O.Box 950, Richland, WA 99352	TOCVND@rl.gov *(external)* ^TOC Vendor *(internal)*
Vendor is On-Site: WRPS, Document Control, 2750, D199, 200E	**Electronic Transmittal: To establish a File Transfer Protocol (FTP) to send and receive vendor material electronically contact Information Resource Management (IRM) this can be used versus email.

Submittal Number	Submittal Description	Specification Number	Specification Paragraph Number	Copies E / H	TOC Document Number	Rev	Supplier Document Number	Supplier Rev
004-005	Task 3 Final Weekly Summary Report: 53005-81-RPT-005	SOW	3.0	E	N/A	0	53005-81-COM-0518-003	0

E = Electronic H = Hardcopy ***No Electronic Media Will Come in Password Protected, See SOW/PO for Acceptable Formats**

Vendor/Company Representative:

John Coddington — *Print First and Last Name*; [signature] — *Signature*; 5/4/2018 — *Date*

DCC Receipt Acknowledgement:

Print First and Last Name — *Signature* — *Date*

RECEIVED
By Kimberly Saworski at 2:32 pm, May 07, 2018

A-6005-315 (REV 13)

Approved for Public Release;
Further Dissemination Unlimited

VIA E-MAIL – TOCVND@rl.gov / Kyle_R_Dickman@rl.gov

53005-81-COM-0518-003

May 4, 2018

Kyle Dickman
Buyer's Technical Representative
Washington River Protection Solutions, LLC
Post Office Box 850
Richland, Washington 99352

Dear Mr. Dickman:

SUBJECT: **CONTRACT 53005, RELEASE 81 - TRANSMITTAL OF FINAL 53005-81-RPT-005, WEEKLY REPORT FOR WEEK 5**

TerraGraphics is pleased to transmit the final weekly summary report, 53005-81-RPT-005, *Weekly Report for Week 5 (April 8, 2018 – April 14, 2018)*, Revision 0, for your distribution and use, as appropriate.

Thank you for the opportunity to support this task. If you have any questions, please feel free to contact me at (509) 547-3883.

Sincerely,

John W. Coddington, Ph.D.
Senior Consulting Scientist
Pasco Office

/kls

cc:
Brandon Black (Brandon_J_Black@rl.gov)
John Coddington (John.Coddington@TerraGraphics.com)
Matt Erickson (Matthew.Erickson@TerraGraphics.com)
Robert Frank (Robert_E_Frank@rl.gov)
Chris Haas (Chris.Haas@TerraGraphics.com)
Heath Low (Heath.Low@TerraGraphics.com)
Cris Lungu (Cristinel_C_Lungu@rl.gov)
Eugene Morrey (Eugene_V_Morrey@rl.gov)
Dale Roberson (Dale_L_Robertson@rl.gov)
Todd Rogers (Todd.Rogers@TerraGraphics.com)
Katie Sichler (Katie.Sichler@TerraGraphics.com)
George Weeks (George_E_Weeks@rl.gov)
Tyler Williams (Tyler.Williams@TerraGraphics.com)

WEEKLY REPORT FOR WEEK 5 (APRIL 8, 2018 – APRIL 14, 2018)

Report No. 53005-81-RPT-005
Revision 0

May 2018

Prepared for:

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

Subcontract 53005, Release 81

Prepared by:

TerraGraphics Environmental Engineering, Inc.
428 W. Shoshone St.
Pasco, WA 99301

TerraGraphics

www.terragraphics.com

Approval Form

Prepared by:

_______________________________ Date: 5/4/2018

Matt Erickson, Ph.D.

Reviewed by:

_______________________________ Date: 5/4/2018

Todd Rogers, Ph.D.

Approved by:

_______________________________ Date: 5/4/2018

John Coddington, Ph.D.

Record of Revision

Revision	Date	Pages/Sections Changed	Brief Description
0	05/2018	N/A	Initial release.

Table of Contents

Figures

Tables

Acronyms

CAPA	Corrective and Preventative Action
COPC	Chemical of Potential Concern
FTP	File Transfer Protocol
NDMA	N-nitrosodimethylamine
NMEA	N-nitrosomethylethylamine
NMOR	N-nitrosomorpholine
OEL	Occupational Exposure Limit
ppb	parts per billion
PTR-MS	Proton Transfer Reaction – Mass Spectrometer
QA	Quality Assurance
QC	Quality Control
WRPS	Washington River Protection Solutions, LLC

1.0 APRIL 8, 2018 – APRIL 9, 2018 – STUDY SITE #2

1.1 Quality Assessment

Data from April 8, 2018, were transferred to TerraGraphics via the Washington River Protection Solutions, LLC (WRPS) File Transfer Protocol (FTP) site on April 12, 2018. Data were assessed using Procedure 17124-DOE-HS-102, "Mobile Laboratory Data Processing – Analysis." A completed Data Exchange Checklist was sent to WRPS on April 16, 2018. The data were accepted by TerraGraphics with the following comments. All startup, shutdown, and calibration procedures were adequately documented and all other checks passed the acceptance limits. No other exceptions besides those below were noted.

The generator exhaust line blew off of the Mobile Laboratory on April 8, 2018, and Corrective and Preventative Action (CAPA) 1821 was issued on April 9, 2018. Due to high winds, the exhaust line blew off the Mobile Laboratory in the evening or during the night of April 8, 2018. In the future, when expecting high winds or other dramatic weather events, Mobile Laboratory personnel will take necessary precautions to secure the exhaust line prior to leaving the Mobile Laboratory for the day.

1.2 Summary

The Mobile Laboratory personnel performed background sampling using the Mobile Laboratory from April 8, 2018, to April 9, 2018 at Study Site 2. Site 2 is located near the northern end of the 200W Tank Farms. The Mobile Laboratory arrived at Site 2 at 11:59 on April 8, 2018. The initial quality assurance/quality control (QA/QC) zero air/sensitivity checks were performed on the CO_2 monitor, NH_3 monitor, and the Proton Transfer Reactor – Mass Spectrometer (PTR-MS) beginning at 12:12. The data file names were confirmed and routine data collection resumed by 13:12. The Mobile Laboratory staff departed the monitoring site at 15:45.

The Mobile Laboratory staff returned to Site 2 at 06:52 on April 9, 2018, and began confirmatory sample collection by 06:58. Due to variable wind, the exhaust line was repositioned several times between 08:00 and 10:00 to minimize influence on measurements. Closeout zero air/sensitivity checks were performed at 10:41. The Mobile Laboratory moved to Site 3 by 12:18.

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

1.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

- PTR-MS,
- LI-COR®[1] CO_2 Monitor,
- Picarro Ammonia Monitor, and
- Weather Station.

Confirmatory air samples were collected as follows:

Table 1-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
2	8-Apr	Thermosorb®[2]/N	EL22188	12:20	15:20	180
2	8-Apr	CarboTrap®[3]-300	A007213	12:28	13:38	70
2	9-Apr	Thermosorb/N	EL22197	06:58	10:00	181
2	9-Apr	CarboTrap-300	A020988	07:07	08:17	70

[1] LI-COR is a registered trademark of LI-COR, Inc., Lincoln, Nebraska.
[2] Thermosorb is a registered trademark of Ellutia Limited Company, Cambridgeshire, United Kingdom.
[3] CarboTrap is a registered trademark of Sigma-Aldrich Co., LLC, St. Louis, Missouri.

Table 1-2 displays the statistical information for the monitoring period of April 8, 2018, to April 9, 2018. By definition, the occupational exposure limit (OEL) is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 1-2. Statistical Information for the Monitoring Period of April 8, 2018 – April 9, 2018.

COPC #	COPC Name	Reporting Limit (ppb)	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel. St. Dev. (%)	Max (ppb)	Median (ppb)	Sec. over 50% OEL	Sec. over OEL
1	ammonia	1	25000	5.46	1.607	29.4%	9.99	4.72	0	0
2	furan	0.09	1	0.045	0.015	77.5%	0.309	0.017	0	0
3	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	0.22	1	0.112	0.033	126.6%	N/A*	N/A*	N/A	N/A
4	NDMA**	0.06	0.3	0.032	0.020	122.9%	0.132	0.008	0	0
5	2-methylfuran	0.05	1	0.026	0.016	94.2%	0.340	0.015	0	0
6	NEMA	0.02	0.3	0.012	0.010	190.2%	0.073	0.000	0	0
7	2,5-dimethylfuran	0.05	1	0.026	0.013	101.6%	0.246	0.011	0	0
8	NDEA	0.01	0.1	0.006	0.006	214.5%	0.047	0.000	0	0
9	2-propylfuran + 2-ethyl-5-methylfuran	0.02	1	0.011	0.008	119.7%	0.141	0.004	0	0
10	NMOR	0.05	0.6	0.025	0.005	104.9%	0.064	0.003	0	0
11	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	0.04	1	0.020	0.007	63.9%	0.099	0.010	0	0
12	2-pentylfuran	0.04	1	0.020	0.008	45.1%	0.124	0.017	0	0
13	2-heptylfuran	0.02	1	0.010	0.004	61.4%	0.048	0.006	0	0
14	2-octylfuran	0.01	1	0.005	0.002	215.8%	0.029	0.000	0	0
15	6-(2-furanyl)-6-methyl-2-heptanone	0.01	1	0.005	0.002	159.2%	0.017	0.000	0	0
16	furfural acetophenone	0.07	1	0.035	0.004	55.2%	0.026	0.006	0	0

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.949 ppb and the median value was 0.022 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

**Nitrosamine results are also suspect due to interferants identified during the background study.

The following figures display each chemical of potential concern (COPC) signal, overlaid with the same signal smoothed using a 1-minute moving average, and CO_2, for the monitoring period April 8, 2018, to April 9, 2018.

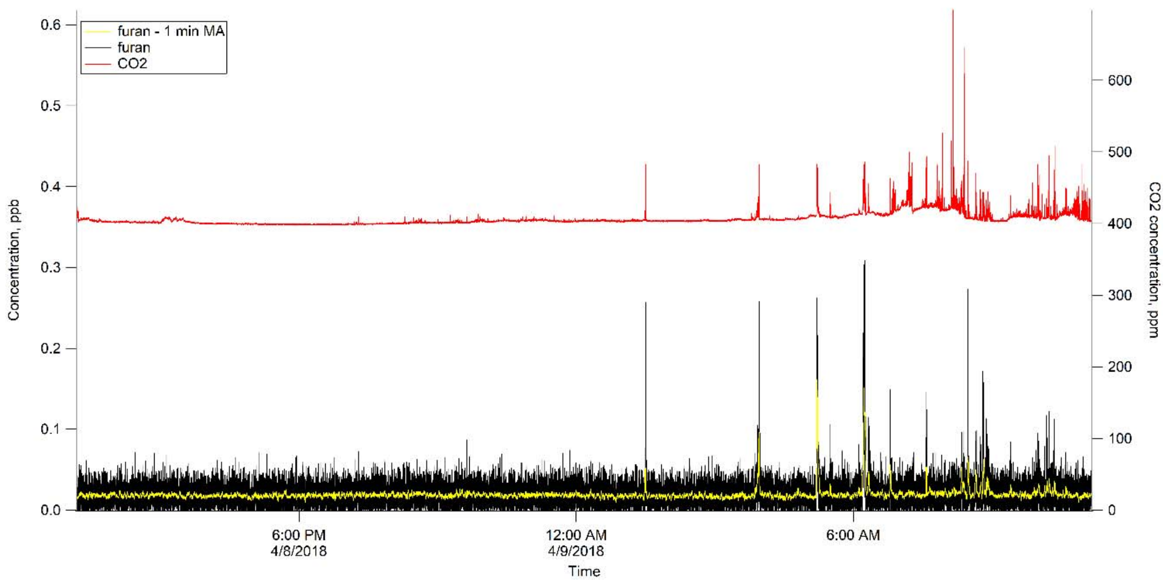

Figure 1-2. Furan.

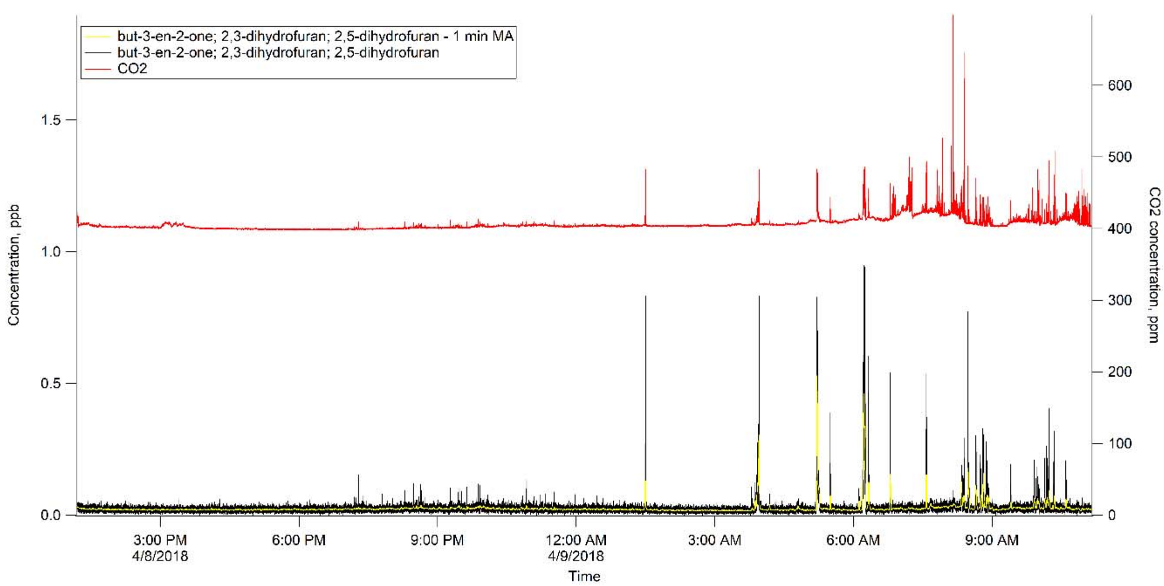

Figure 1-3. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

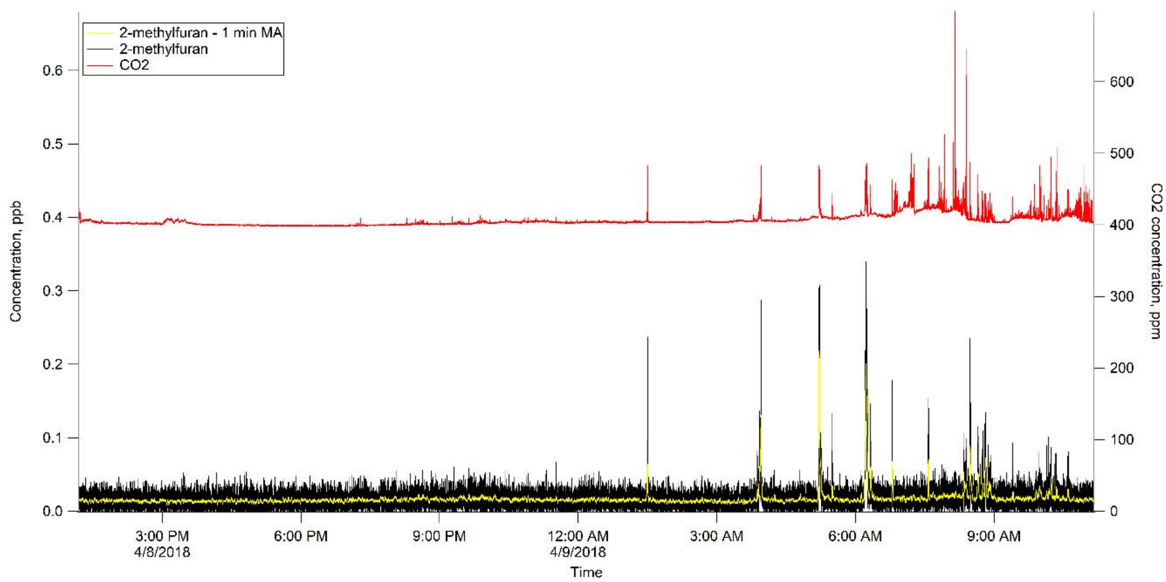

Figure 1-4. 2-methylfuran.

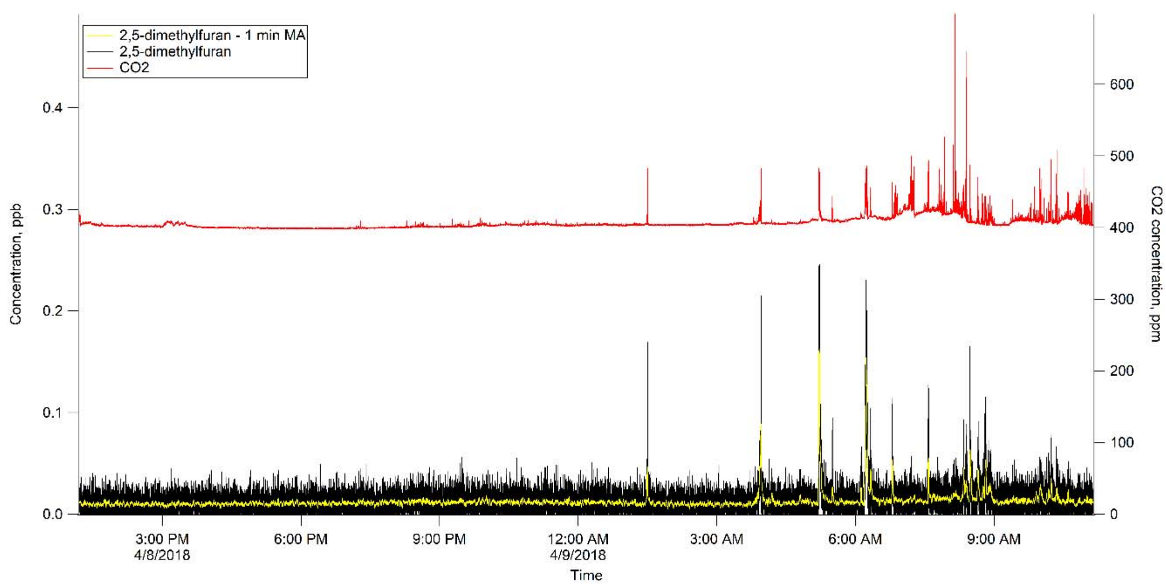

Figure 1-5. 2,5-dimethylfuran.

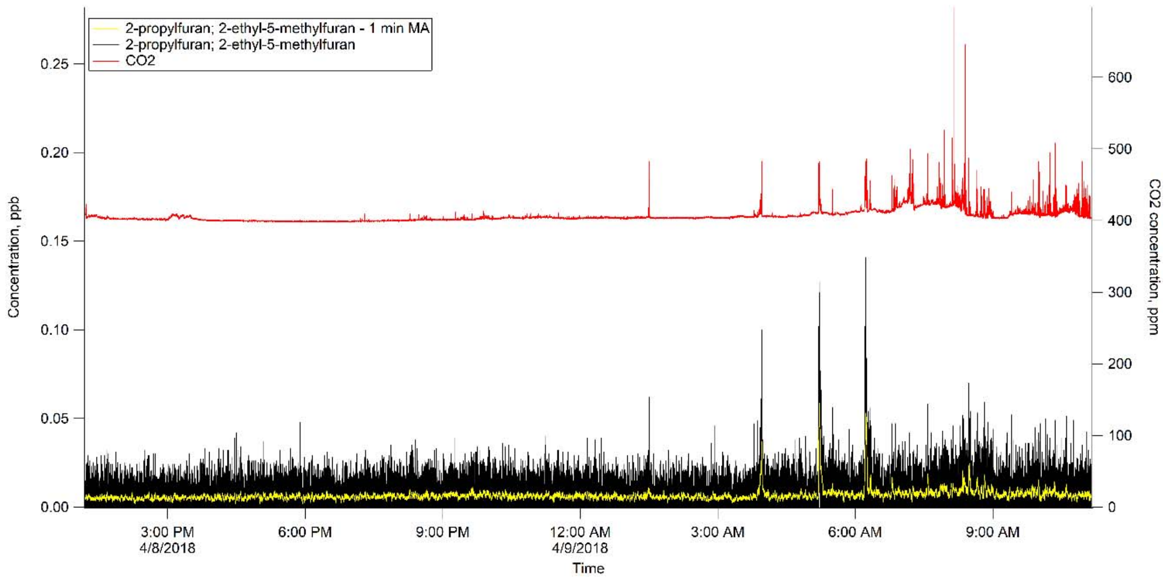

Figure 1-6. 2-propylfuran + 2-ethyl-5-methylfuran.

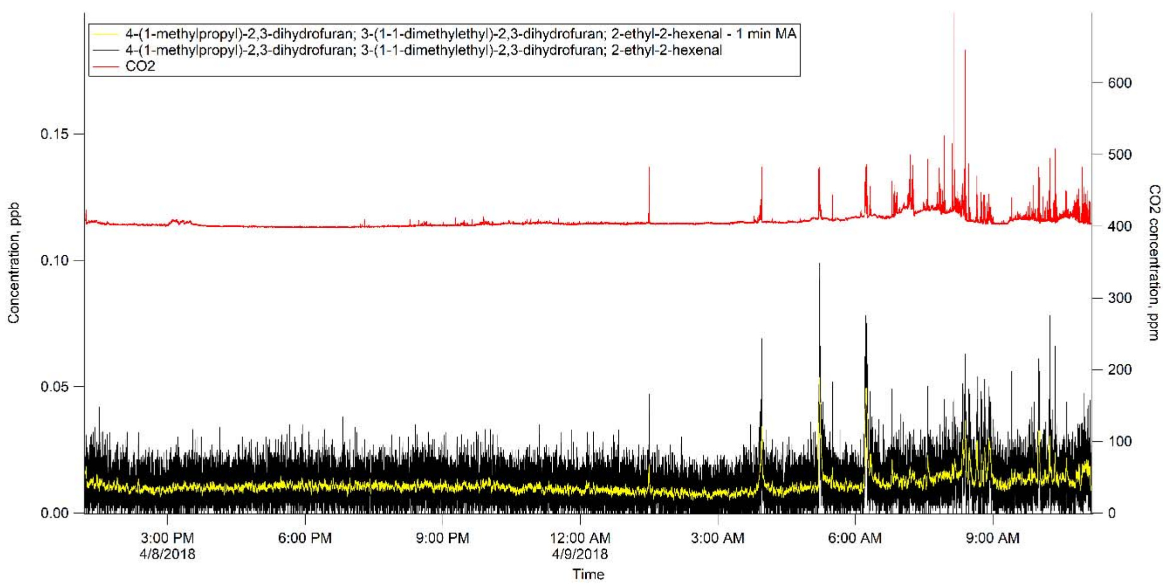

Figure 1-7. 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1-1-dimethylethyl)-2,3-dihydrofuran + 2-ethyl-2-hexenal.

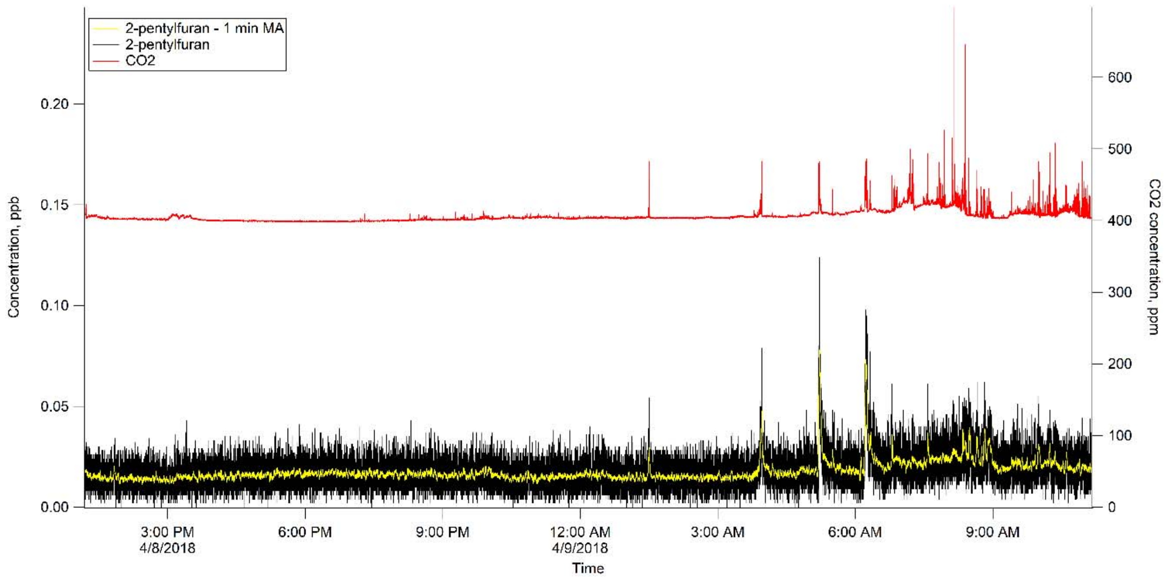

Figure 1-8. 2-pentylfuran.

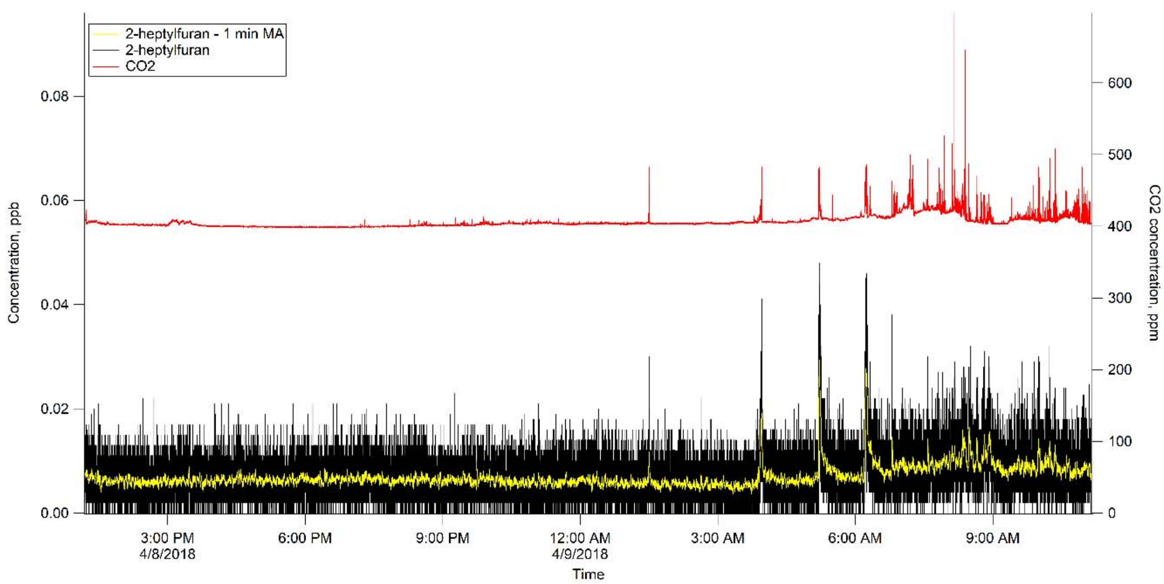

Figure 1-9. 2-heptylfuran.

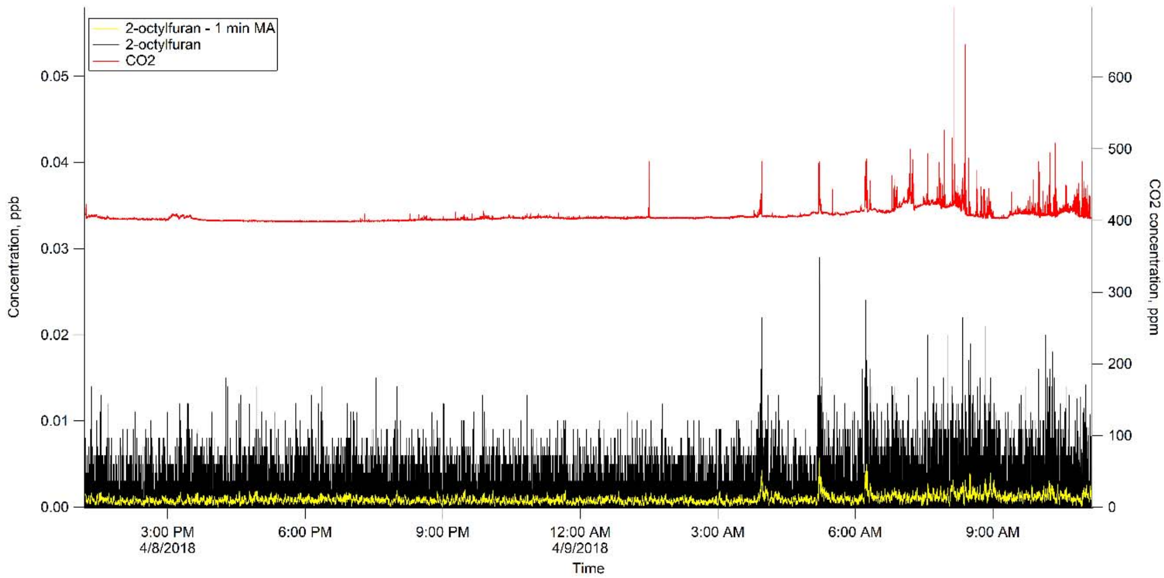

Figure 1-10. 2-octylfuran.

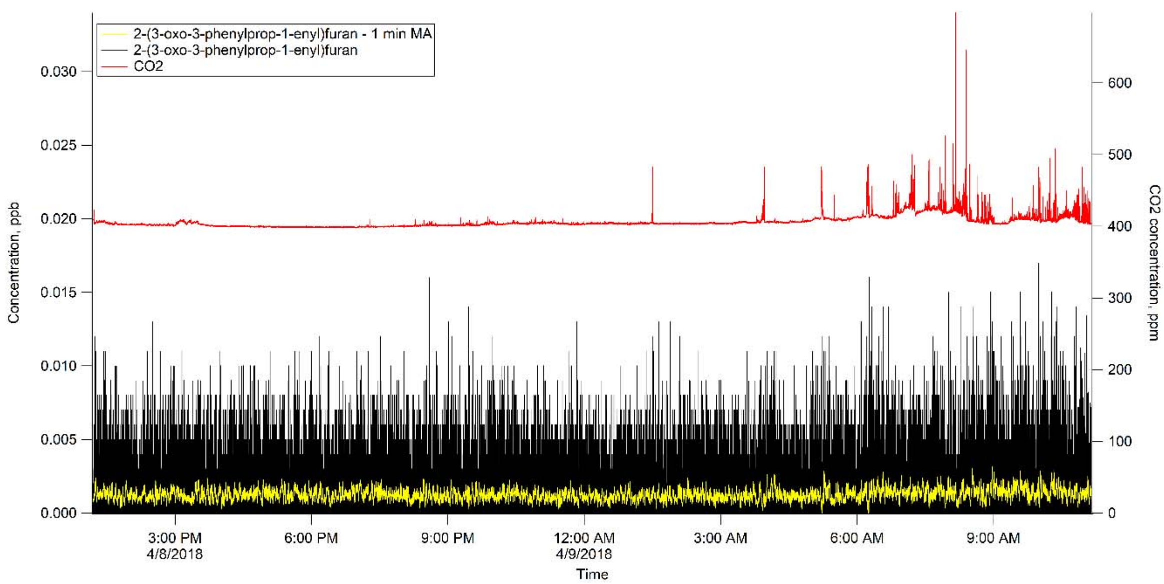

Figure 1-11. 2-(3-oxo-3-phenylprop-1-enyl)furan.

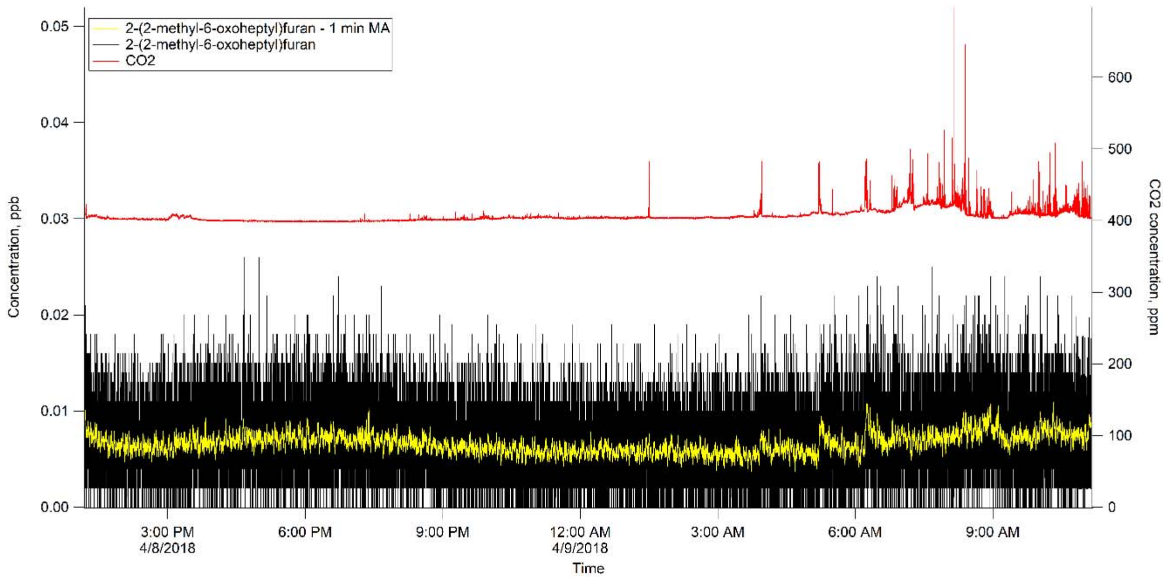

Figure 1-12. 2-(2-methyl-6-oxoheptyl)furan.

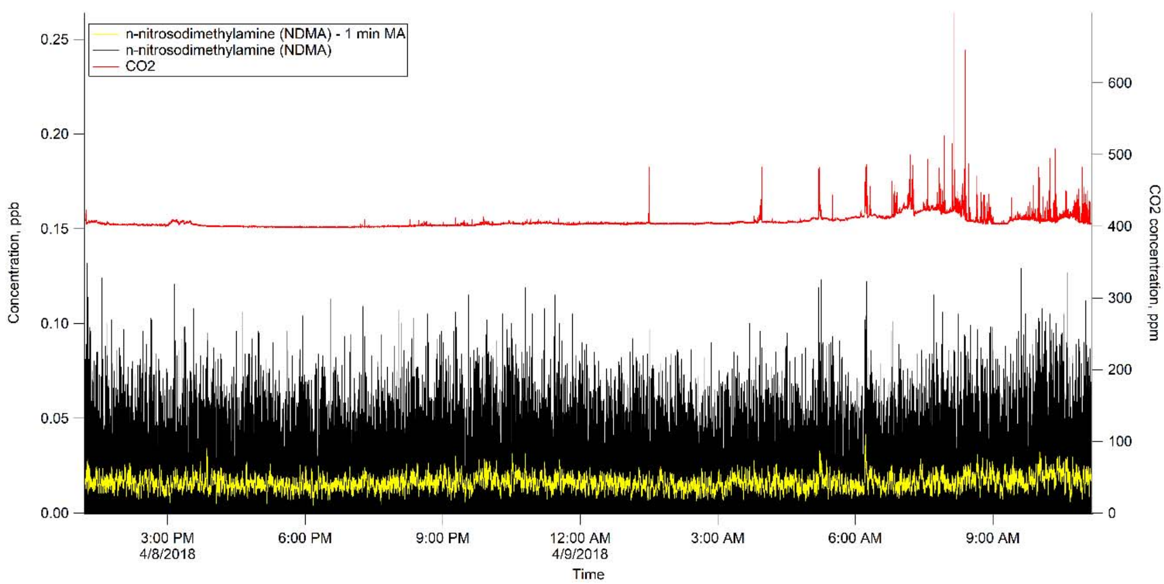

Figure 1-13. N-nitrosodimethylamine (NDMA).

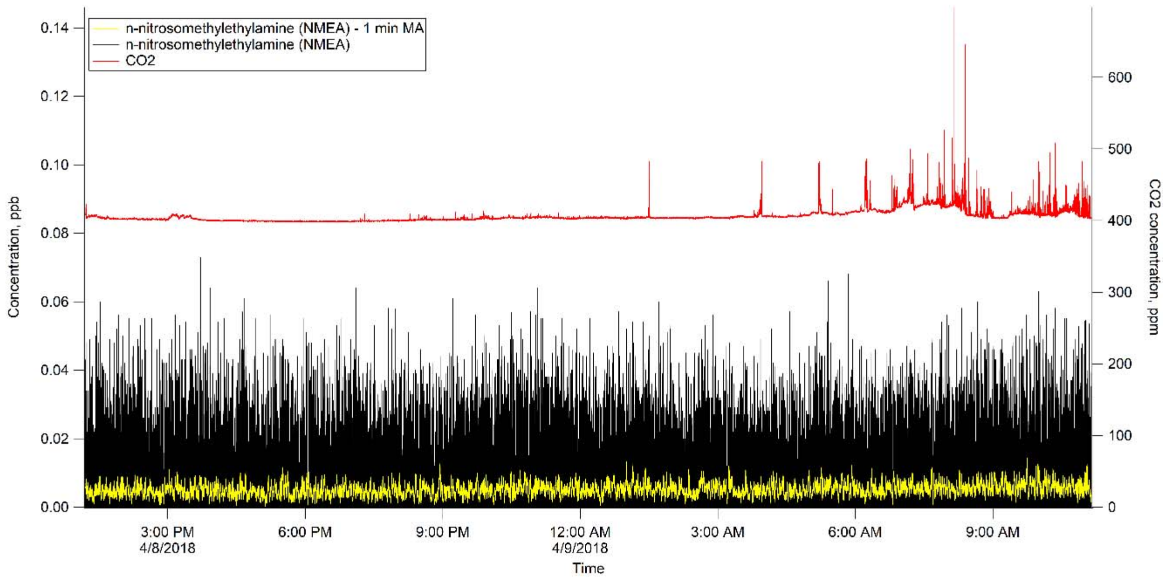

Figure 1-14. N-nitrosomethylethylamine (NMEA).

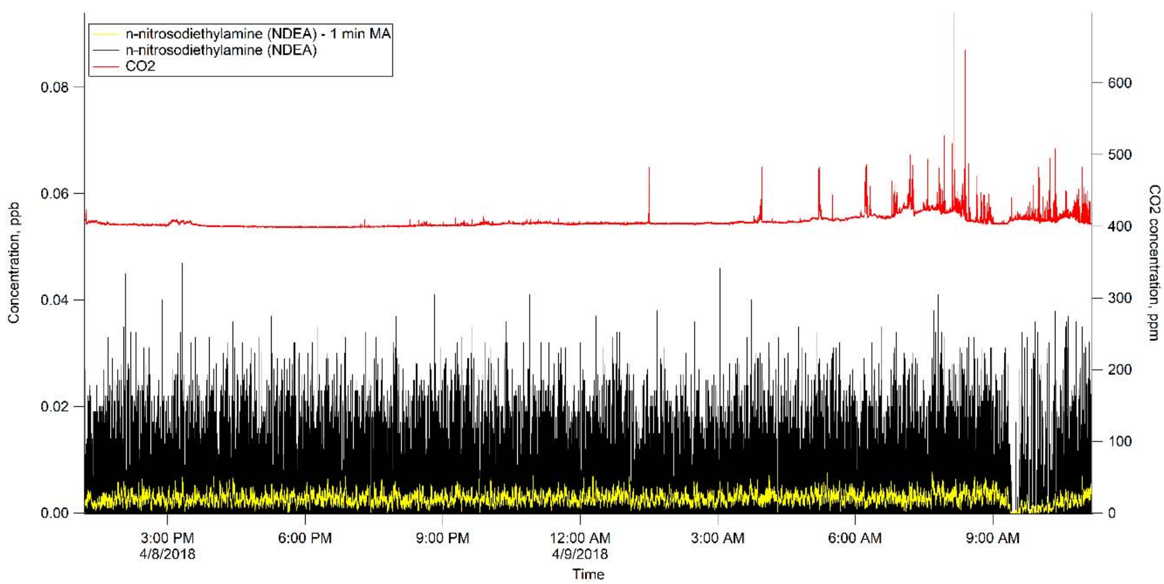

Figure 1-15. N-nitrosodiethylamine (NDEA).

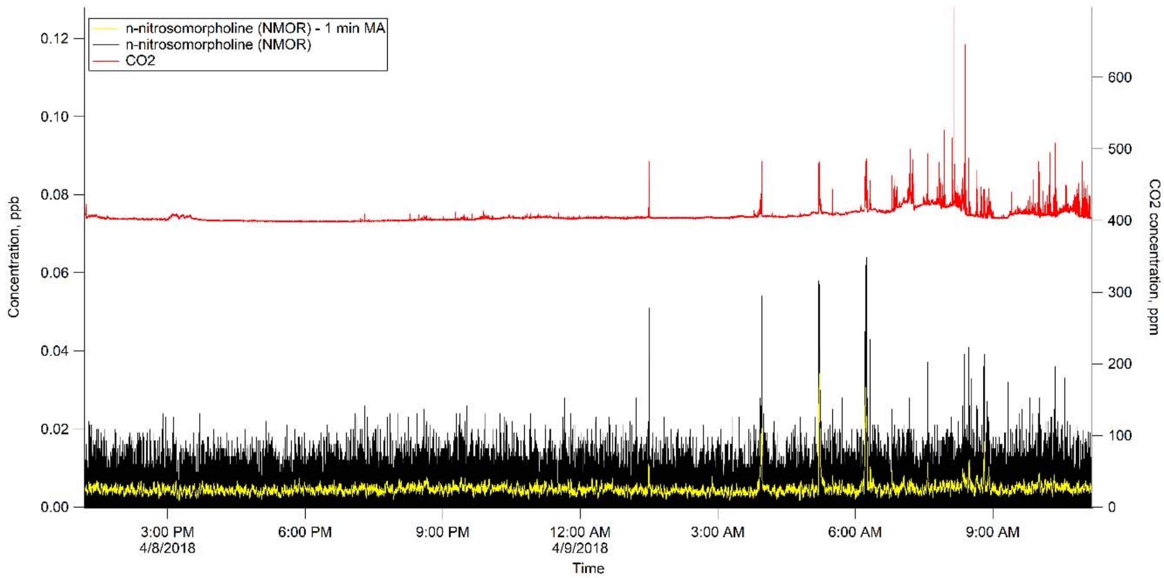

Figure 1-16. N-nitrosomorpholine (NMOR).

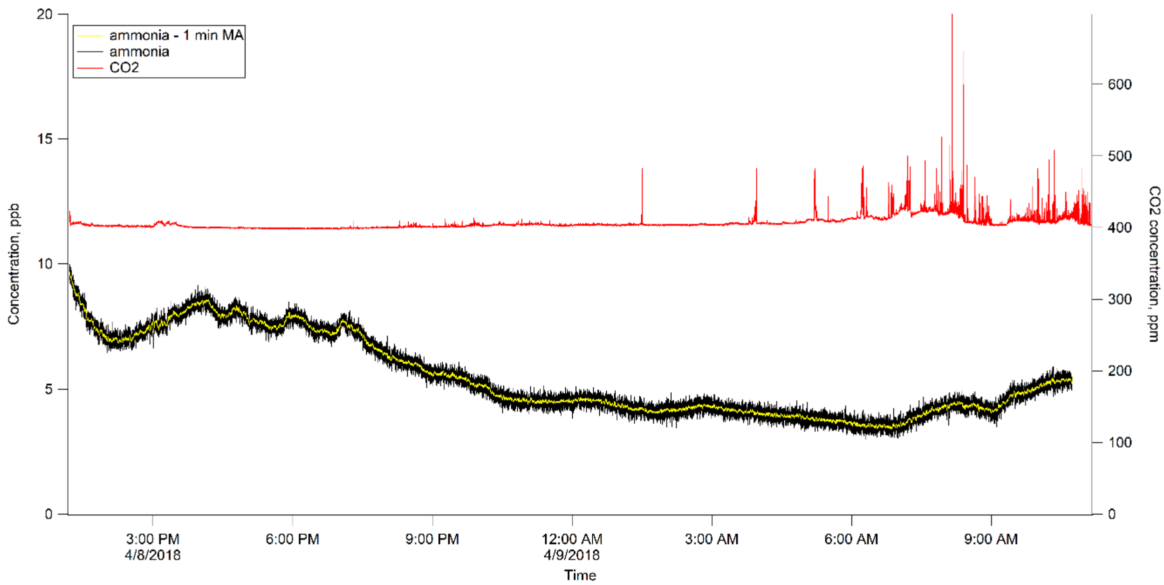

Figure 1-17. Ammonia.

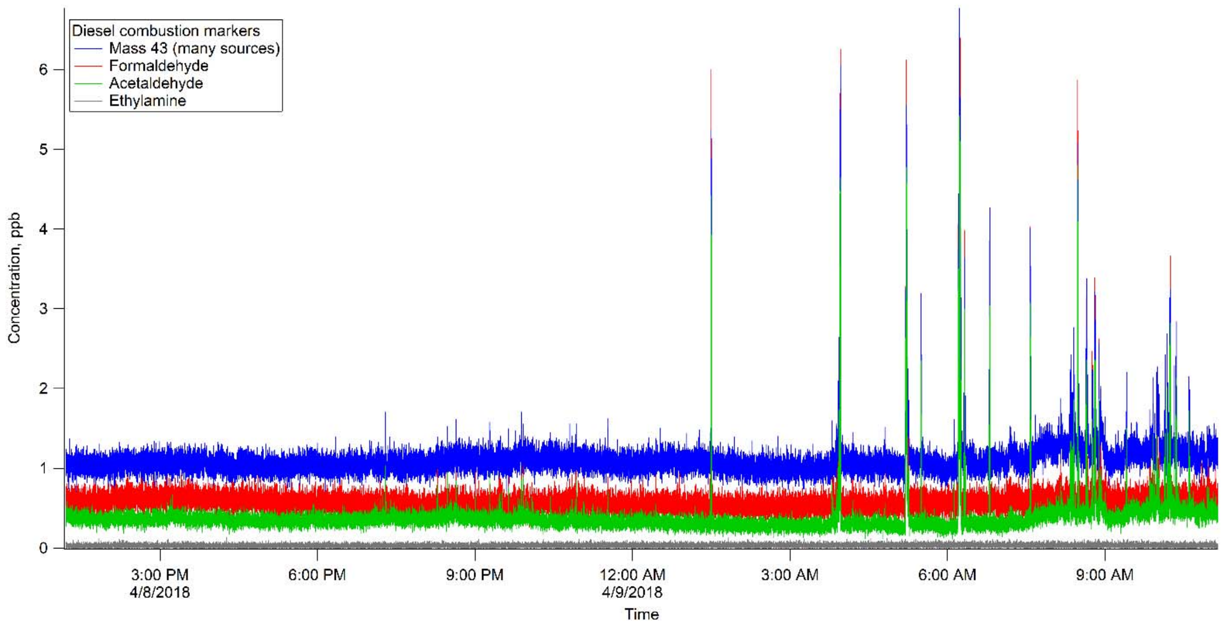

Figure 1-18. Diesel Combustion Markers.

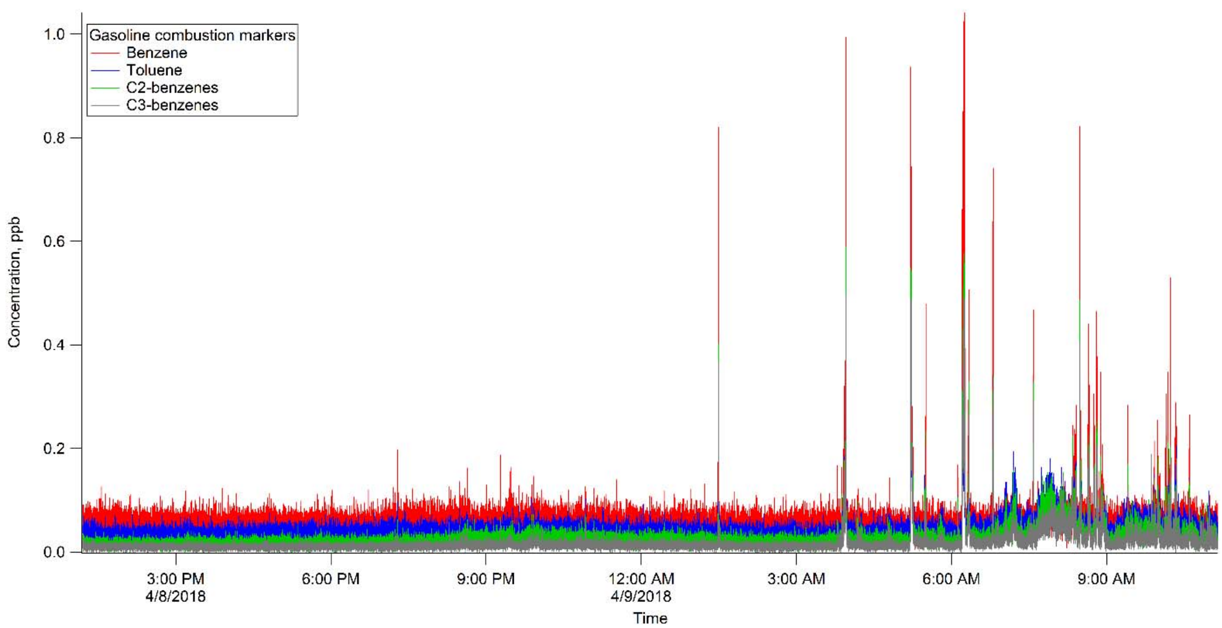

Figure 1-19. Gasoline Combustion Markers.

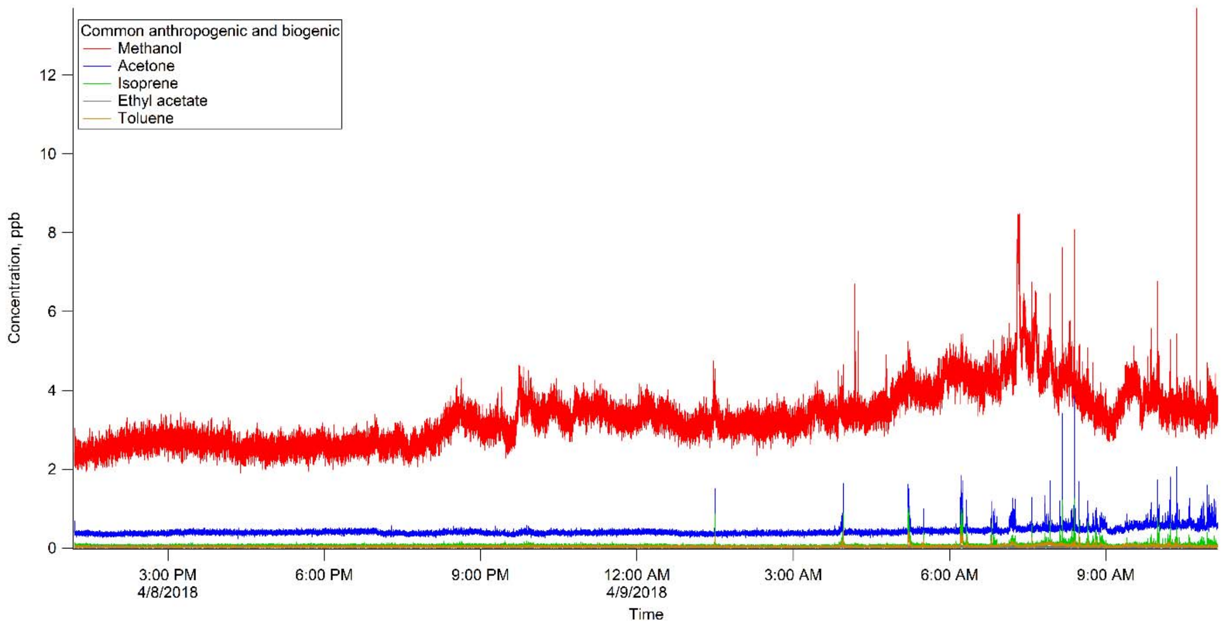

Figure 1-20. Plant and Human Markers.

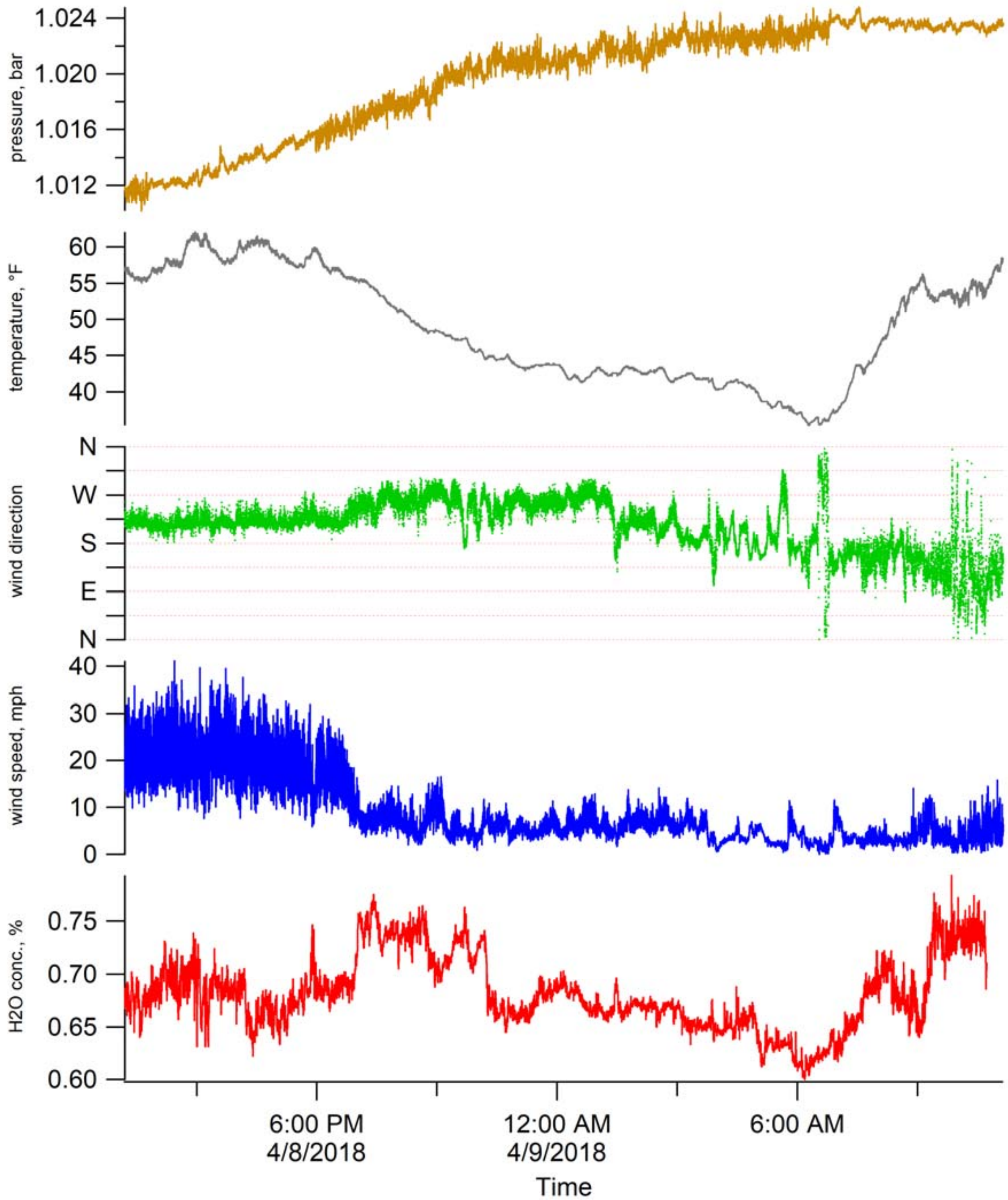

Figure 1-21. Weather Data.

2.0 APRIL 9, 2018 – APRIL 10, 2018 – STUDY SITE #3

2.1 Quality Assessment

Data from April 9, 2018, were transferred to TerraGraphics via the WRPS FTP site on April 17, 2018. Data were assessed using Procedure 17124-DOE-HS-102. A completed Data Exchange Checklist was sent to WRPS on April 17, 2018. The data were accepted by TerraGraphics with the following comments. All startup, shutdown, and calibration procedures were adequately documented and all other checks passed the acceptance limits. No other exceptions besides those below were noted.

2.2 Summary

The Mobile Laboratory personnel performed background sampling using the Mobile Laboratory from April 9, 2018, to April 10, 2018 at Study Site 3. Site 3 is located near the corner of 4th and Buffalo just to the west of the 242-A Evaporator. This site historically has seen the occurrence of several AOP-15 events (reports of unusual odors). The Mobile Laboratory arrived at Site 3 at 12:10 on April 9, 2018. The initial QA/QC zero air/sensitivity checks were performed on the CO_2 monitor, NH_3 monitor, and the PTR-MS beginning at 12:20. The data file names were confirmed and routine data collection resumed by 13:30. The exhaust line was moved at 14:09 and 14:15 to account for shifting winds. The Mobile Laboratory staff departed the monitoring site at 15:35.

The Mobile Laboratory staff returned to Site 3 at 06:25 on April 10, 2018, and began confirmatory sample collection by 06:42. Data collection was stopped briefly at 06:26 to fix 4-second data discrepancies. Rain at 07:30 prompted a call to Mr. George Weeks to approve the use of a funnel to protect sample collection. Due to variable wind, the exhaust line was repositioned several times between 08:00 and 10:00 to minimize influence on measurements. Closeout zero air/sensitivity checks were performed at 10:43. The Mobile Laboratory moved to Site 4 by 12:08.

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

2.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

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

Confirmatory air samples were collected as follows:

Table 2-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
3	9-Apr	Thermosorb/N	EL22196	12:28	15:30	181
3	9-Apr	CarboTrap-300	A048104	12:38	13:50	71
3	10-Apr	Thermosorb/N	EL22195	06:42	09:44	181
3	10-Apr	CarboTrap-300	A001331	06:50	08:05	75

Table 2-2 displays the statistical information for the monitoring period of April 9, 2018, to April 10, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to

OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 2-2. Statistical Information for the Monitoring Period of April 9, 2018 – April 10, 2018.

COPC #	COPC Name	Reporting Limit (ppb)	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel. St. Dev. (%)	Max (ppb)	Median (ppb)	Sec. over 50% OEL	Sec. over OEL
1	ammonia	1	25000	5.82	0.491	8.4%	7.51	5.80	0	0
2	furan	0.09	1	0.046	0.021	71.5%	0.467	0.026	0	0
3	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	0.22	1	0.114	0.058	87.0%	N/A*	N/A*	N/A	N/A
4	NDMA**	0.06	0.3	0.037	0.030	115.7%	0.290	0.016	134	0
5	2-methylfuran	0.05	1	0.036	0.027	75.5%	0.603	0.030	4	0
6	NEMA	0.02	0.3	0.015	0.016	179.0%	0.113	0.000	0	0
7	2,5-dimethylfuran	0.05	1	0.031	0.022	77.0%	0.366	0.024	0	0
8	NDEA	0.01	0.1	0.007	0.007	230.9%	0.056	0.000	8	0
9	2-propylfuran + 2-ethyl-5-methylfuran	0.02	1	0.015	0.013	102.7%	0.186	0.009	0	0
10	NMOR	0.05	0.6	0.025	0.007	88.6%	0.109	0.007	0	0
11	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	0.04	1	0.021	0.010	51.5%	0.155	0.019	0	0
12	2-pentylfuran	0.04	1	0.024	0.012	42.1%	0.166	0.028	0	0
13	2-heptylfuran	0.02	1	0.012	0.006	52.1%	0.075	0.011	0	0
14	2-octylfuran	0.01	1	0.005	0.003	184.4%	0.029	0.000	0	0
15	6-(2-furanyl)-6-methyl-2-heptanone	0.01	1	0.005	0.003	156.3%	0.020	0.000	0	0
16	furfural acetophenone	0.07	1	0.035	0.004	45.3%	0.044	0.009	0	0

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 1.394 ppb and the median value was 0.050 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

**Nitrosamine results are also suspect due to interferants identified during the background study.

The following figures display each COPC signal, overlaid with the same signal smoothed using a 1-minute moving average, and CO_2, for the monitoring period April 9, 2018, to April 10, 2018.

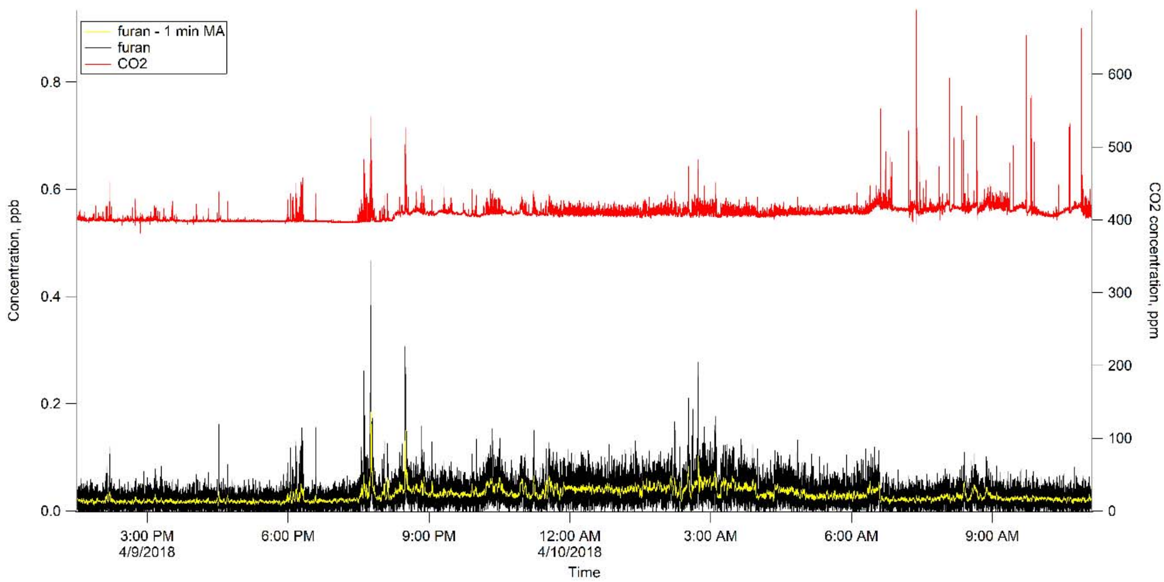

Figure 2-2. Furan.

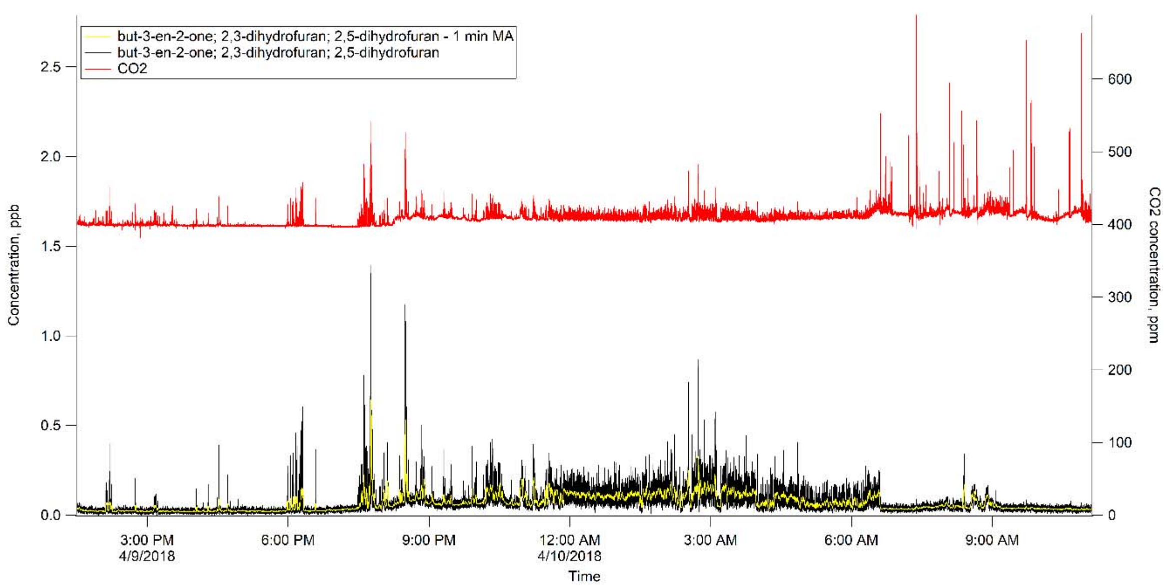

Figure 2-3. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

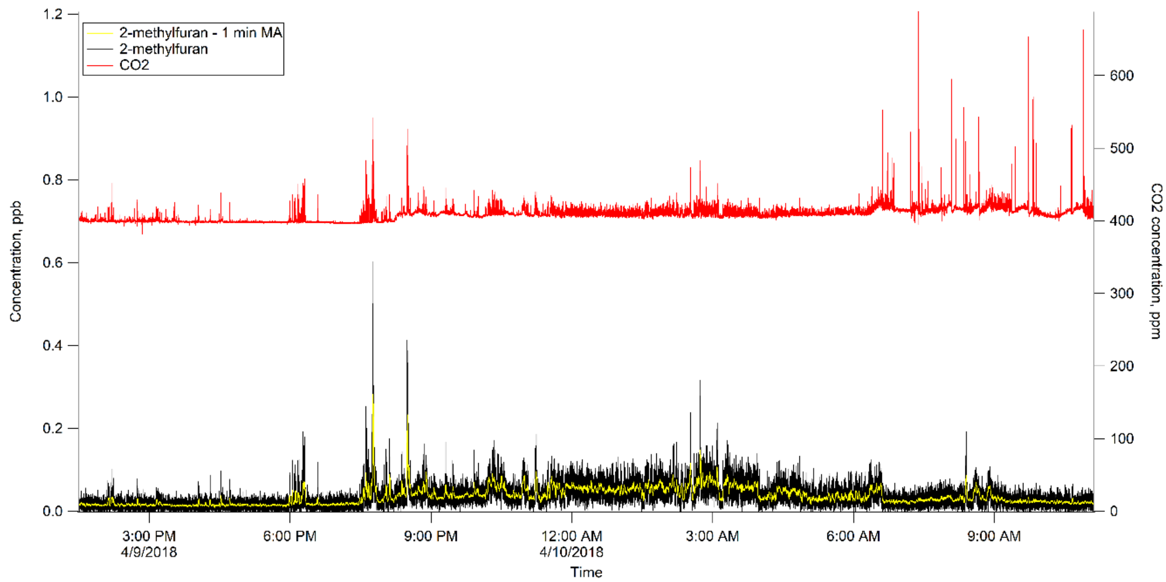

Figure 2-4. 2-methylfuran.

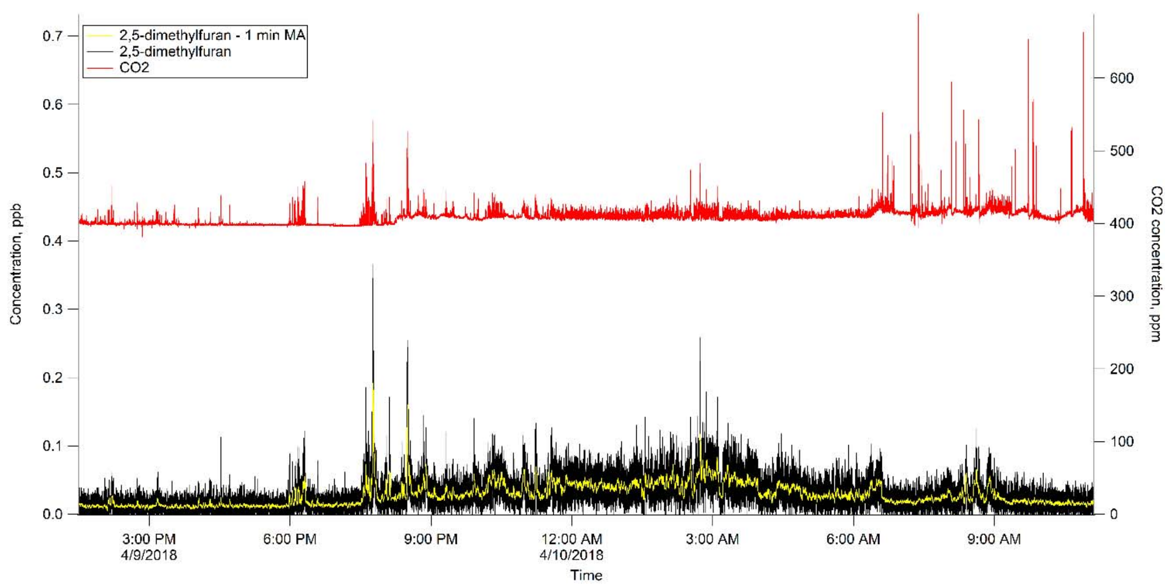

Figure 2-5. 2,5-dimethylfuran.

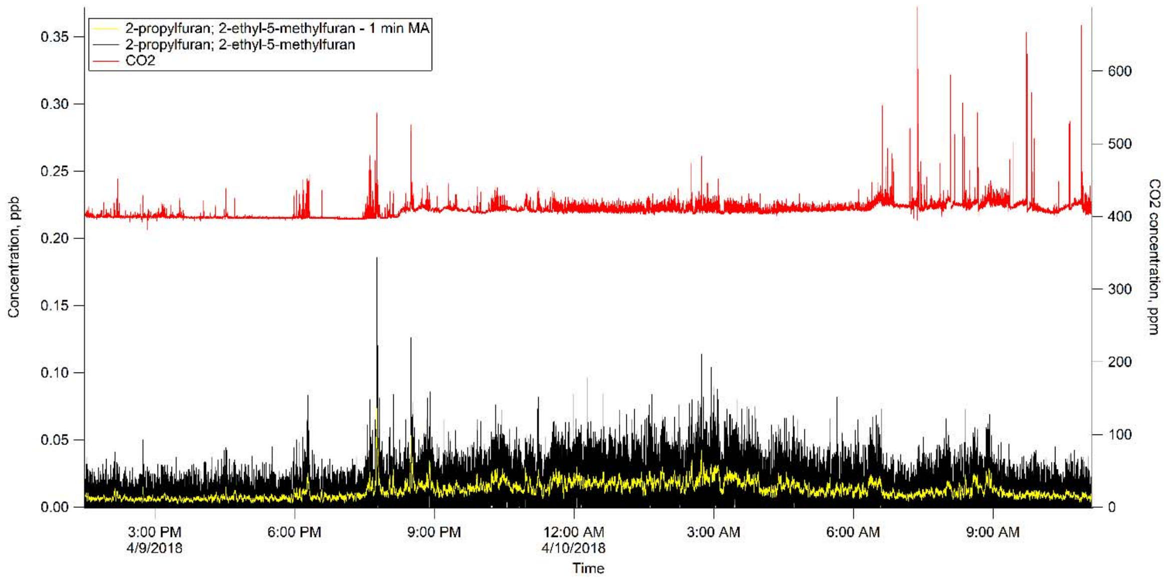

Figure 2-6. 2-propylfuran + 2-ethyl-5-methylfuran.

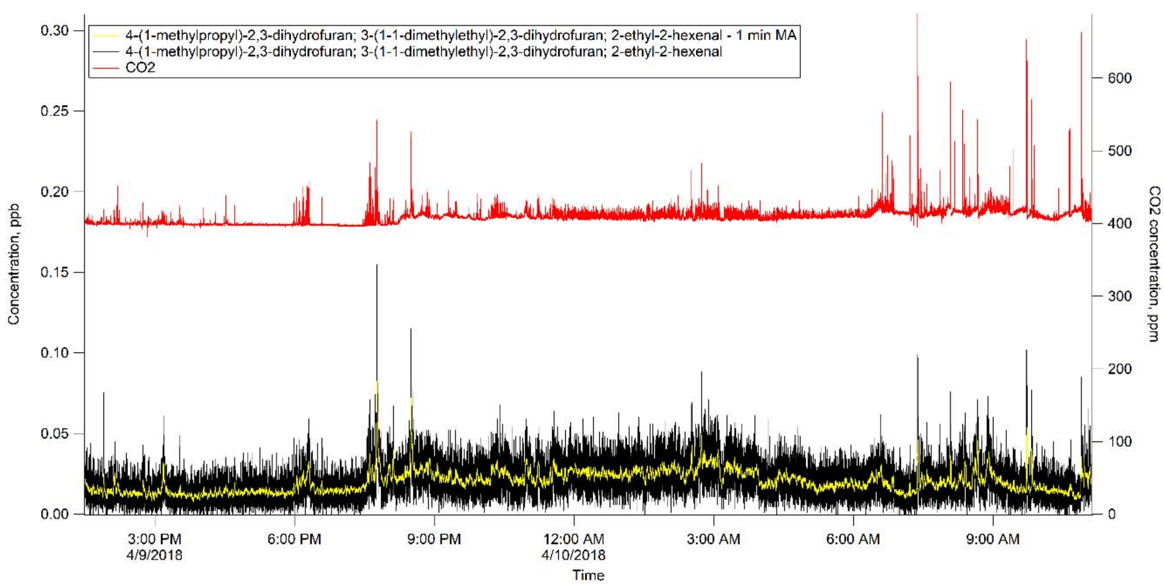

Figure 2-7. 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1-1-dimethylethyl)-2,3-dihydrofuran + 2-ethyl-2-hexenal.

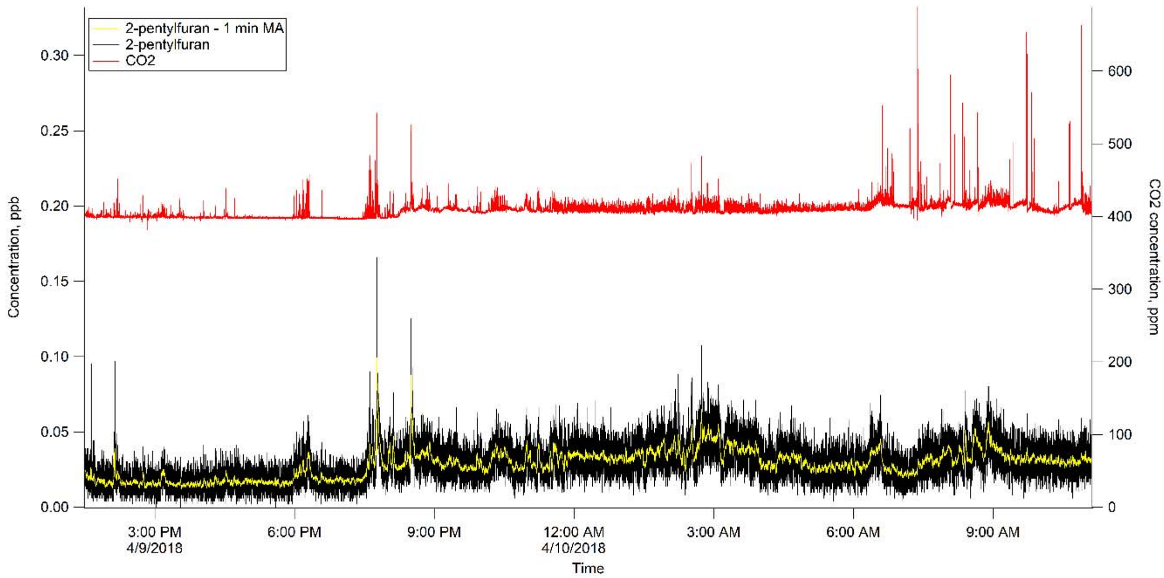

Figure 2-8. 2-pentylfuran.

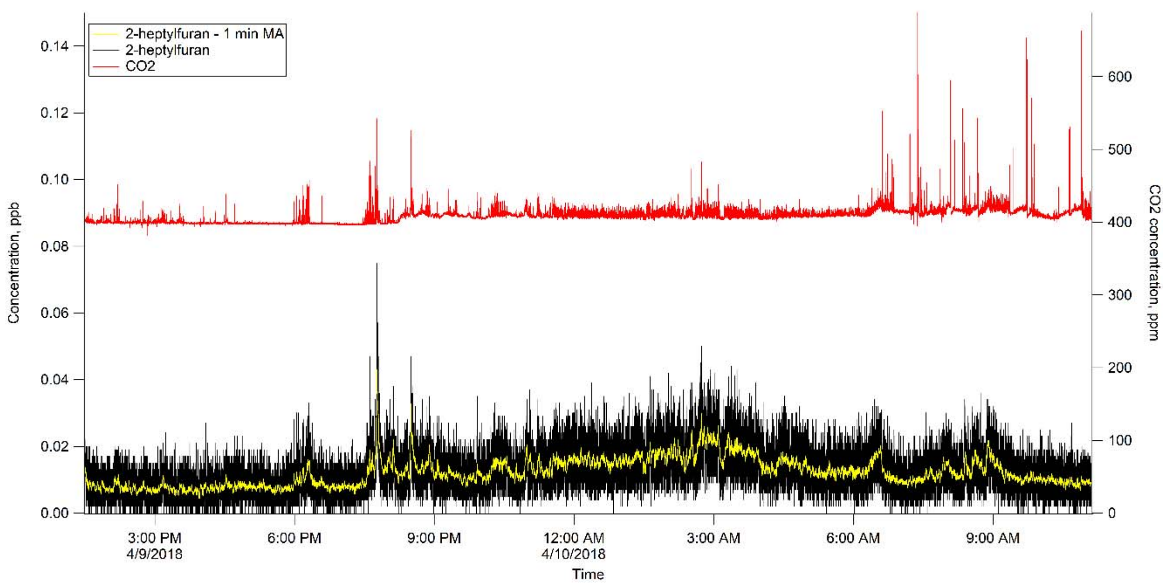

Figure 2-9. 2-heptylfuran.

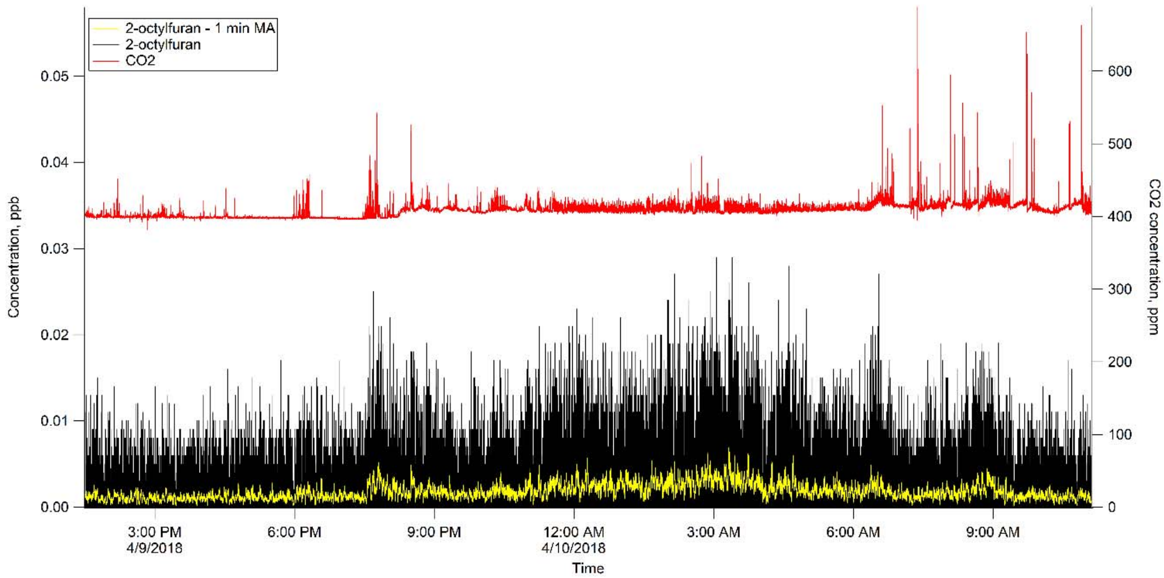

Figure 2-10. 2-octylfuran.

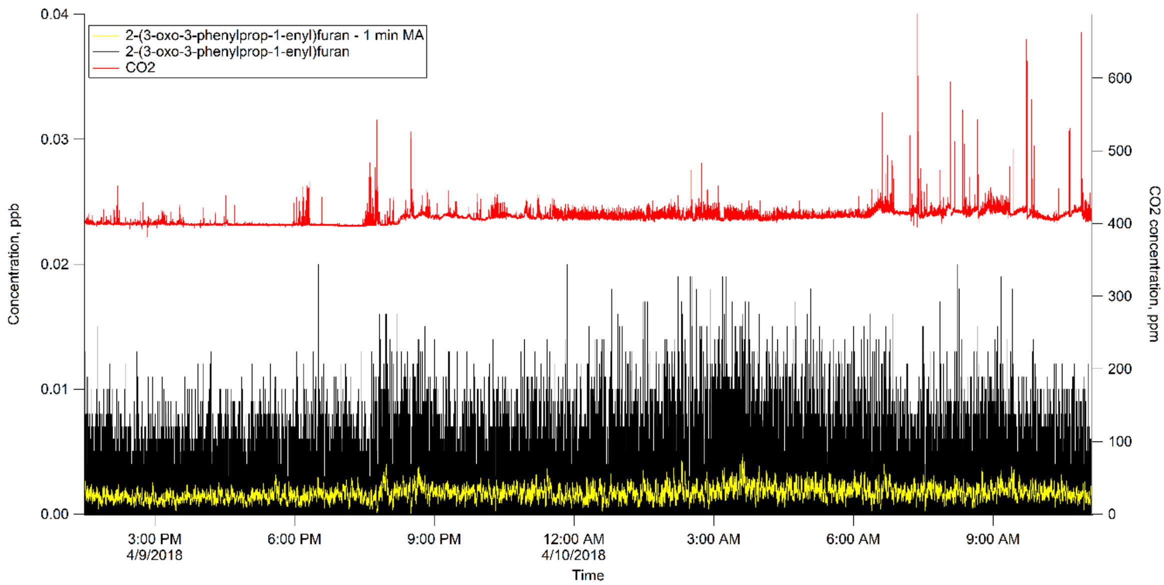

Figure 2-11. 2-(3-oxo-3-phenylprop-1-enyl)furan.

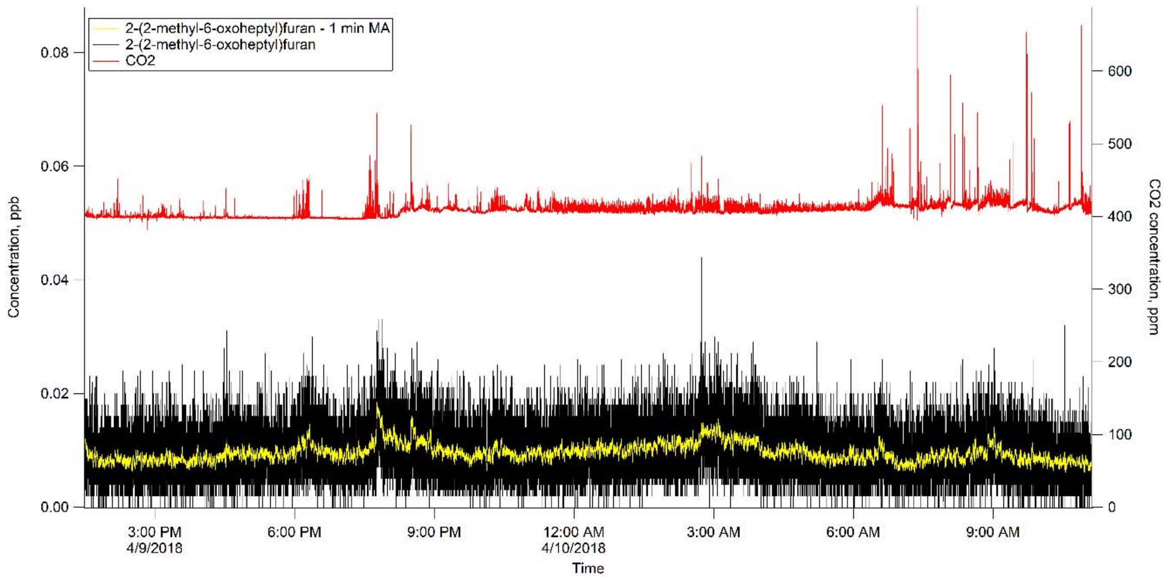

Figure 2-12. 2-(2-methyl-6-oxoheptyl)furan.

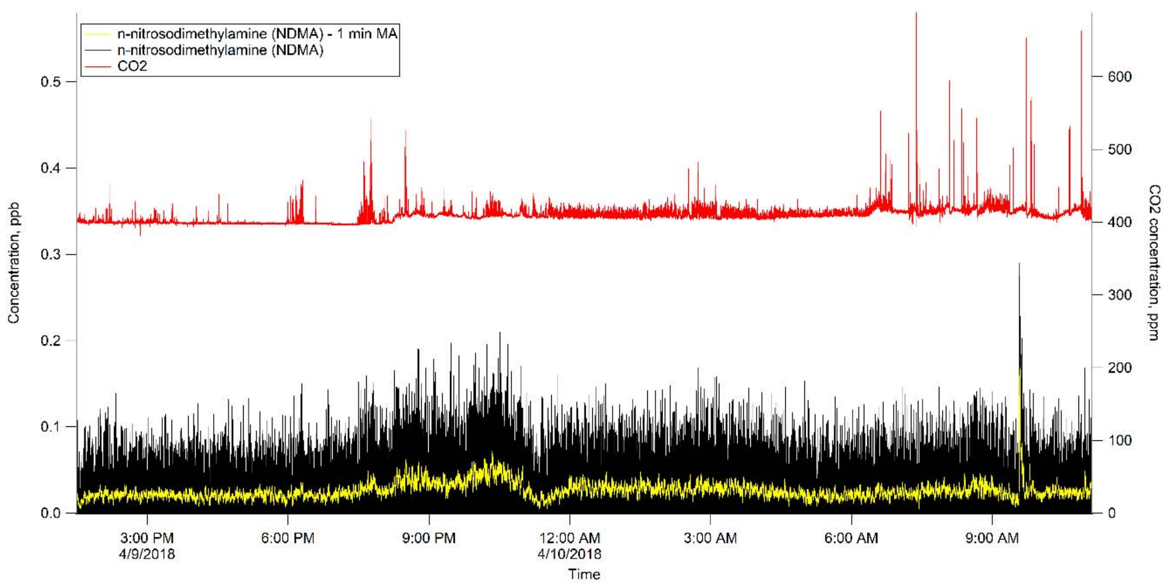

Figure 2-13. N-nitrosodimethylamine (NDMA).

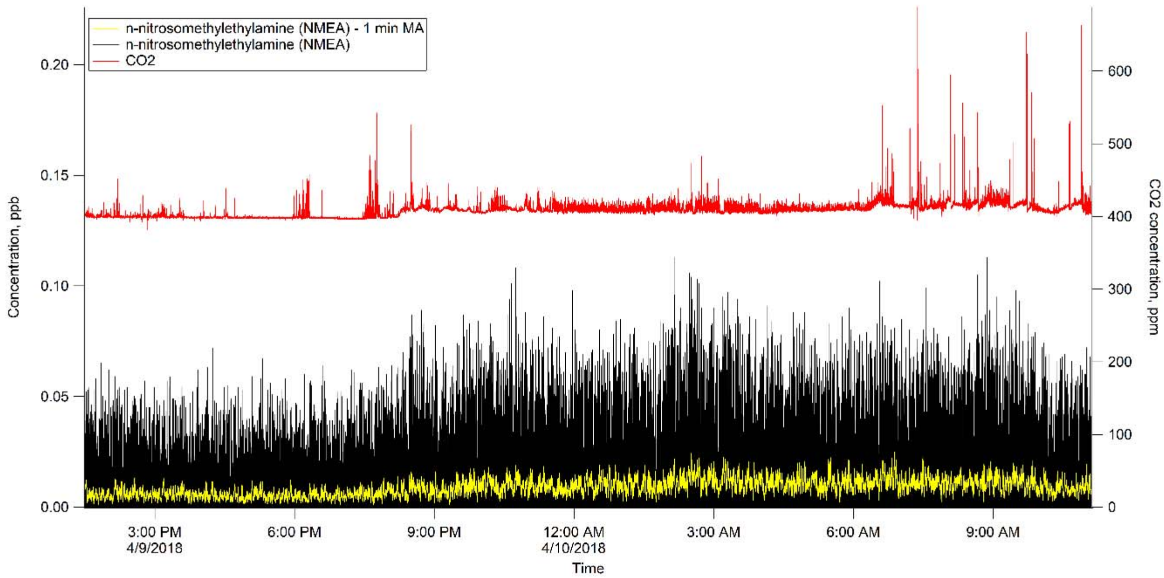

Figure 2-14. N-nitrosomethylethylamine (NMEA).

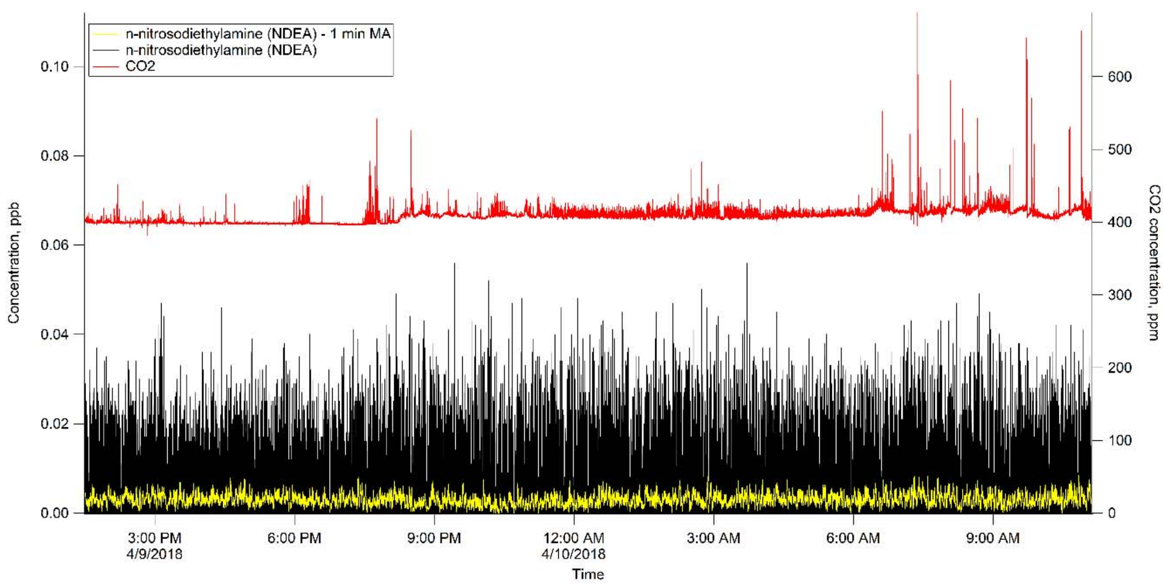

Figure 2-15. N-nitrosodiethylamine (NDEA).

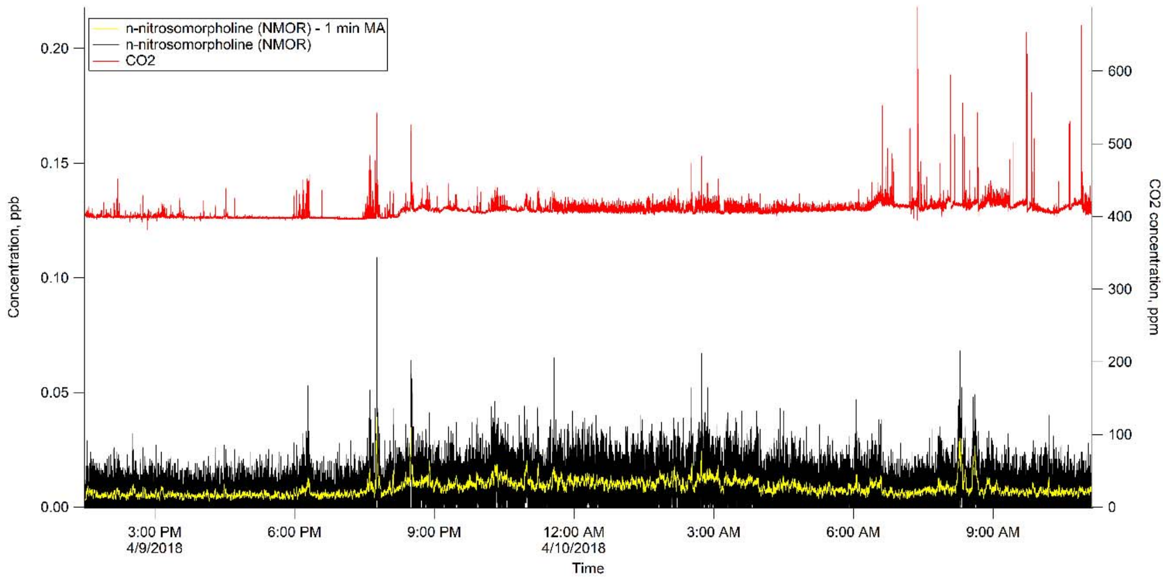

Figure 2-16. N-nitrosomorpholine (NMOR).

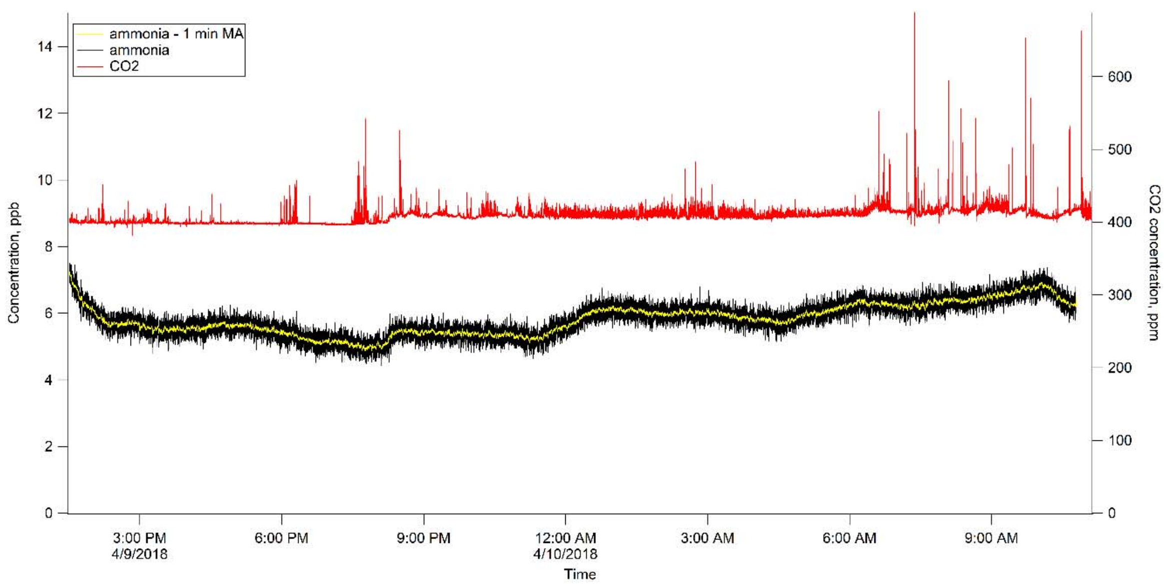

Figure 2-17. Ammonia.

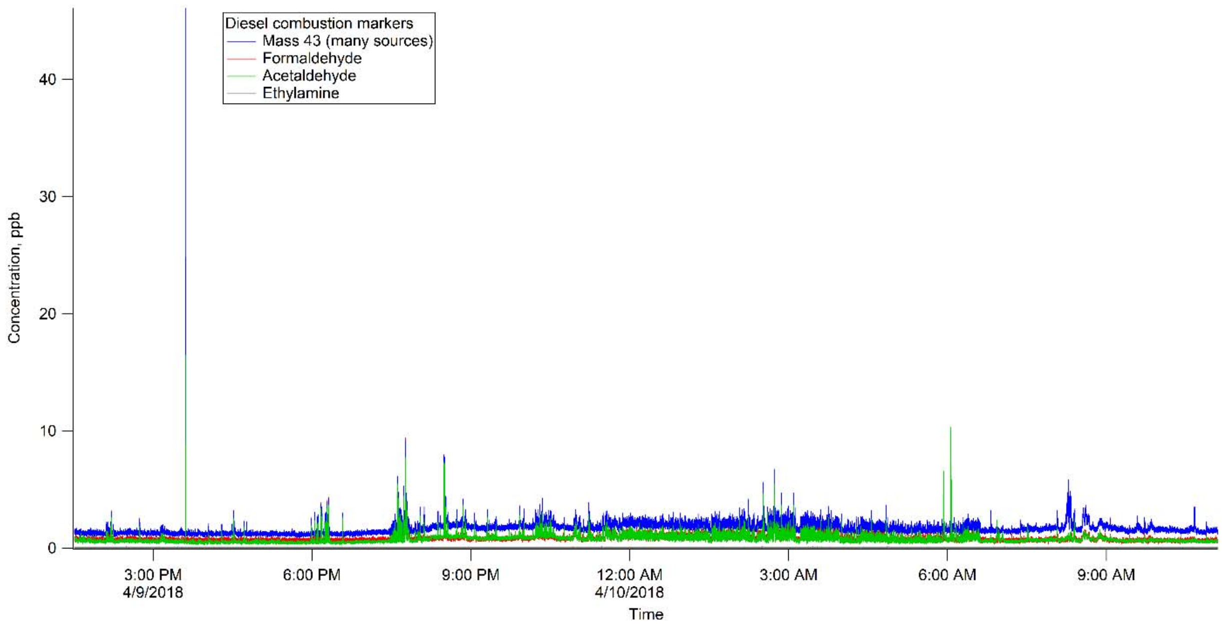

Figure 2-18. Diesel Combustion Markers.

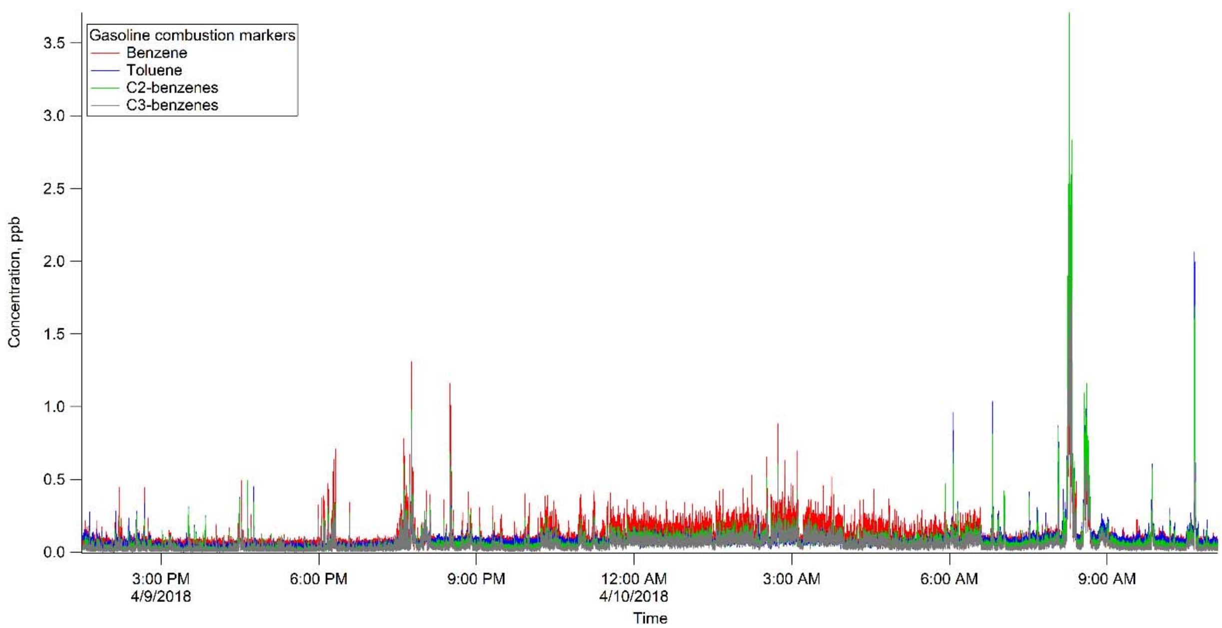

Figure 2-19. Gasoline Combustion Markers.

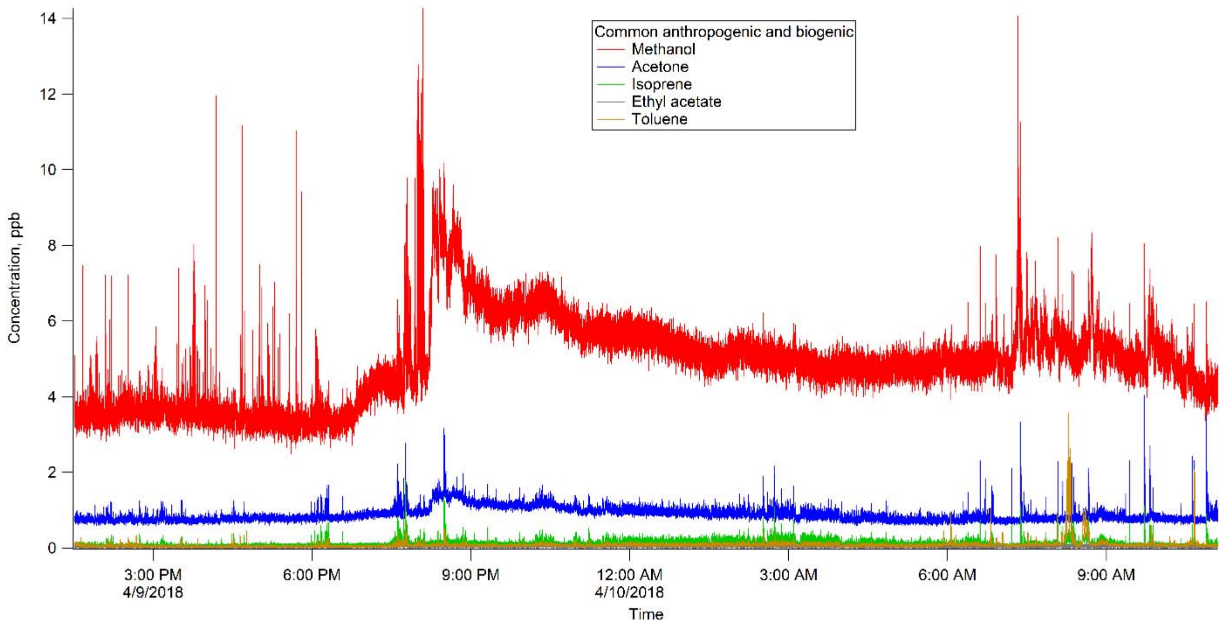

Figure 2-20. Plant and Human Markers.

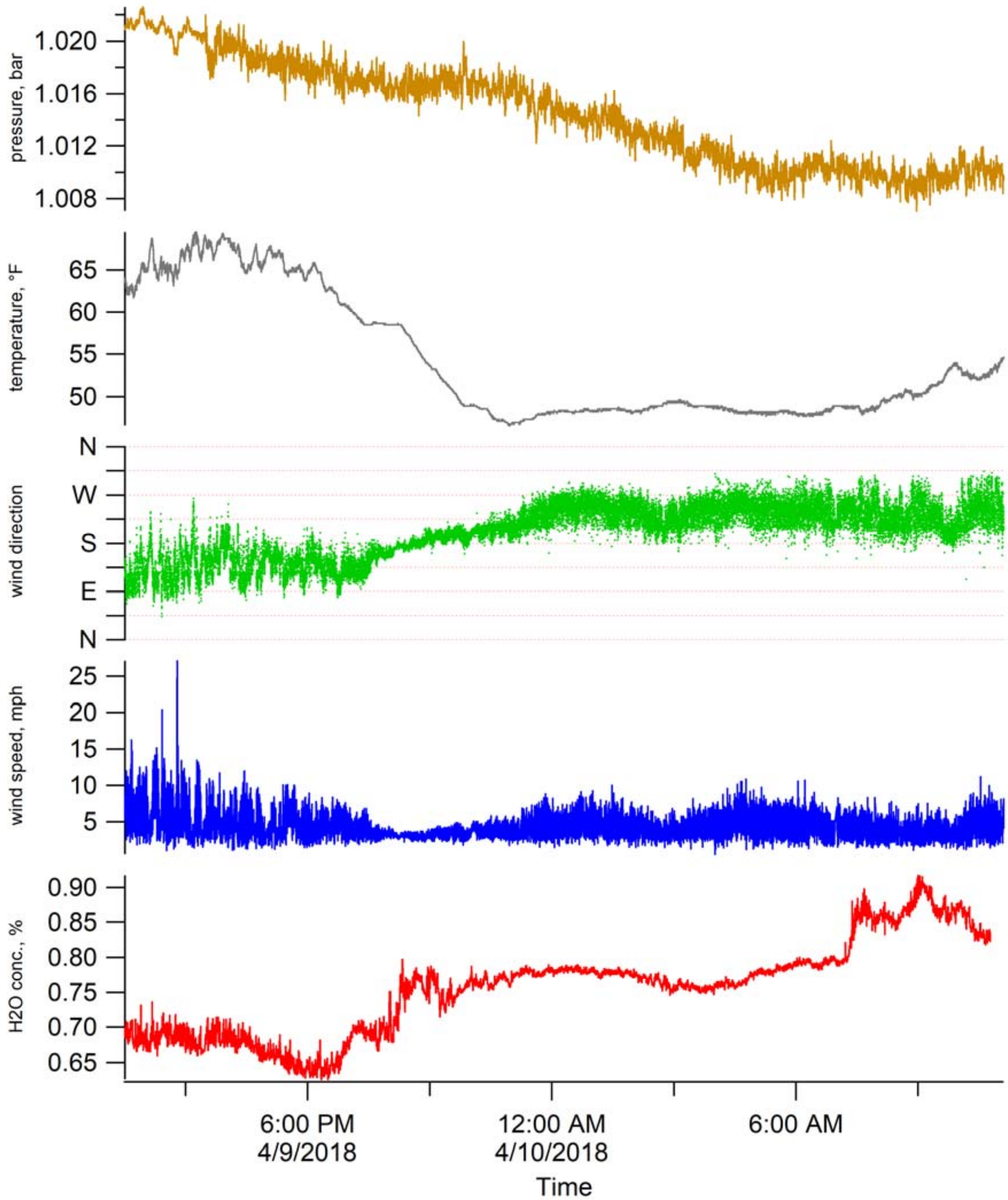

Figure 2-21. Weather Data.

3.0 APRIL 11, 2018 – APRIL 12, 2018 – STUDY SITE #5

3.1 Quality Assessment

Data from April 11, 2018, were transferred to TerraGraphics via the WRPS FTP site on April 18, 2018. Data were assessed using Procedure 17124-DOE-HS-102. A completed Data Exchange Checklist was sent to WRPS on April 23, 2018. The data were accepted by TerraGraphics with the following comments. All startup, shutdown, and calibration procedures were adequately documented and all other checks passed the acceptance limits.

3.2 Summary

The Mobile Laboratory personnel performed background sampling using the Mobile Laboratory from April 11, 2018, to April 12, 2018 at Study Site 5. Site 5 is located SE of the Waste Treatment Facility. This site may provide data related to stack emission dispersion downwind of the tank farm ventilation and as a baseline data point for future reference once the Waste Treatment Facility begins operation. The Mobile Laboratory arrived at Site 5 at 12:30 on April 11, 2018. The initial QA/QC zero air/sensitivity checks were performed on the CO_2 monitor, NH_3 monitor, and the PTR-MS beginning at 12:37. The data file names were confirmed and routine data collection resumed by 13:33. The Mobile Laboratory staff departed the monitoring site after 15:00.

The Mobile Laboratory staff returned to Site 5 at 06:44 on April 12, 2018, and began confirmatory sample collection by 06:50. Closeout zero air/sensitivity checks were performed at 10:42. The 10,000 ppbv NH_3 standard (CBAL-451-85A) failed percent recovery criteria so the Mobile Laboratory staff switched back to the 100,000 ppbv NH_3 standard (CBAL-451-74A) as discussed. The Mobile Laboratory moved to Site 6 by 12:49.

Figure 3-1. Mobile Lab Site #5 for the Duration of the Monitoring Period.

3.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

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

Confirmatory air samples were collected as follows:

Table 3-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
5	11-Apr	Thermosorb/N	EL22190	12:43	15:43	180
5	11-Apr	CarboTrap-300	A046028	12:50	14:01	71
5	12-Apr	Thermosorb/N	EL22191	06:50	09:53	181
5	12-Apr	CarboTrap-300	A0221875	06:58	08:12	72

Table 3-2 displays the statistical information for the monitoring period of April 11, 2018, to April 12, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 3-2. Statistical Information for the Monitoring Period of April 11, 2018 – April 12, 2018.

COPC #	COPC Name	Reporting Limit (ppb)	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel. St. Dev. (%)	Max (ppb)	Median (ppb)	Sec. over 50% OEL	Sec. over OEL
1	ammonia	1	25000	7.09	3.902	55.0%	19.14	5.68	0	0
2	furan	0.09	1	0.045	0.012	66.3%	0.188	0.017	0	0
3	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	0.22	1	0.110	0.020	62.9%	N/A*	N/A*	N/A	N/A
4	NDMA**	0.06	0.3	0.032	0.022	118.1%	0.135	0.011	0	0
5	2-methylfuran	0.05	1	0.025	0.011	66.8%	0.258	0.015	0	0
6	NEMA	0.02	0.3	0.013	0.011	180.7%	0.084	0.000	0	0
7	2,5-dimethylfuran	0.05	1	0.025	0.009	76.0%	0.167	0.011	0	0
8	NDEA	0.01	0.1	0.006	0.006	206.4%	0.045	0.000	0	0
9	2-propylfuran + 2-ethyl-5-methylfuran	0.02	1	0.011	0.008	105.4%	0.110	0.005	0	0
10	NMOR	0.05	0.6	0.025	0.005	100.9%	0.083	0.004	0	0
11	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	0.04	1	0.020	0.008	65.2%	0.094	0.011	0	0
12	2-pentylfuran	0.04	1	0.020	0.008	43.7%	0.108	0.018	0	0
13	2-heptylfuran	0.02	1	0.012	0.007	62.4%	0.057	0.010	0	0
14	2-octylfuran	0.01	1	0.005	0.002	207.9%	0.028	0.000	0	0
15	6-(2-furanyl)-6-methyl-2-heptanone	0.01	1	0.005	0.002	155.9%	0.016	0.000	0	0
16	furfural acetophenone	0.07	1	0.035	0.004	55.7%	0.032	0.006	0	0

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.765 ppb and the median value was 0.029 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.
**Nitrosamine results are also suspect due to interferants identified during the background study.

The following figures display each COPC signal, overlaid with the same signal smoothed using a 1-minute moving average, and CO_2, for the monitoring period April 11, 2018, to April 12, 2018.

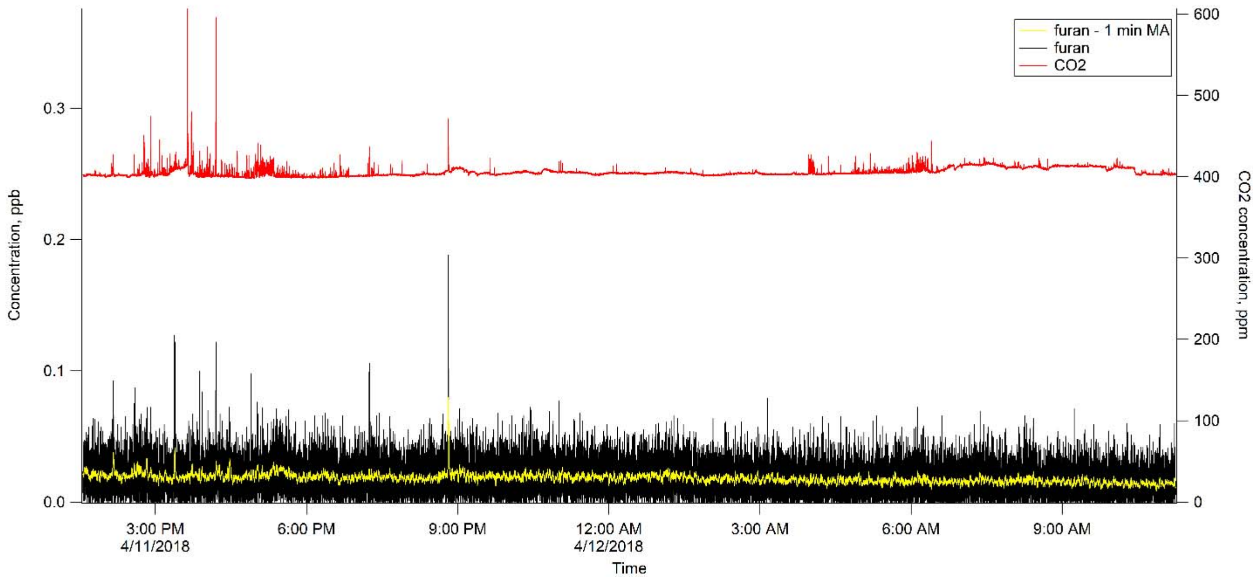

Figure 3-2. Furan.

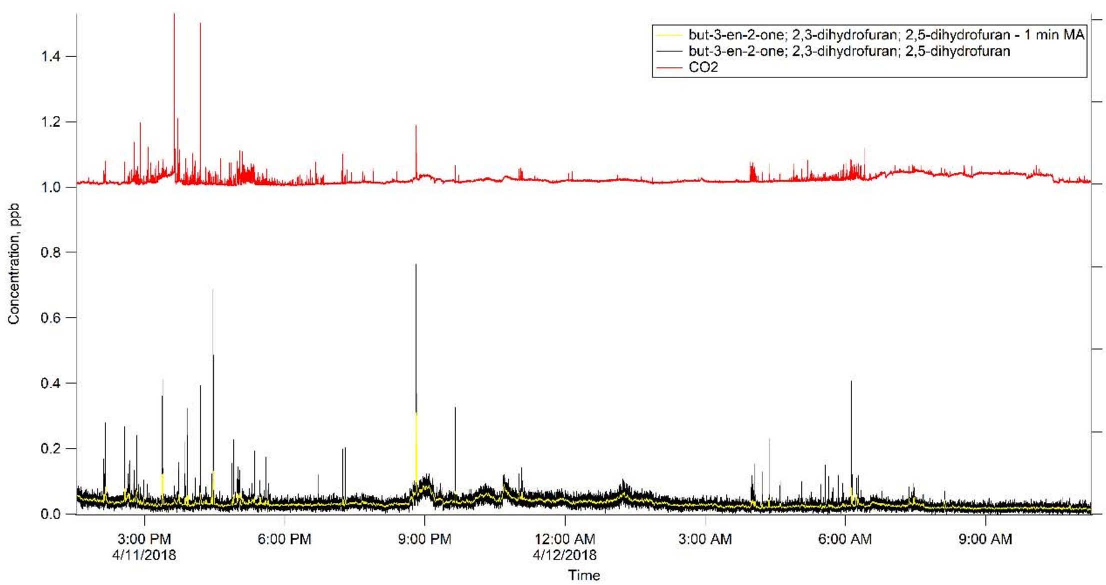

Figure 3-3. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

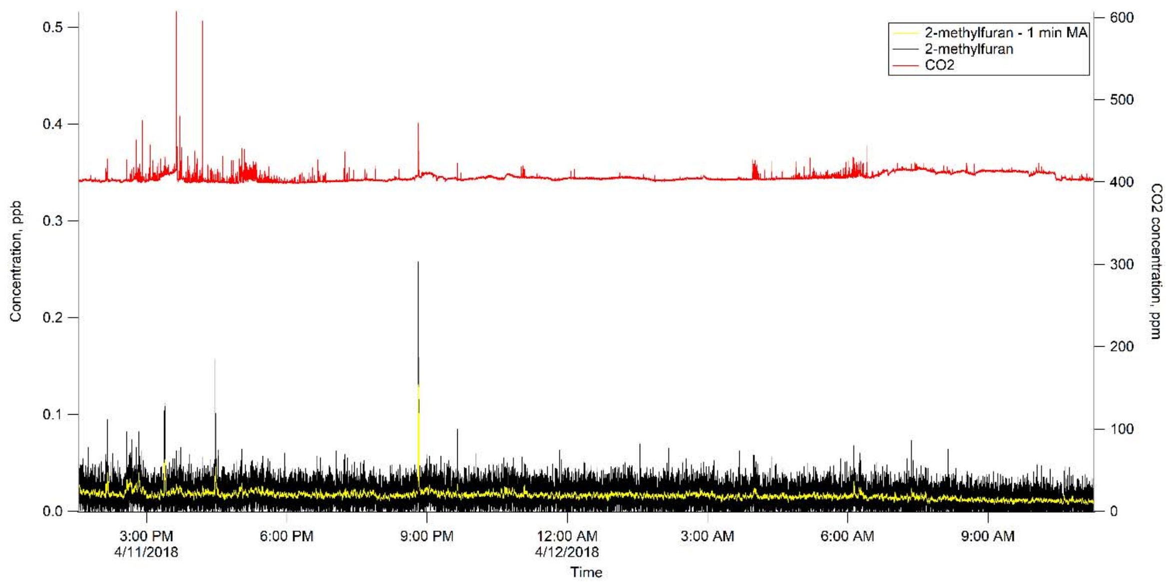

Figure 3-4. 2-methylfuran.

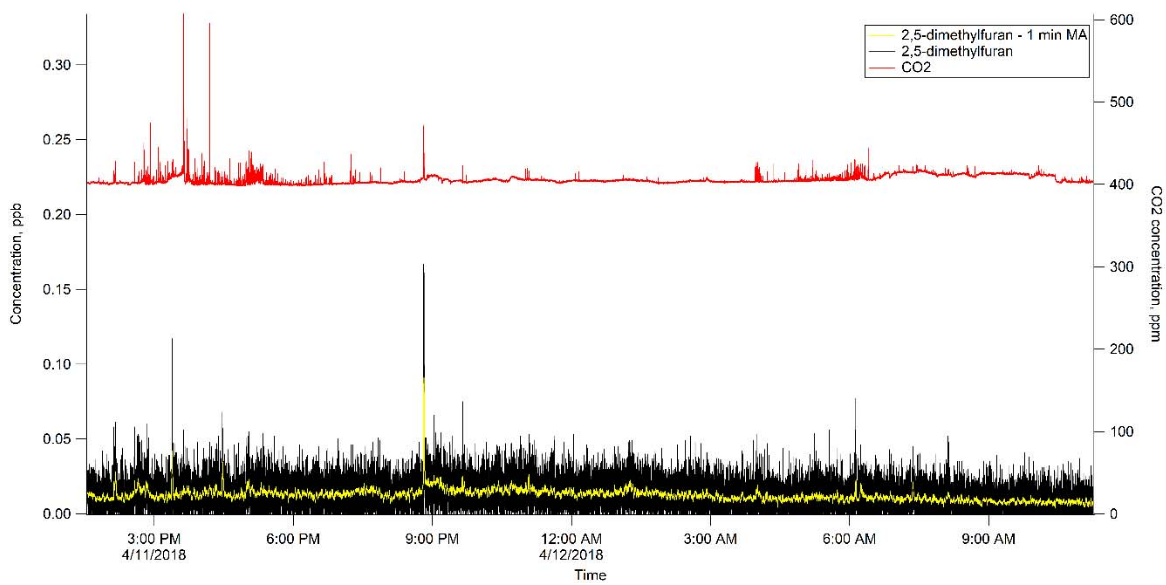

Figure 3-5. 2,5-dimethylfuran.

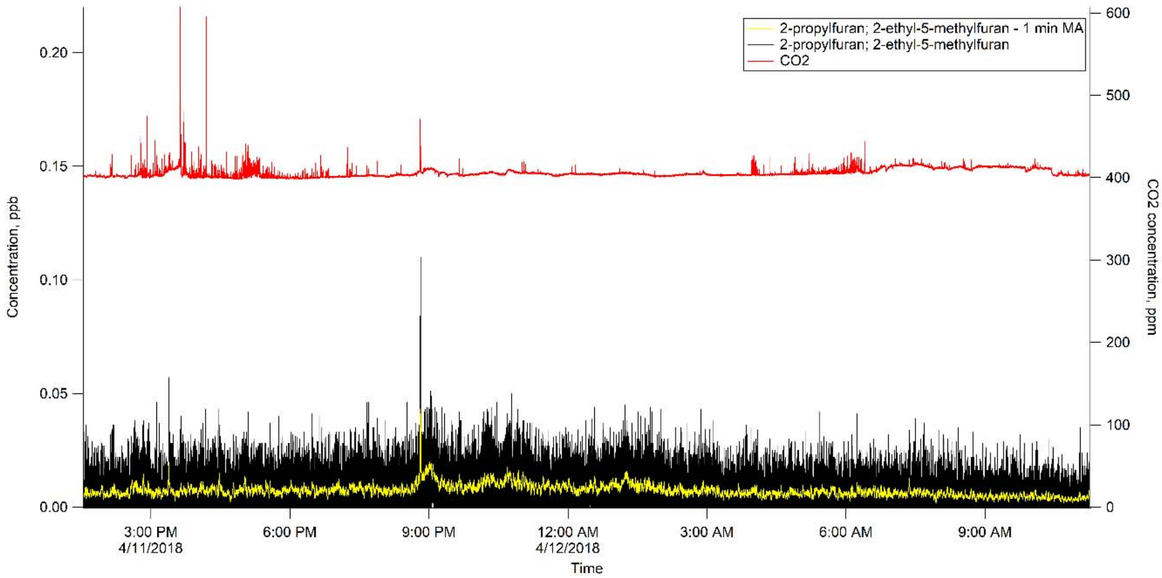

Figure 3-6. 2-propylfuran + 2-ethyl-5-methylfuran.

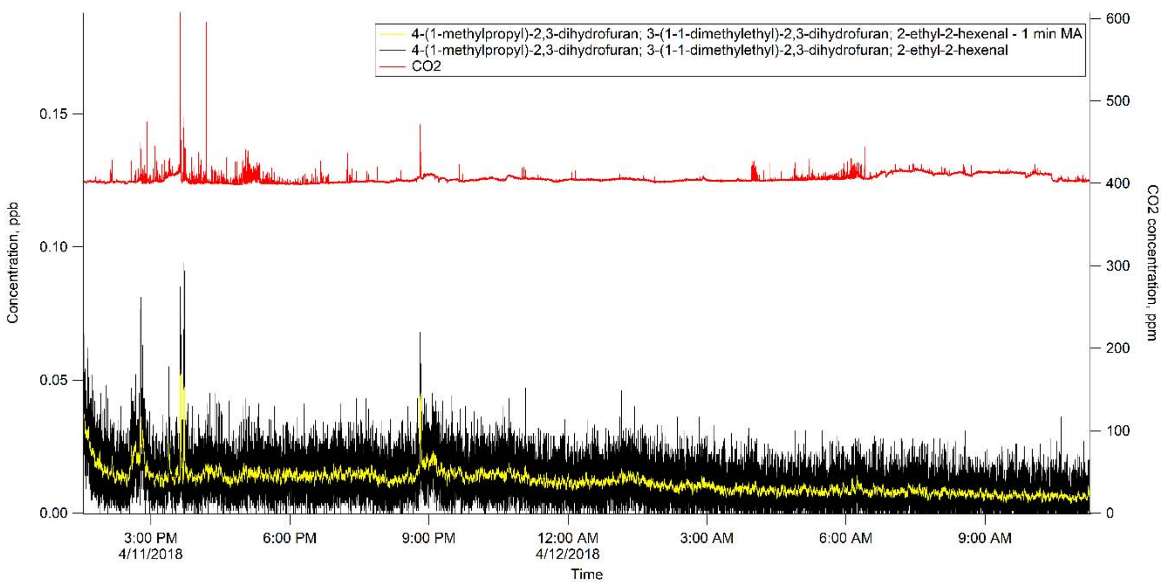

Figure 3-7. 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1-1-dimethylethyl)-2,3-dihydrofuran + 2-ethyl-2-hexenal.

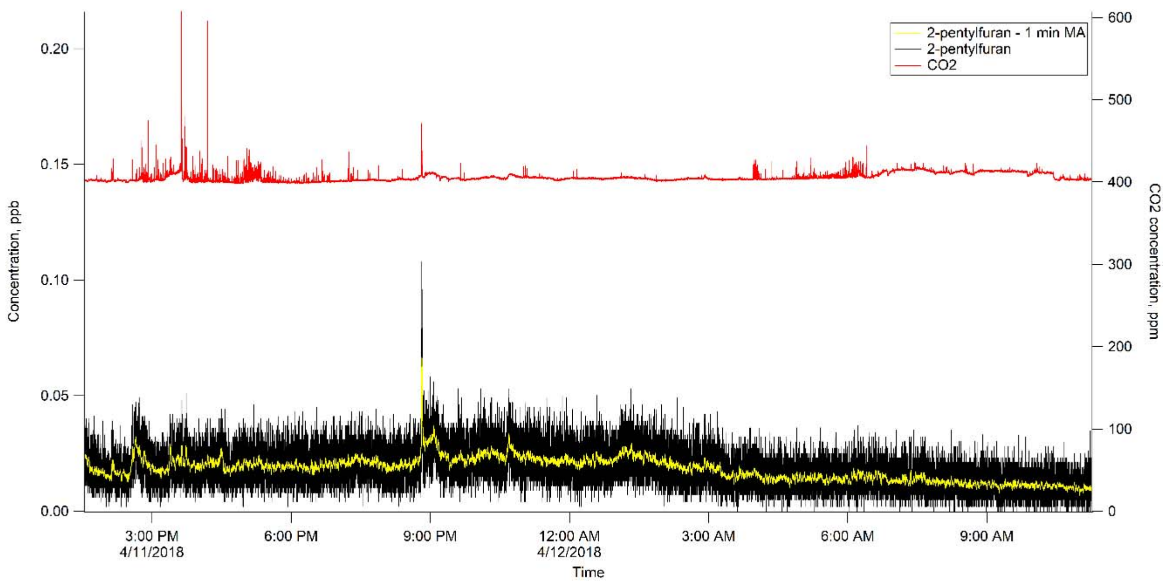

Figure 3-8. 2-pentylfuran.

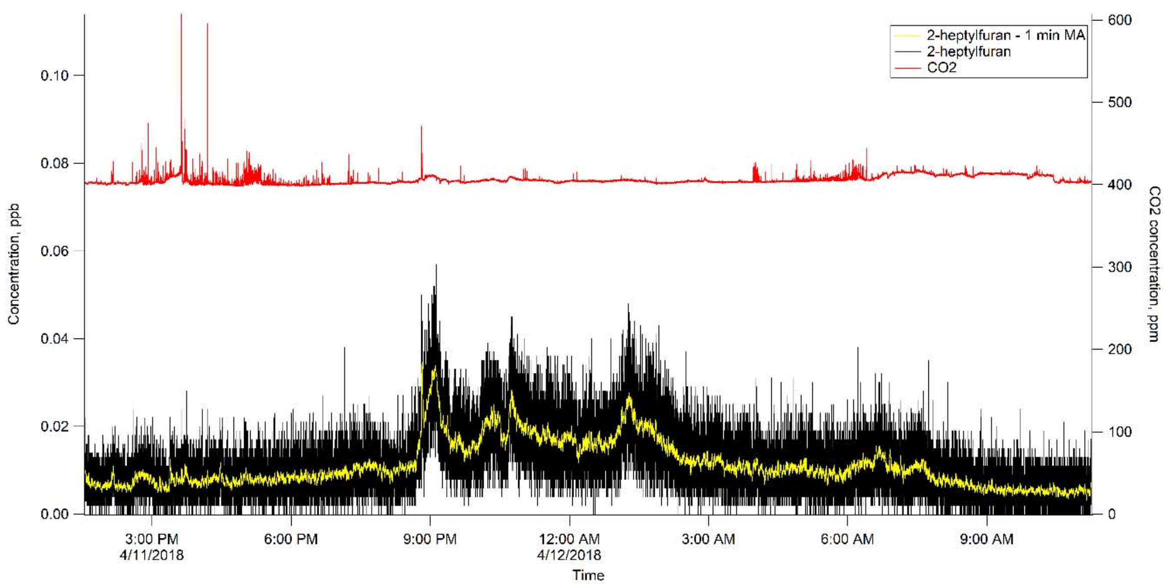

Figure 3-9. 2-heptylfuran.

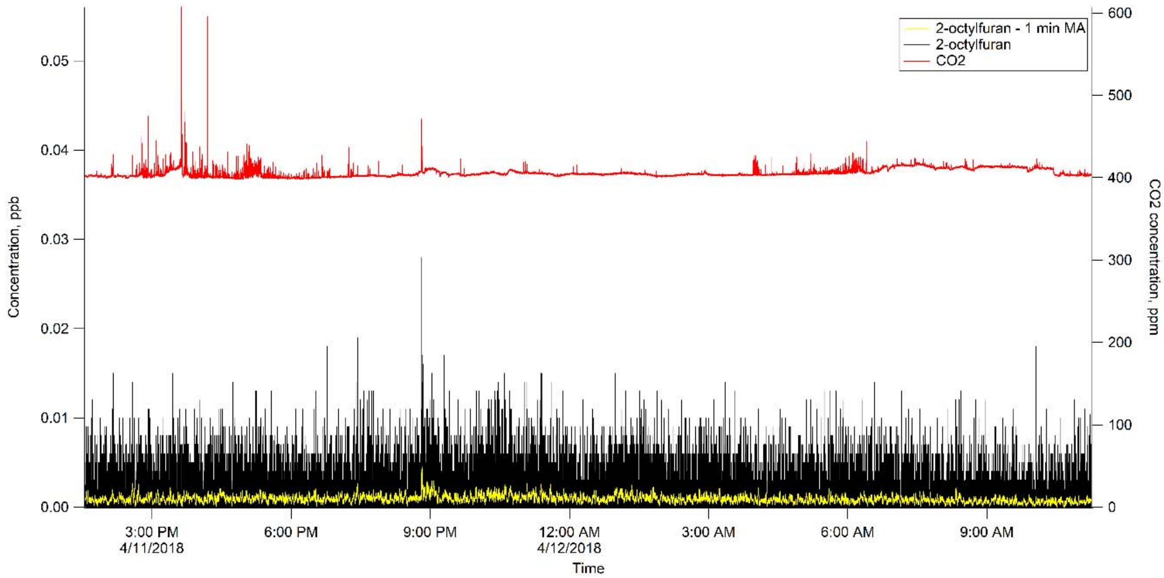

Figure 3-10. 2-octylfuran.

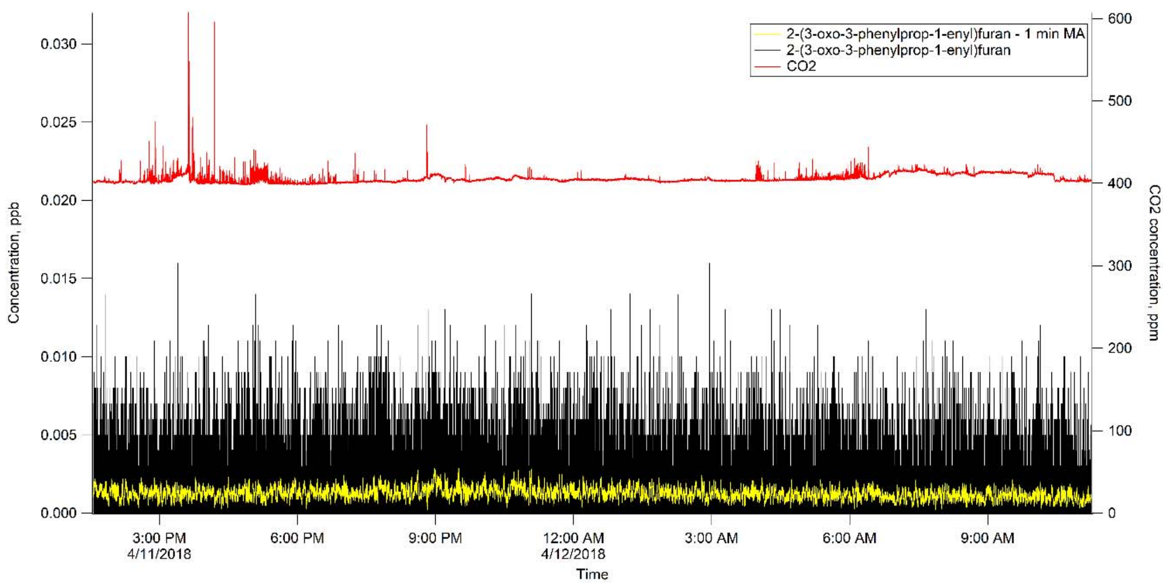

Figure 3-11. 2-(3-oxo-3-phenylprop-1-enyl)furan.

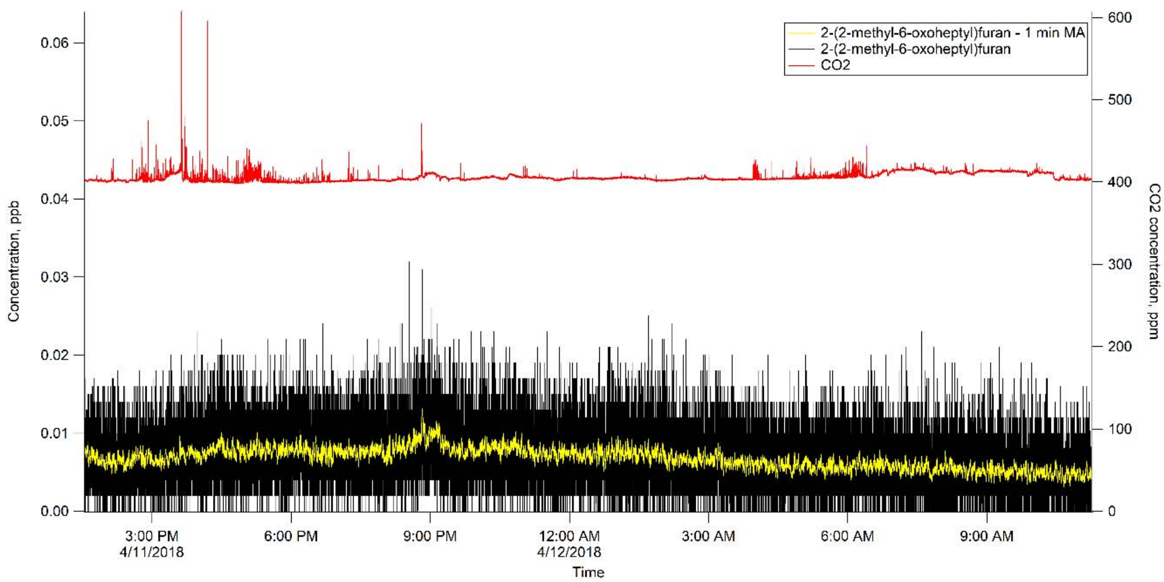

Figure 3-12. 2-(2-methyl-6-oxoheptyl)furan.

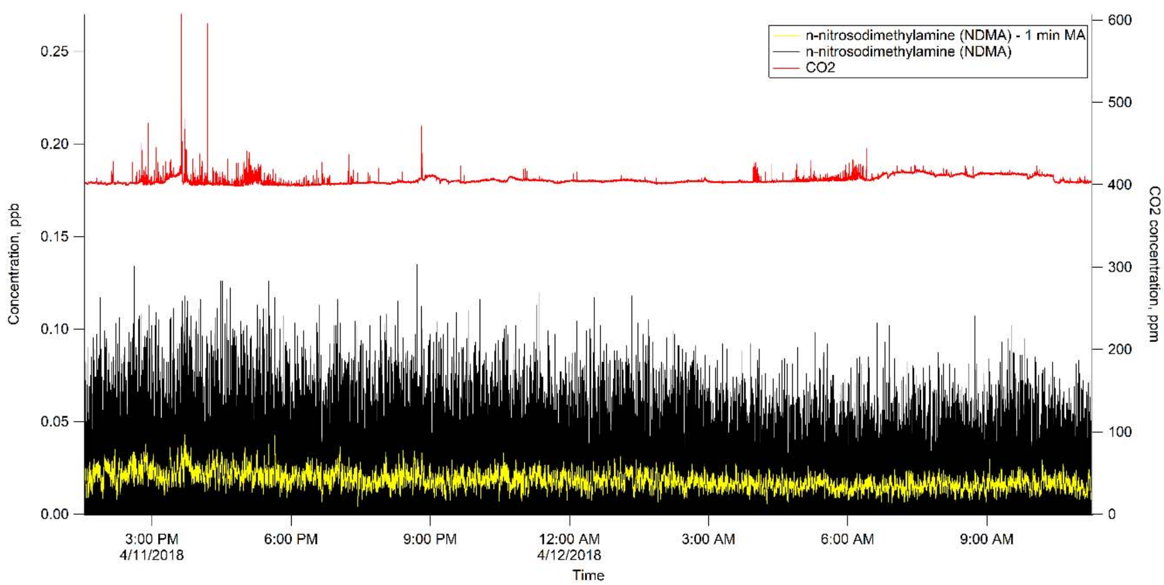

Figure 3-13. N-nitrosodimethylamine (NDMA).

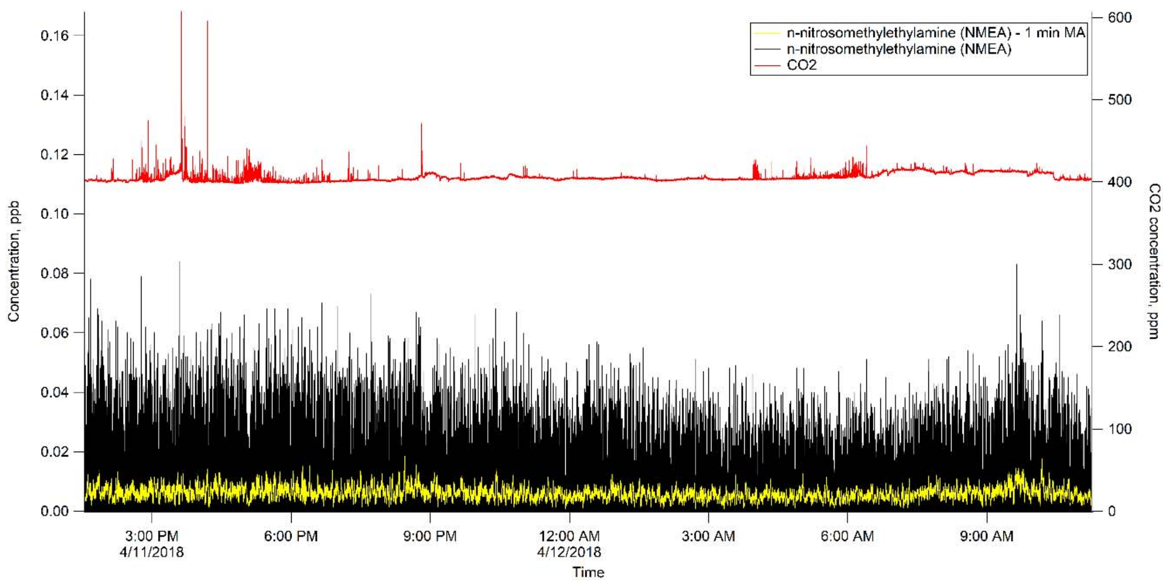

Figure 3-14. N-nitrosomethylethylamine (NMEA).

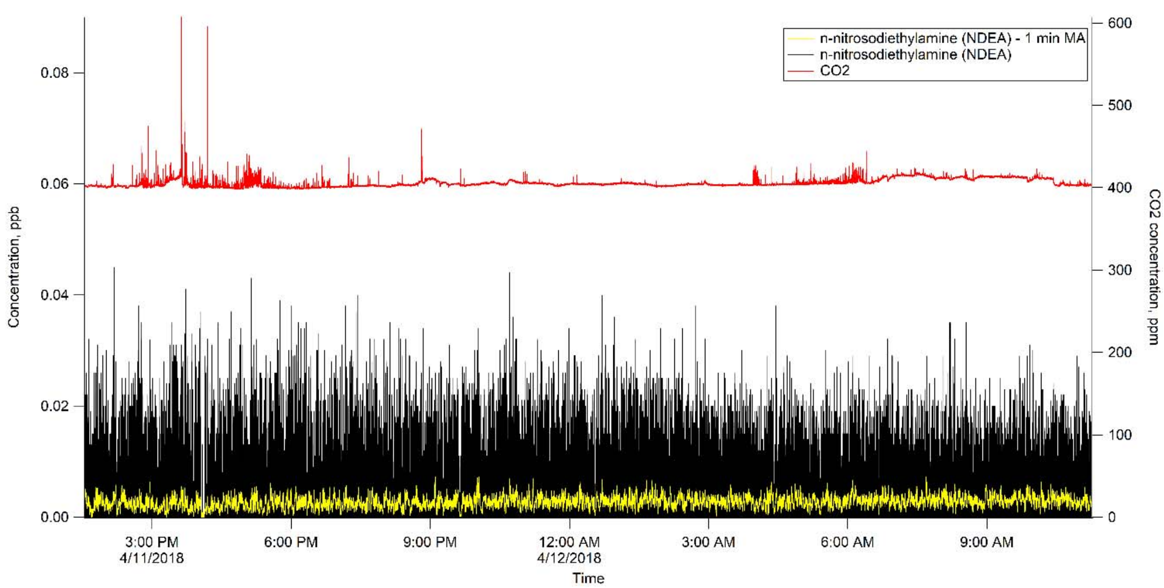

Figure 3-15. N-nitrosodiethylamine (NDEA).

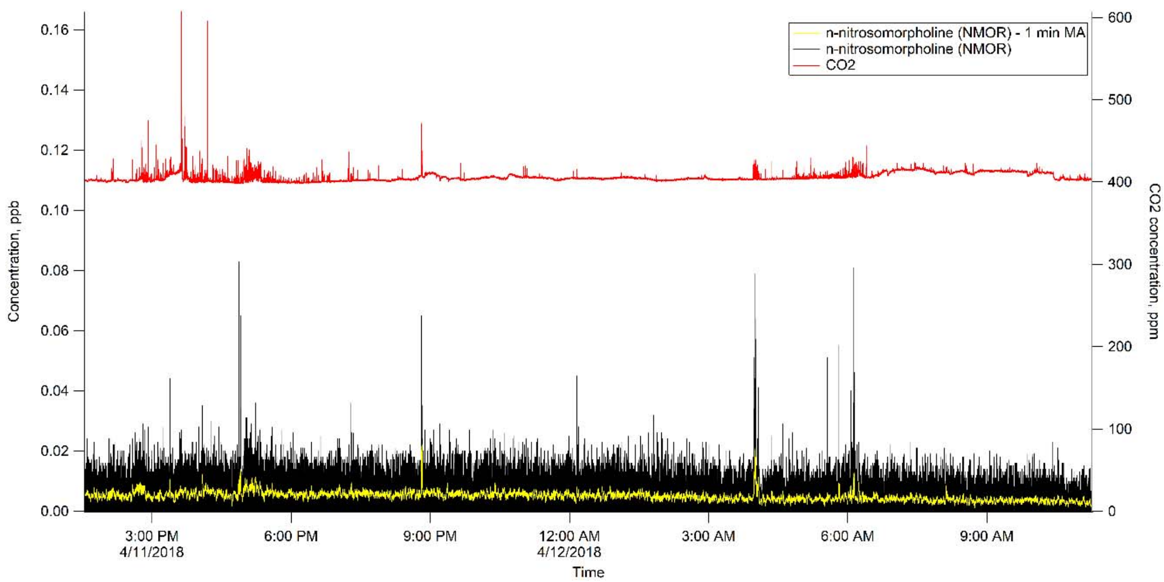

Figure 3-16. N-nitrosomorpholine (NMOR).

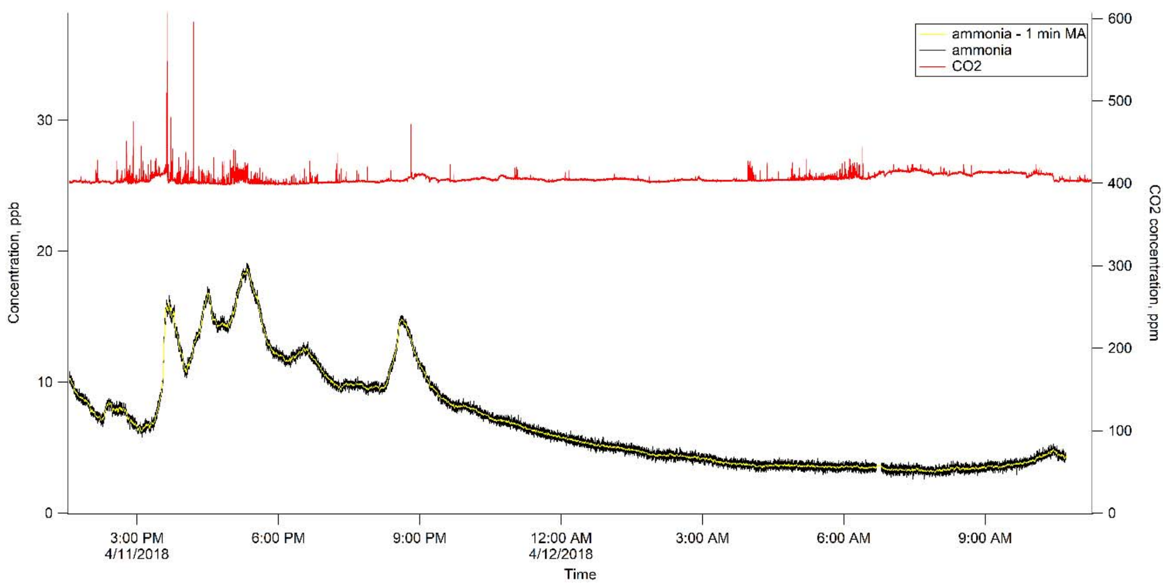

Figure 3-17. Ammonia.

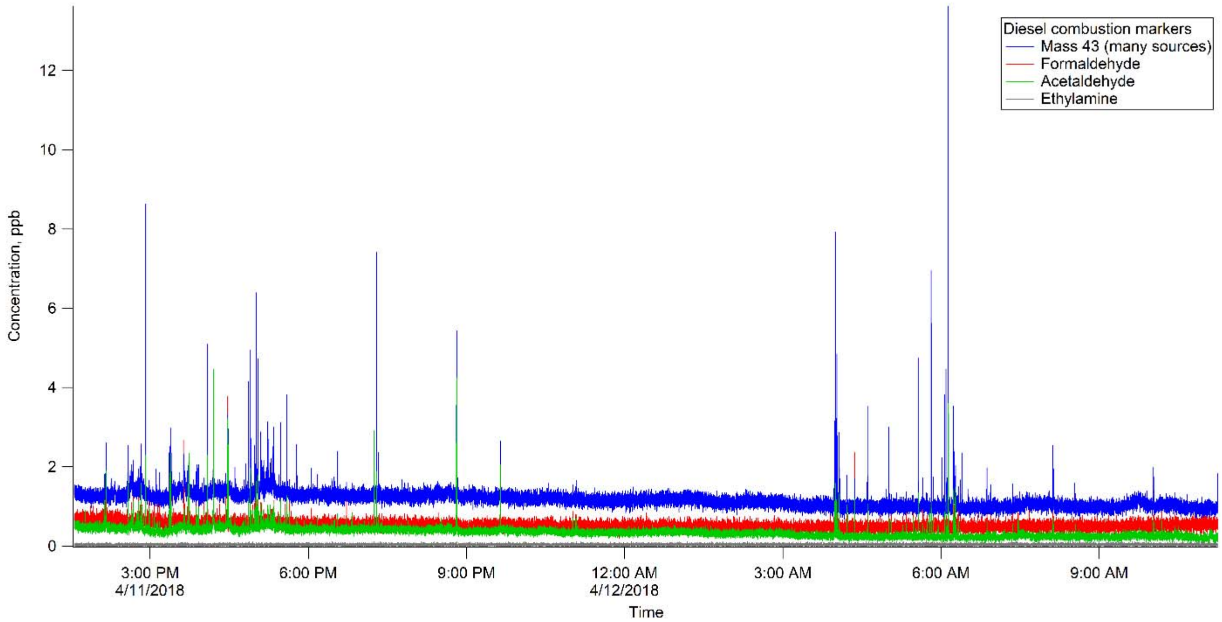

Figure 3-18. Diesel Combustion Markers.

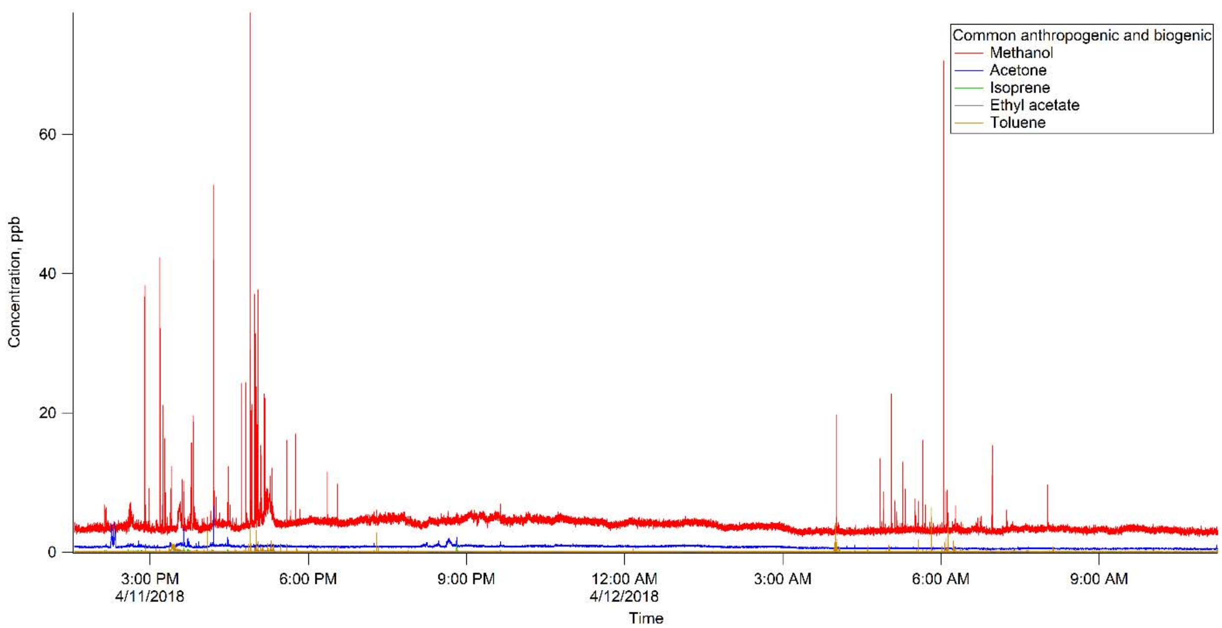

Figure 3-19. Gasoline Combustion Markers.

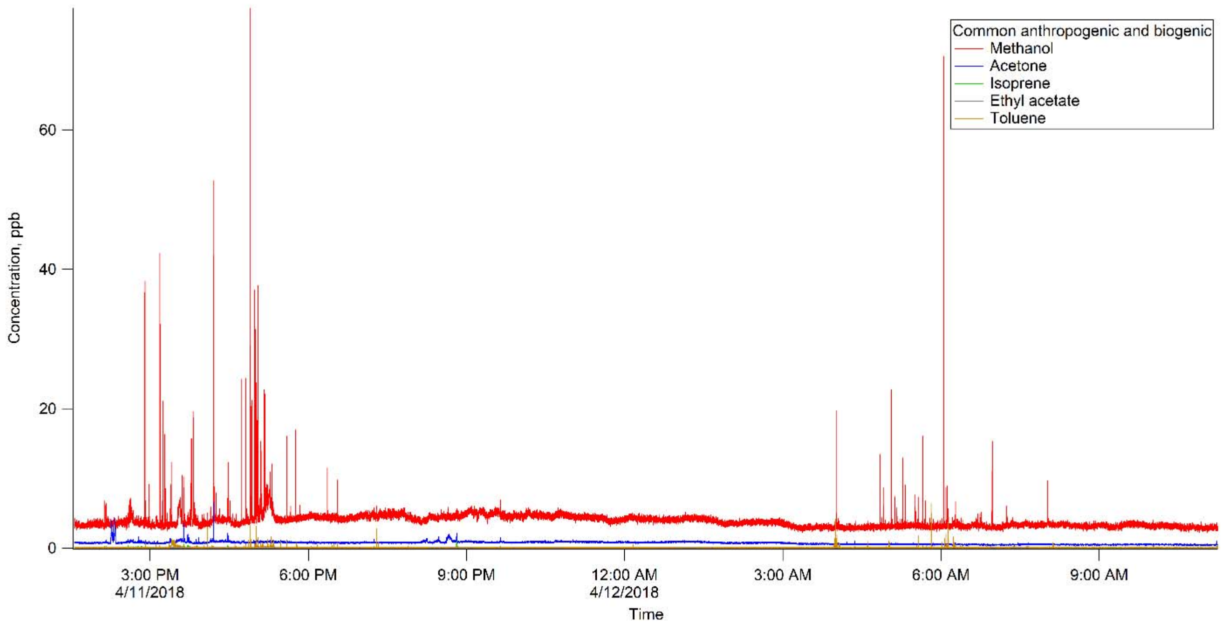

Figure 3-20. Plant and Human Markers.

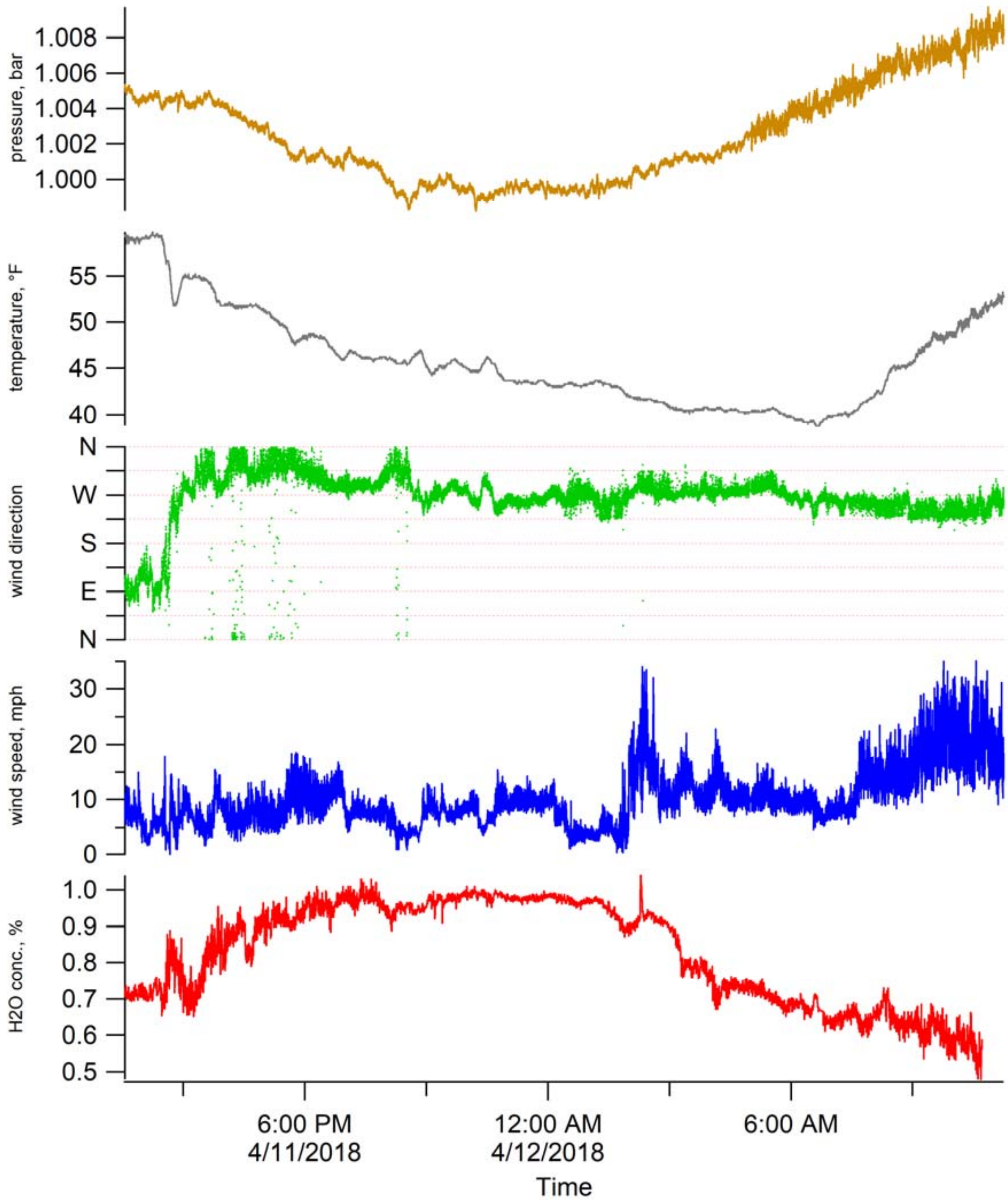

Figure 3-21. Weather Data.

4.0 APRIL 12, 2018 – APRIL 13, 2018 – STUDY SITE #6

4.1 Quality Assessment

Data from April 12, 2018, were transferred to TerraGraphics via the WRPS FTP site on April 19, 2018. Data were assessed using Procedure 17124-DOE-HS-102. A completed Data Exchange Checklist was sent to WRPS on April 23, 2018. The data were accepted by TerraGraphics with the following comments. All startup, shutdown, and calibration procedures were adequately documented and all other checks passed the acceptance limits.

At 13:40 on April 12, 2018, Anna arrived on-site to perform a brief surveillance (ID: ML-18-004) of activities and to perform the weekly Measurement and Test Equipment validations. The two MesaLabs®[4] digital flow meters, the two liquid calibration unit mass flow controllers, and the TSI Incorporated digital flow meter were checked against QA/QC reference flow meter.

4.2 Summary

The Mobile Laboratory personnel performed background sampling using the Mobile Laboratory from April 12, 2018, to April 13, 2018 at Study Site 6. Site 6 is located near the intersection of US Highway 395 and Clearwater Avenue in Kennewick, WA. This site is represented by heavy traffic patterns of mixed vehicle types and light commercial activity including a variety of eating establishments. The Mobile Laboratory arrived at Site 6 at 12:49 on April 12, 2018. The initial QA/QC zero air/sensitivity checks were performed on the CO_2 monitor, NH_3 monitor, and the PTR-MS beginning at 12:50. The data file names were confirmed and routine data collection resumed by 14:10. The Mobile Laboratory staff departed the monitoring site at 16:00.

The Mobile Laboratory staff returned to Site 6 at 06:23 on April 13, 2018, and began confirmatory sample collection by 06:30. A new 10,000 ppbv standard CBAL-451-74B was prepared from CBAL-451-92A and installed the new standard at 06:55 on April 13, 2018. Closeout zero air/sensitivity checks were performed at 10:48. The Mobile Laboratory moved to Site 1 by 12:45.

[4] MesaLabs is a registered trademark of Mesa Laboratories, Inc., Lakewood, Colorado.

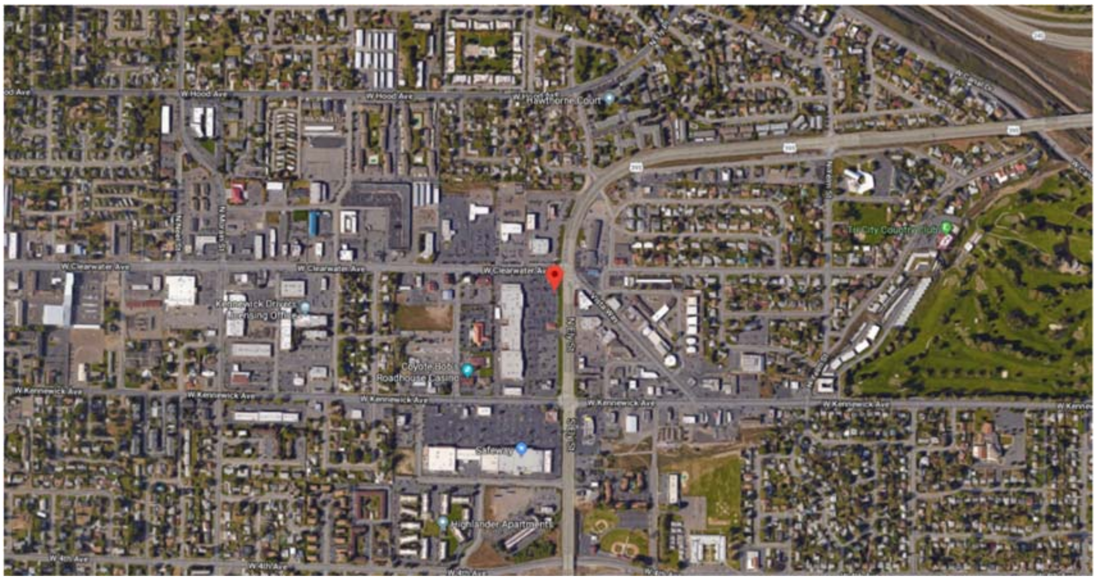

Figure 4-1. Mobile Lab Site #6 for the Duration of the Monitoring Period.

4.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

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

Confirmatory air samples were collected as follows:

Table 4-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
6	12-Apr	Thermosorb/N	EL22194	12:57	15:47	177
6	12-Apr	CarboTrap-300	A022023	13:04	14:15	70
6	13-Apr	Thermosorb/N	EL22180	06:30	09:30	180
6	13-Apr	CarboTrap-300	A020890	06:33	07:46	71

Table 4-2 displays the statistical information for the monitoring period of April 12, 2018, to April 13, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 4-2. Statistical Information for the Monitoring Period of April 12, 2018 – April 13, 2018.

COPC #	COPC Name	Reporting Limit (ppb)	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel. St. Dev. (%)	Max (ppb)	Median (ppb)	Sec. over 50% OEL	Sec. over OEL
1	ammonia	1	25000	4.49	1.674	37.3%	11.30	3.88	0	0
2	furan	0.09	1	0.045	0.012	73.5%	0.231	0.014	0	0
3	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	0.22	1	0.110	0.013	66.6%	N/A*	N/A*	N/A	N/A
4	NDMA**	0.06	0.3	0.031	0.019	121.2%	0.150	0.009	2	0
5	2-methylfuran	0.05	1	0.025	0.010	72.4%	0.130	0.012	0	0
6	NEMA	0.02	0.3	0.012	0.010	165.8%	0.083	0.000	0	0
7	2,5-dimethylfuran	0.05	1	0.025	0.008	84.0%	0.111	0.009	0	0
8	NDEA	0.01	0.1	0.006	0.006	181.3%	0.045	0.000	0	0
9	2-propylfuran + 2-ethyl-5-methylfuran	0.02	1	0.011	0.006	118.0%	0.072	0.003	0	0
10	NMOR	0.05	0.6	0.025	0.008	183.0%	0.725	0.003	10	2
11	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	0.04	1	0.020	0.006	70.6%	0.085	0.007	0	0
12	2-pentylfuran	0.04	1	0.020	0.006	47.8%	0.089	0.011	0	0
13	2-heptylfuran	0.02	1	0.010	0.003	65.8%	0.027	0.004	0	0
14	2-octylfuran	0.01	1	0.005	0.002	229.7%	0.016	0.000	0	0
15	6-(2-furanyl)-6-methyl-2-heptanone	0.01	1	0.005	0.002	169.7%	0.016	0.000	0	0
16	furfural acetophenone	0.07	1	0.035	0.003	62.0%	0.028	0.005	0	0

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.673 ppb and the median value was 0.018 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

**Nitrosamine results are also suspect due to interferants identified during the background study.

The following figures display each COPC signal, overlaid with the same signal smoothed using a 1-minute moving average, and CO_2, for the monitoring period April 12, 2018. to April 13, 2018.

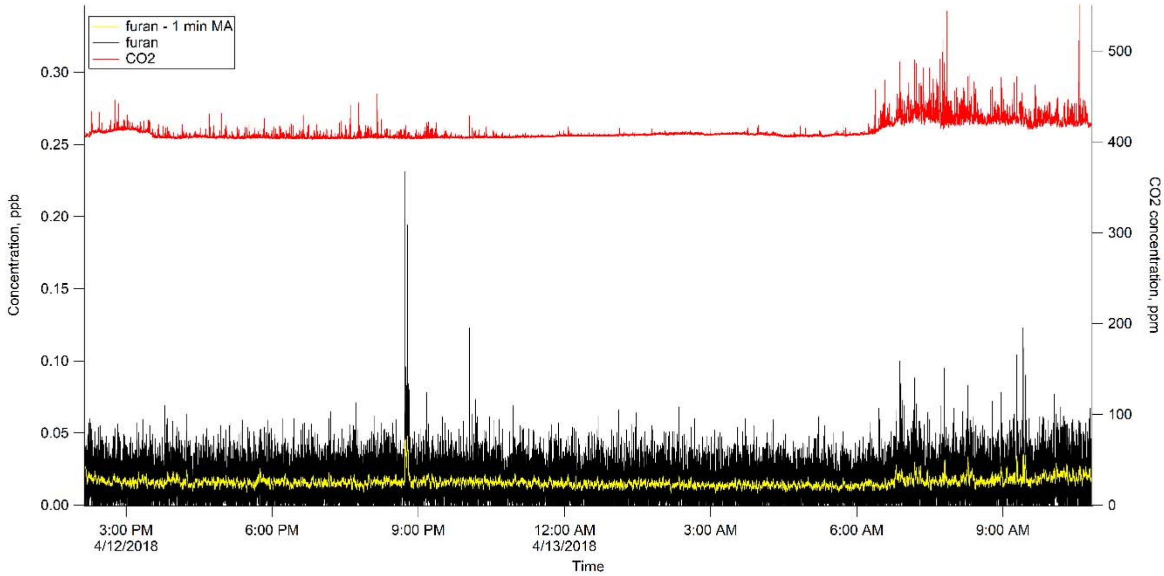

Figure 4-2. Furan.

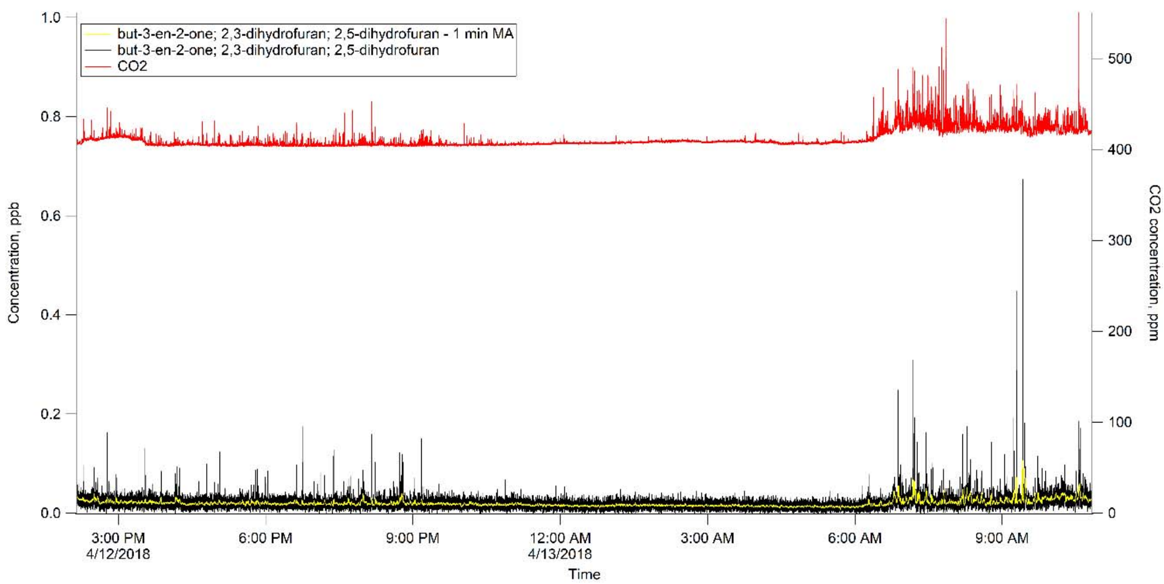

Figure 4-3. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

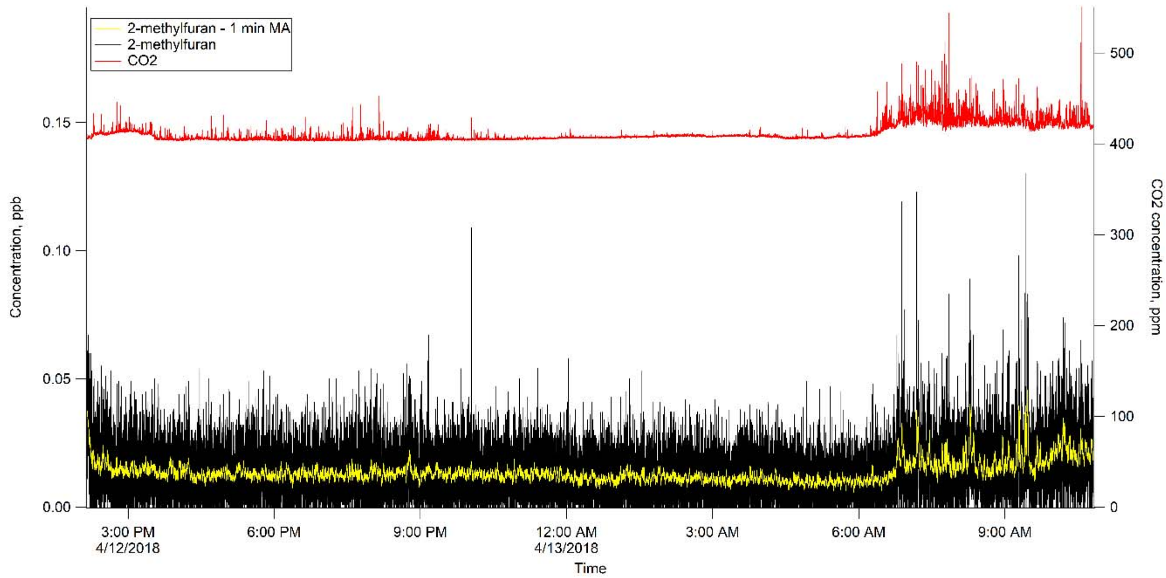

Figure 4-4. 2-methylfuran.

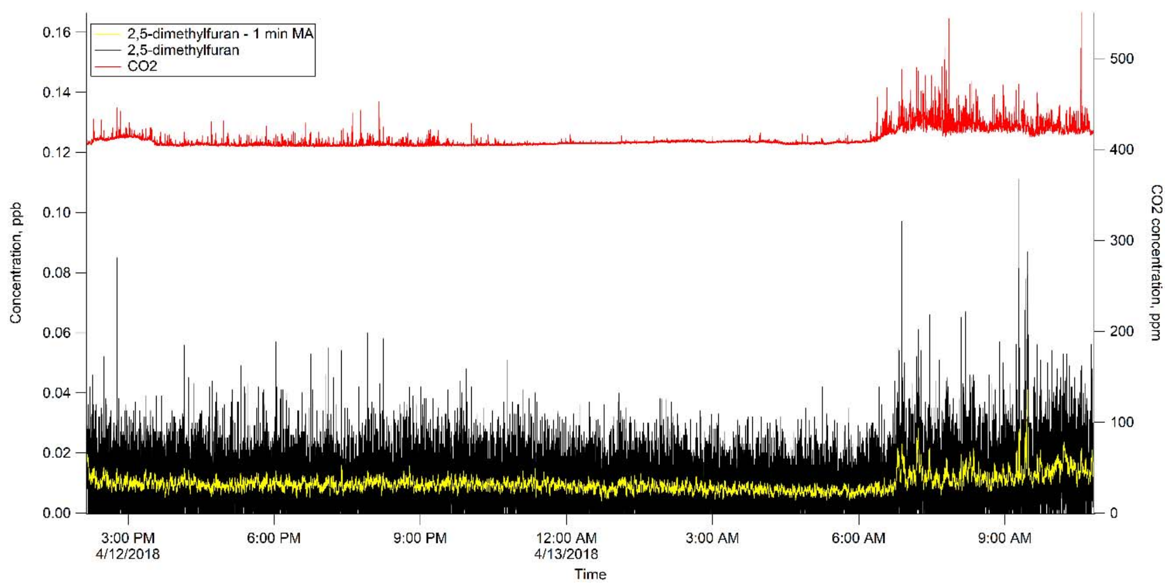

Figure 4-5. 2,5-dimethylfuran.

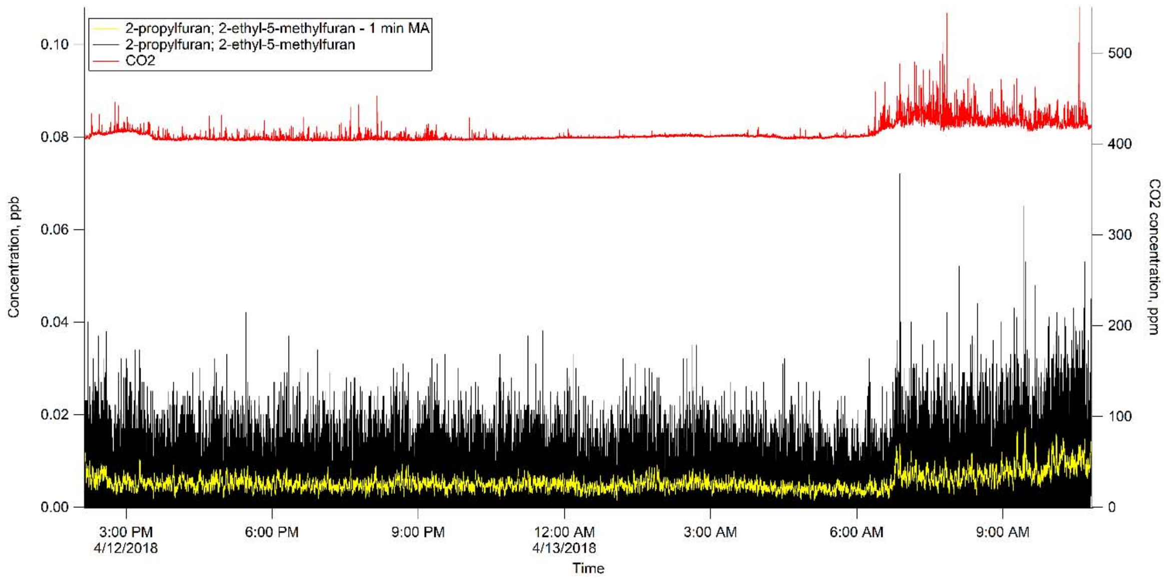

Figure 4-6. 2-propylfuran + 2-ethyl-5-methylfuran.

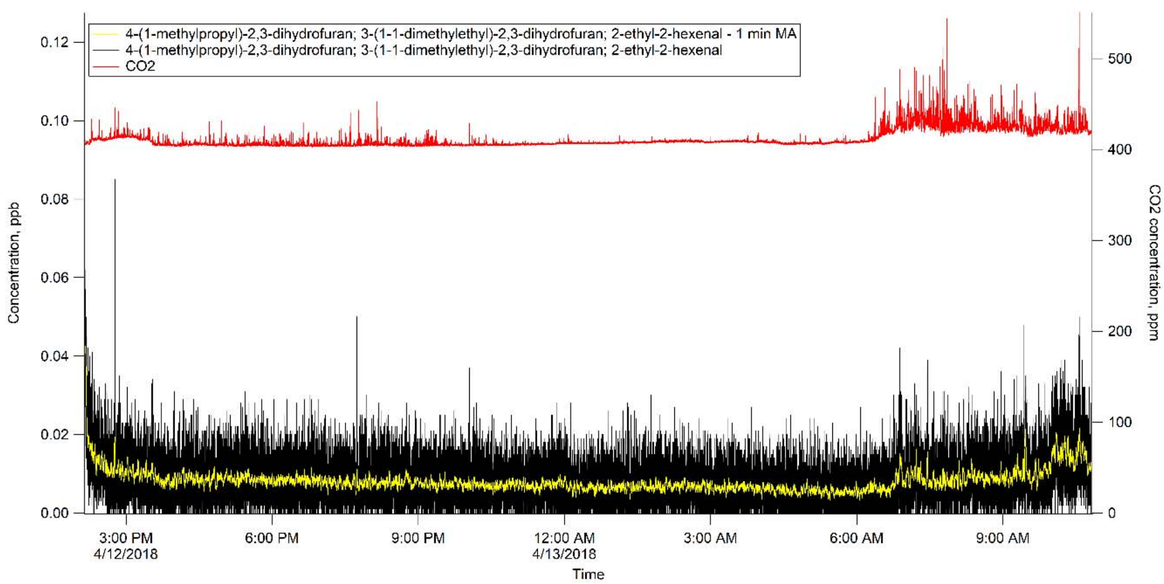

Figure 4-7. 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1-1-dimethylethyl)-2,3-dihydrofuran + 2-ethyl-2-hexenal.

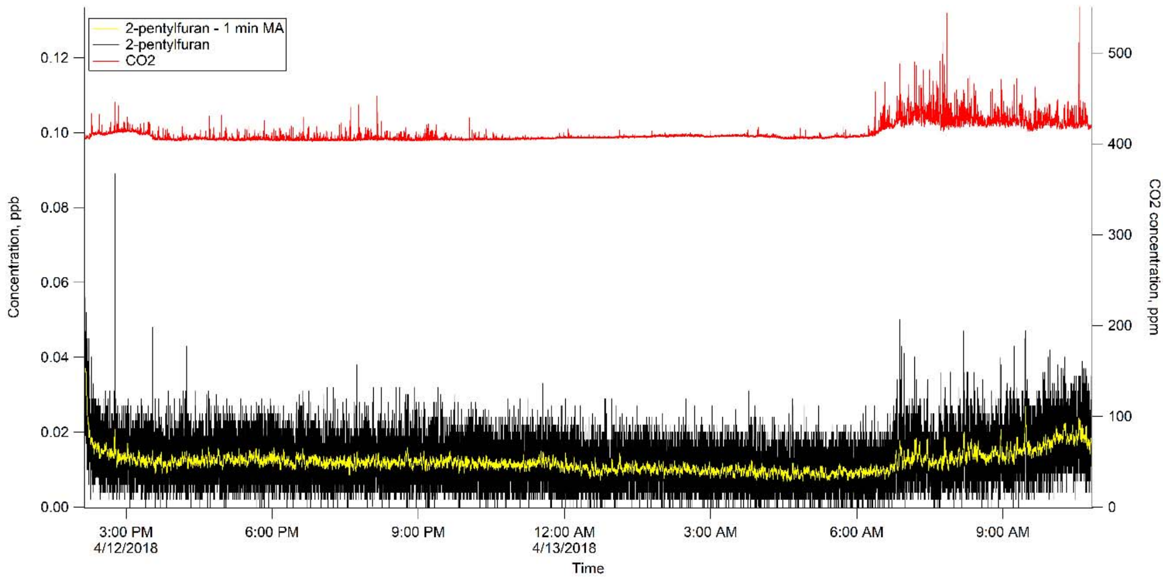

Figure 4-8. 2-pentylfuran.

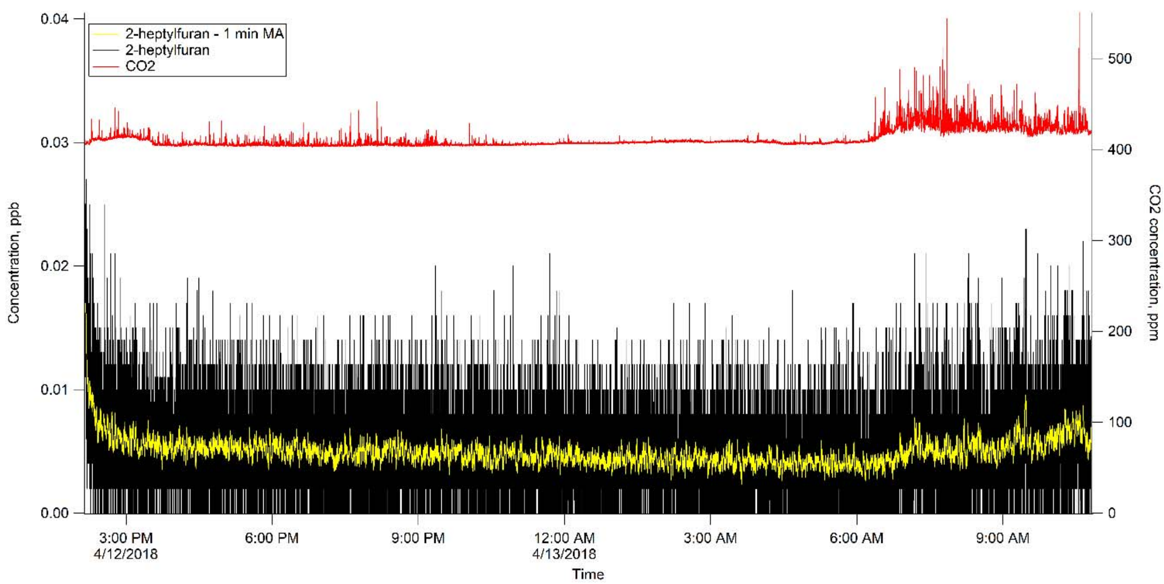

Figure 4-9. 2-heptylfuran.

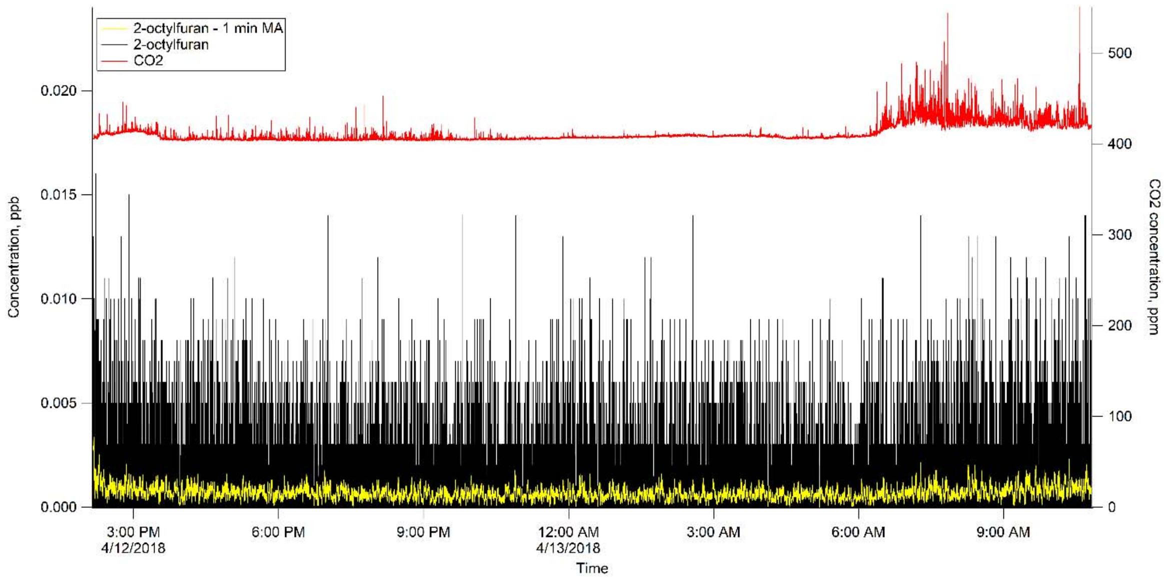

Figure 4-10. 2-octylfuran.

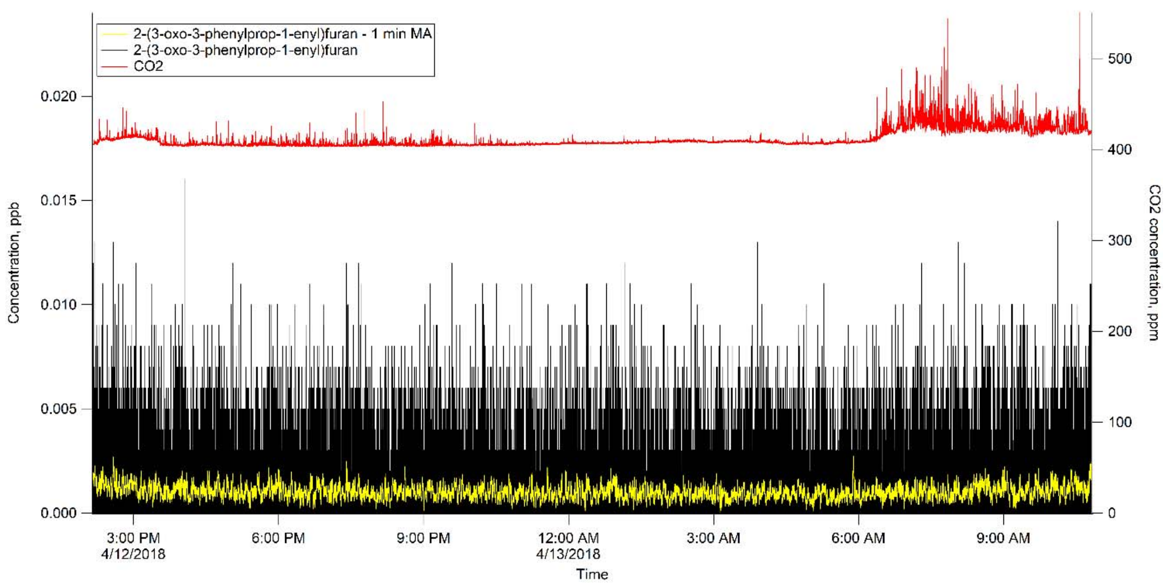

Figure 4-11. 2-(3-oxo-3-phenylprop-1-enyl)furan.

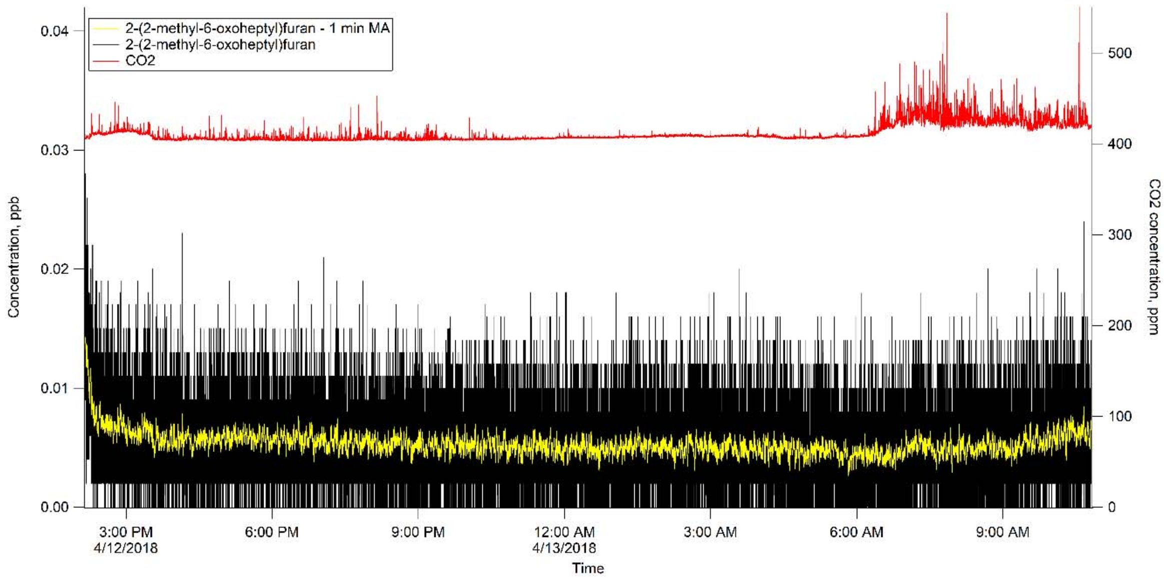

Figure 4-12. 2-(2-methyl-6-oxoheptyl)furan.

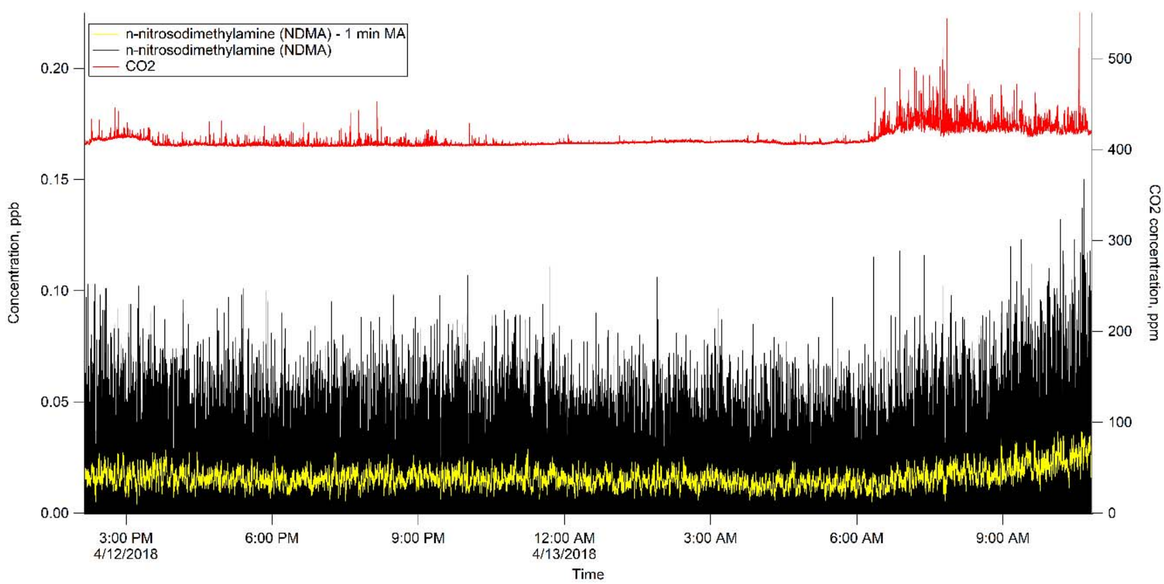

Figure 4-13. N-nitrosodimethylamine (NDMA).

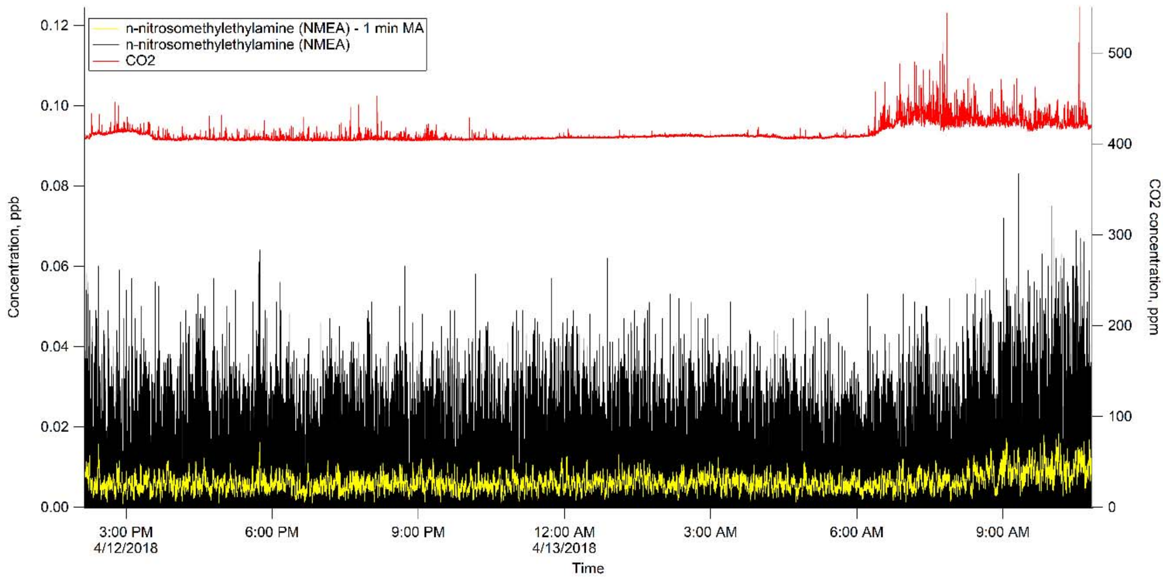

Figure 4-14. N-nitrosomethylethylamine (NMEA).

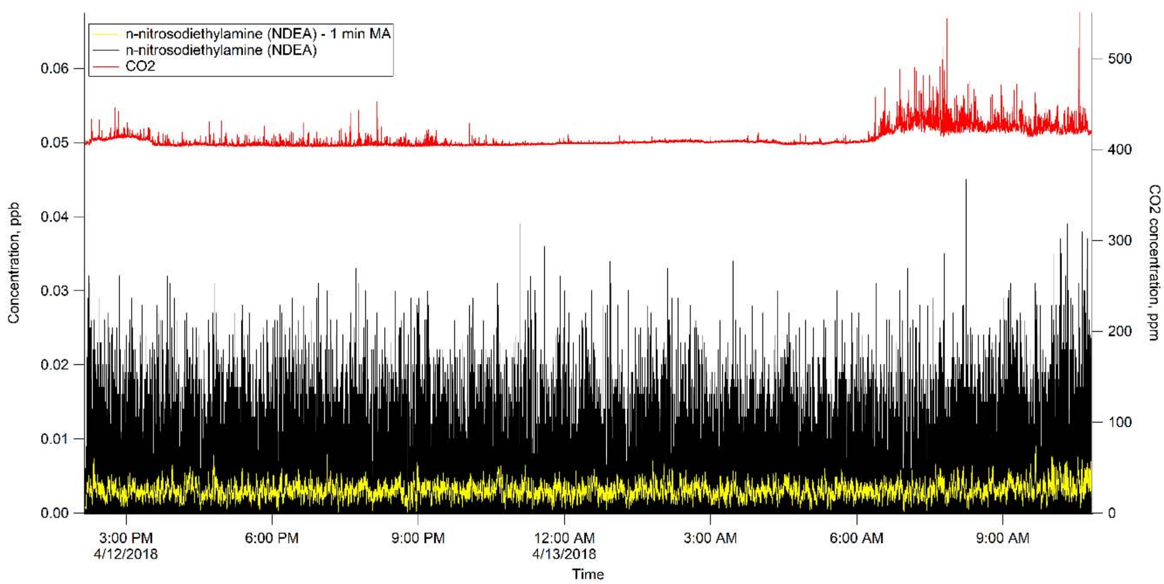

Figure 4-15. N-nitrosodiethylamine (NDEA).

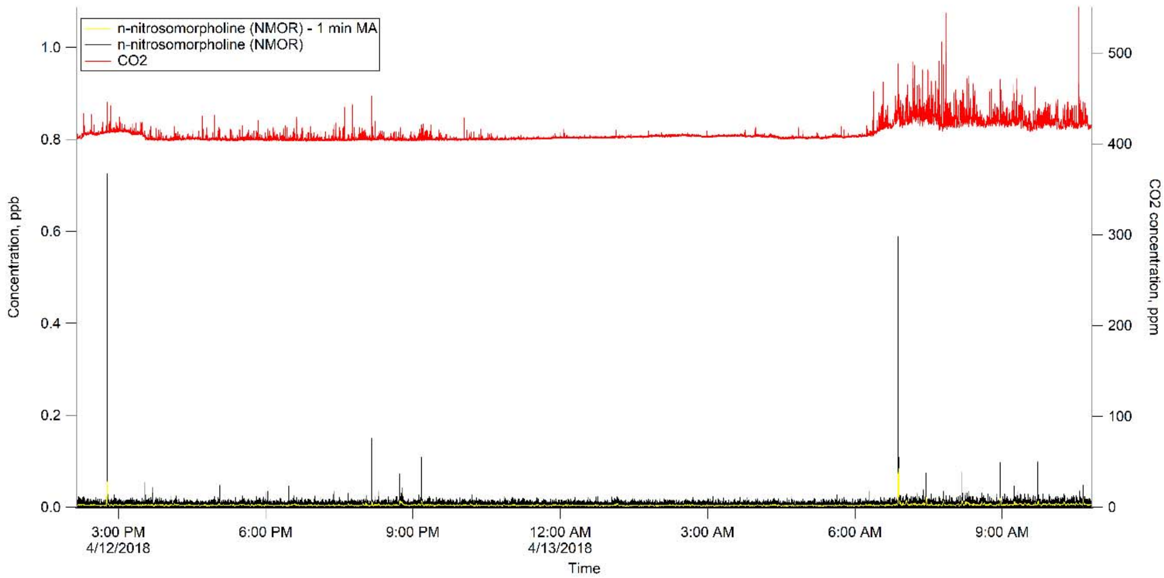

Figure 4-16. N-nitrosomorpholine (NMOR).

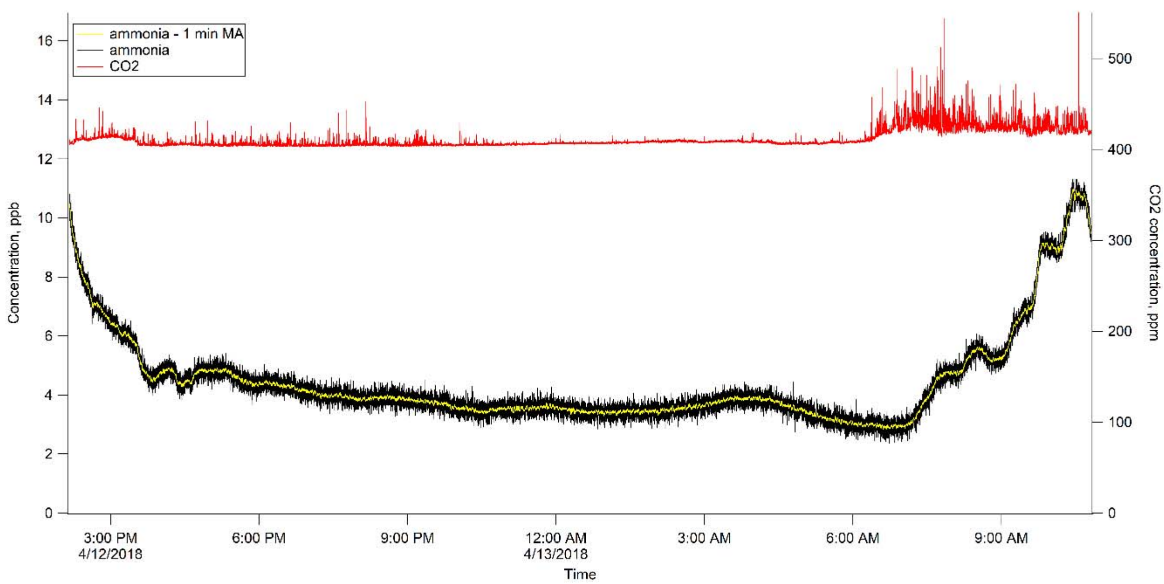

Figure 4-17. Ammonia.

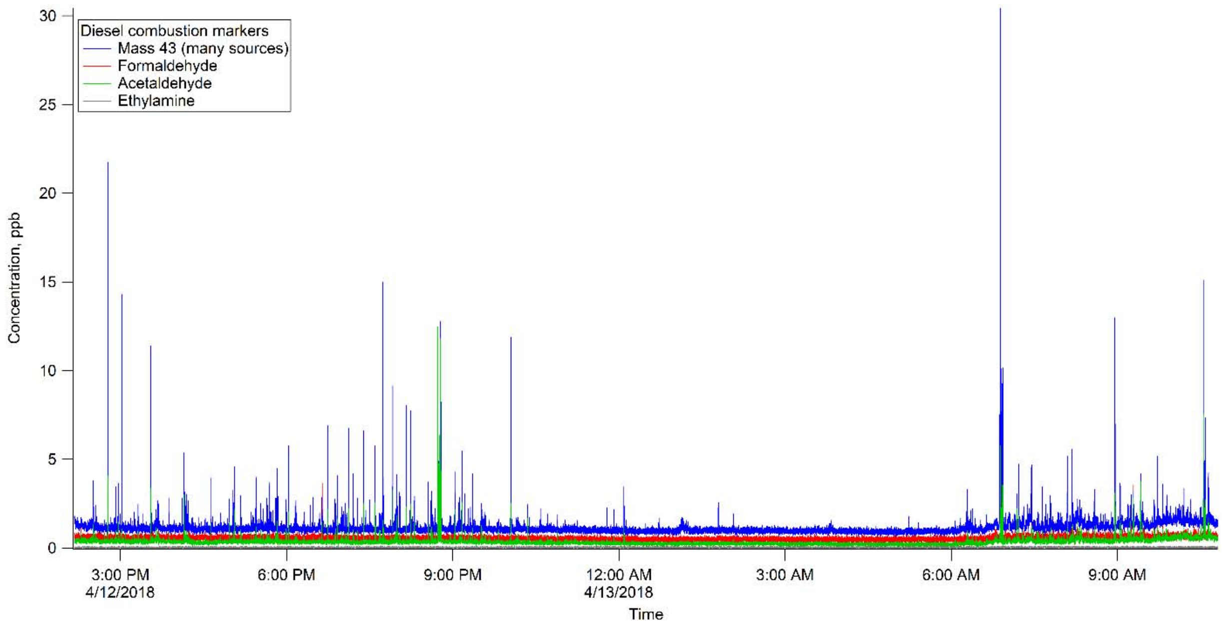

Figure 4-18. Diesel Combustion Markers.

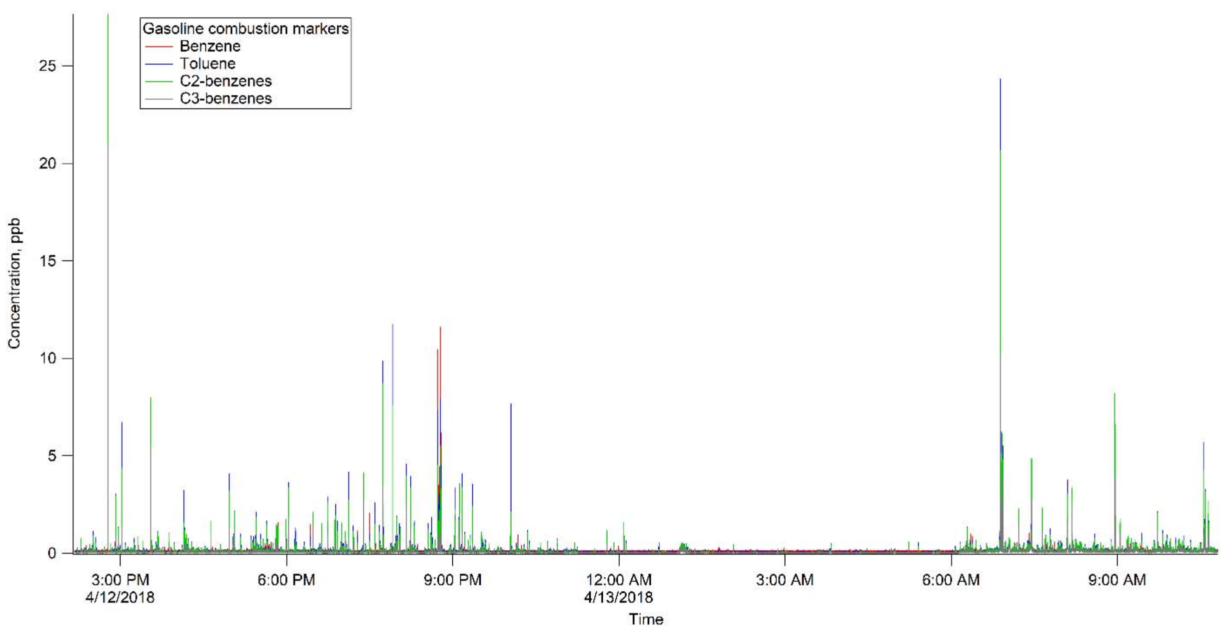

Figure 4-19. Gasoline Combustion Markers.

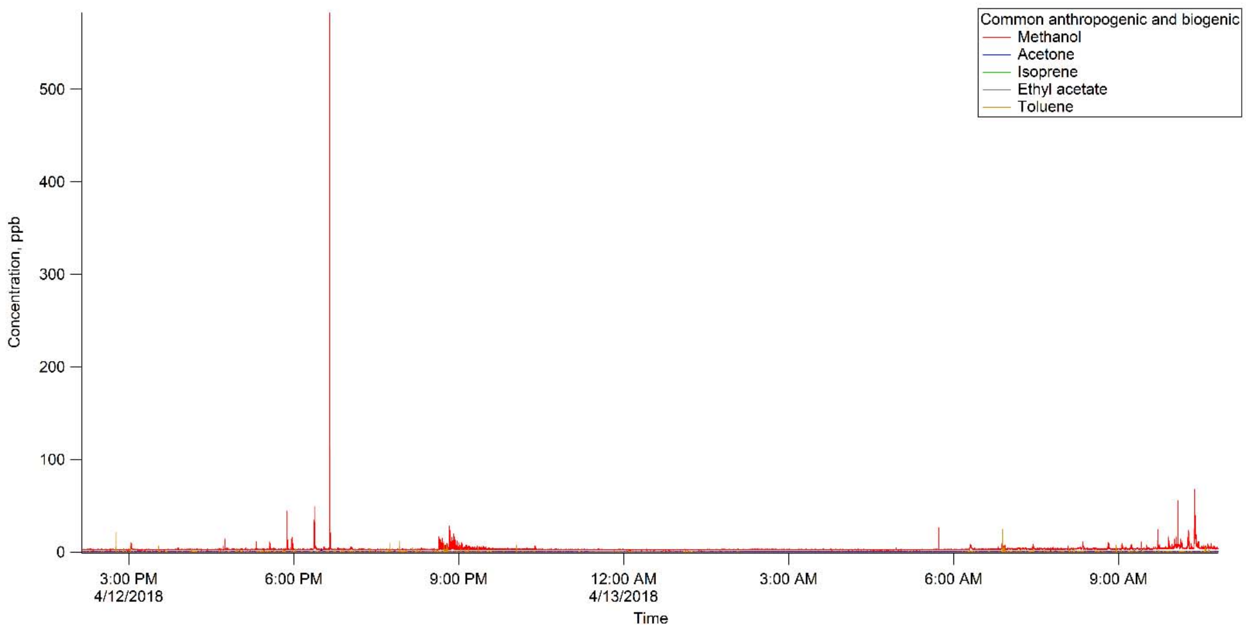

Figure 4-20. Plant and Human Markers.

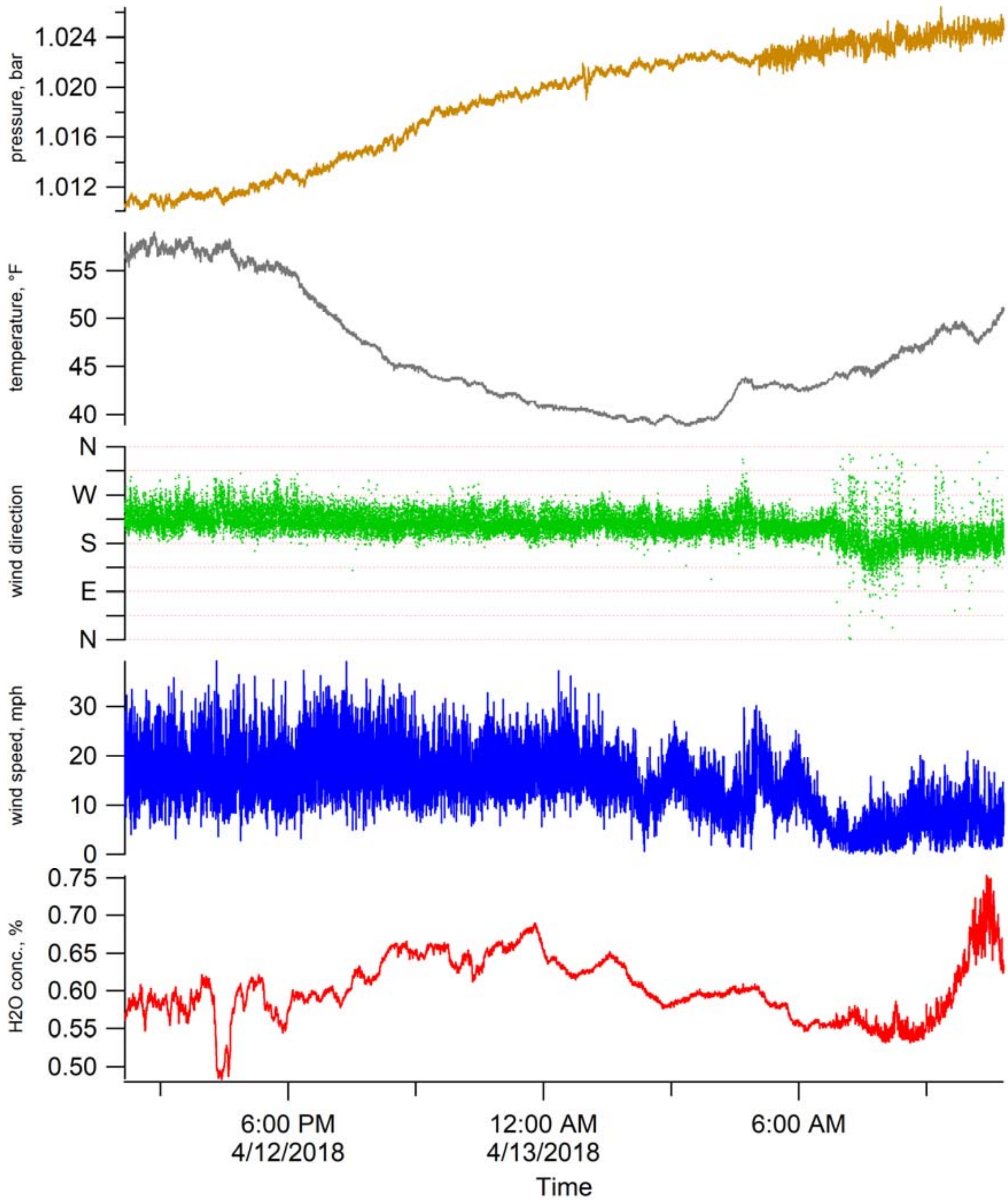

Figure 4-21. Weather Data.

5.0 APRIL 13, 2018 – APRIL 14, 2018 – STUDY SITE #1

5.1 Quality Assessment

Data from April 13, 2018, were transferred to TerraGraphics via the WRPS FTP site on April 19, 2018. Data were assessed using Procedure 17124-DOE-HS-102. A completed Data Exchange Checklist was sent to WRPS on April 23, 2018. The data were accepted by TerraGraphics with the following comments. All startup, shutdown, and calibration procedures were adequately documented and all other checks passed the acceptance limits.

5.2 Summary

The Mobile Laboratory personnel performed background sampling using the Mobile Laboratory from April 13, 2018, to April 14, 2018, at Study Site 1. Site 1 is located on the plateau northwest of the 200W Tank Farm operations. This is an upwind site from the central Hanford Plateau. The Mobile Laboratory arrived at Site 1 at 12:45 on April 13, 2018. The initial QA/QC zero air/sensitivity checks were performed on the CO_2 monitor, NH_3 monitor, and the PTR-MS beginning at 12:45. The data file names were confirmed and routine data collection resumed by 13:43. The Mobile Laboratory staff departed the monitoring site at 16:05.

The Mobile Laboratory staff returned to Site 6 at 06:40 on April 13, 2018, and began confirmatory sample collection by 06:49. Closeout zero air/sensitivity checks were performed at 10:37. The Mobile Laboratory moved to Site 2 by 11:46.

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

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 collected as follows:

Table 5-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
1	13-Apr	Thermosorb/N	EL22183	12:52	15:50	177
1	13-Apr	CarboTrap-300	Y51109	13:01	14:11	71
1	14-Apr	Thermosorb/N	EL22181	06:49	09:49	180
1	14-Apr	CarboTrap-300	A020973	06:55	08:06	71

Table 5-2 displays the statistical information for the monitoring period of April 13, 2018, to April 14, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 5-2. Statistical Information for the Monitoring Period of April 13, 2018 – April 14, 2018.

COPC #	COPC Name	Reporting Limit (ppb)	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel. St. Dev. (%)	Max (ppb)	Median (ppb)	Sec. over 50% OEL	Sec. over OEL
1	ammonia	1	25000	5.07	0.825	16.3%	9.48	4.81	0	0
2	furan	0.09	1	0.045	0.010	70.1%	0.077	0.013	0	0
3	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	0.22	1	0.110	0.007	41.5%	N/A*	N/A*	N/A	N/A
4	NDMA**	0.06	0.3	0.033	0.022	112.6%	0.148	0.013	0	0
5	2-methylfuran	0.05	1	0.025	0.008	70.7%	0.059	0.010	0	0
6	NEMA	0.02	0.3	0.013	0.012	161.4%	0.086	0.000	0	0
7	2,5-dimethylfuran	0.05	1	0.025	0.007	84.0%	0.050	0.007	0	0
8	NDEA	0.01	0.1	0.006	0.006	177.1%	0.042	0.000	0	0
9	2-propylfuran + 2-ethyl-5-methylfuran	0.02	1	0.010	0.005	120.0%	0.039	0.002	0	0
10	NMOR	0.05	0.6	0.025	0.004	108.7%	0.027	0.003	0	0
11	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	0.04	1	0.020	0.005	74.8%	0.065	0.006	0	0
12	2-pentylfuran	0.04	1	0.020	0.005	45.4%	0.045	0.011	0	0
13	2-heptylfuran	0.02	1	0.010	0.003	68.0%	0.023	0.004	0	0
14	2-octylfuran	0.01	1	0.005	0.001	237.6%	0.016	0.000	0	0
15	6-(2-furanyl)-6-methyl-2-heptanone	0.01	1	0.005	0.002	171.7%	0.015	0.000	0	0
16	furfural acetophenone	0.07	1	0.035	0.003	64.1%	0.024	0.004	0	0

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.074 ppb and the median value was 0.016 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

**Nitrosamine results are also suspect due to interferants identified during the background study.

The following figures display each COPC signal, overlaid with the same signal smoothed using a 1-minute moving average, and CO_2, for the monitoring period April 13, 2018, to April 14, 2018.

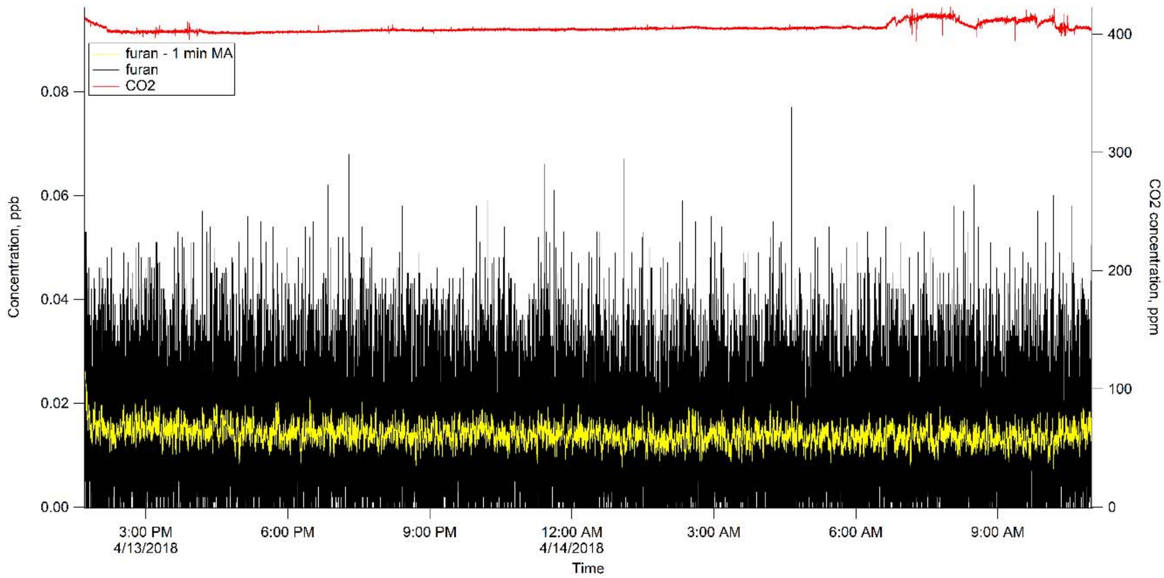

Figure 5-2. Furan.

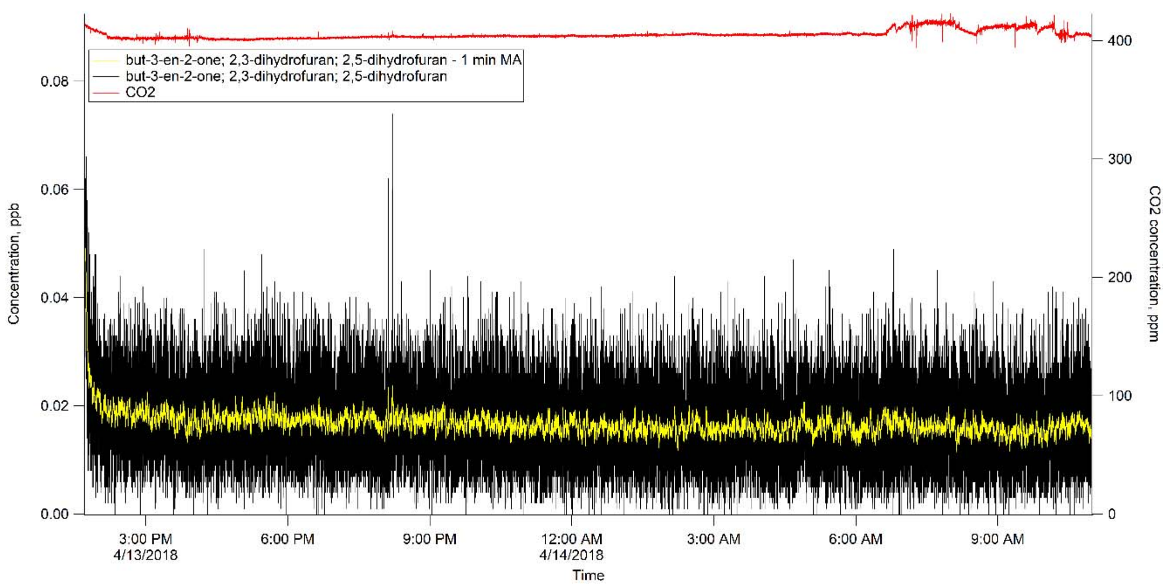

Figure 5-3. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

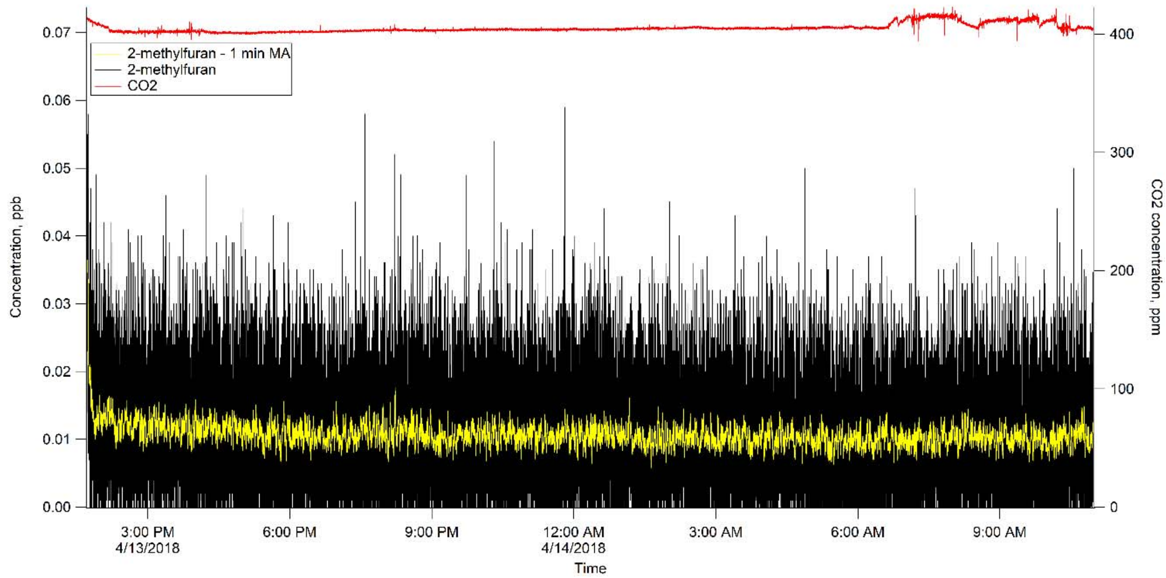

Figure 5-4. 2-methylfuran.

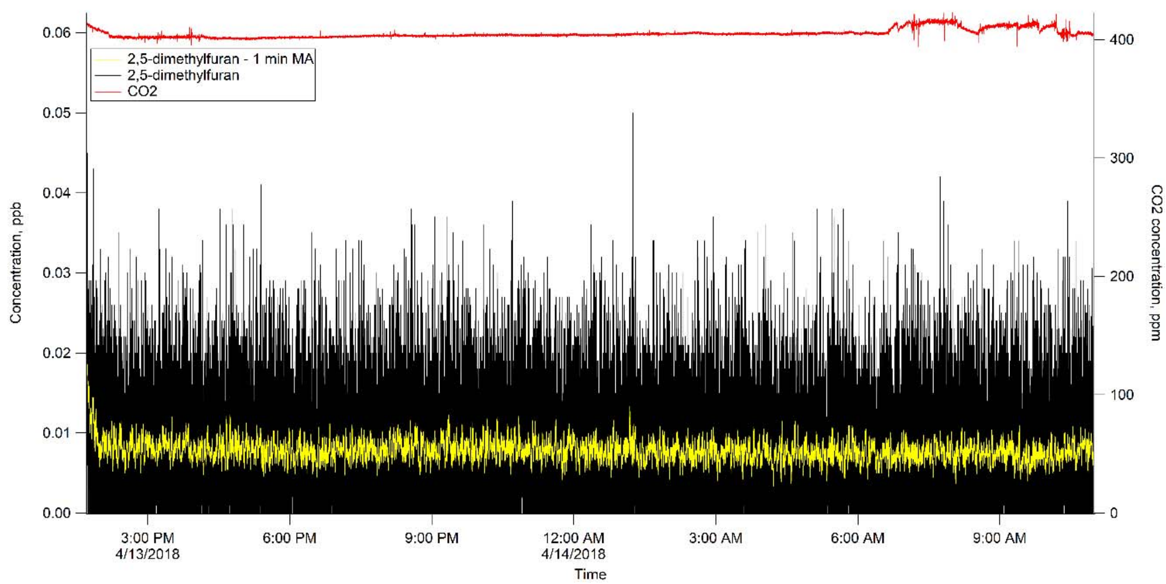

Figure 5-5. 2,5-dimethylfuran.

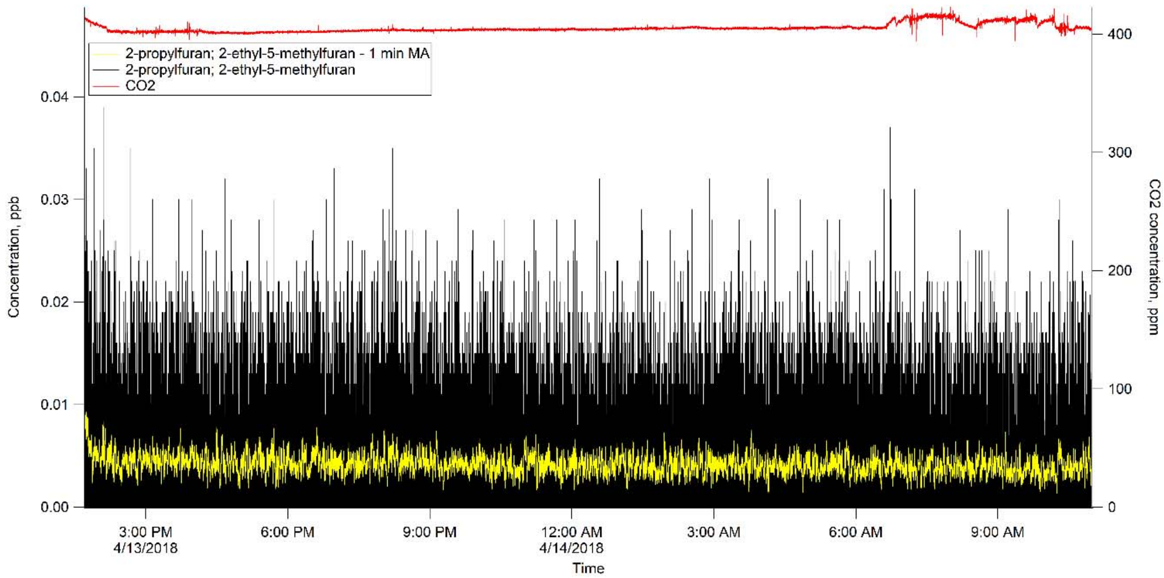

Figure 5-6. 2-propylfuran + 2-ethyl-5-methylfuran.

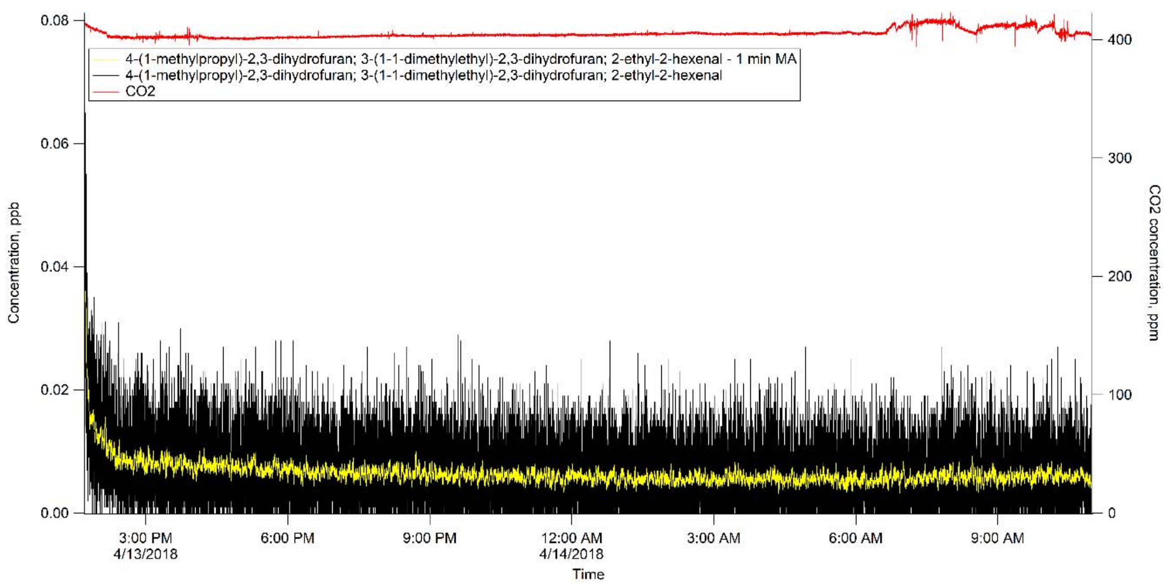

Figure 5-7. 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1-1-dimethylethyl)-2,3-dihydrofuran + 2-ethyl-2-hexenal.

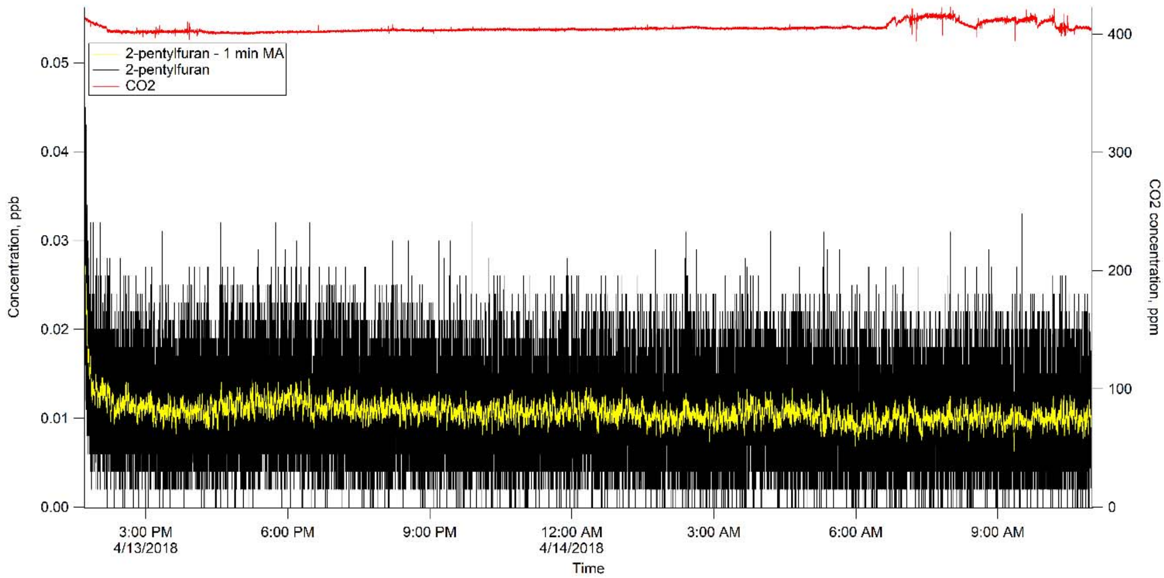

Figure 5-8. 2-pentylfuran.

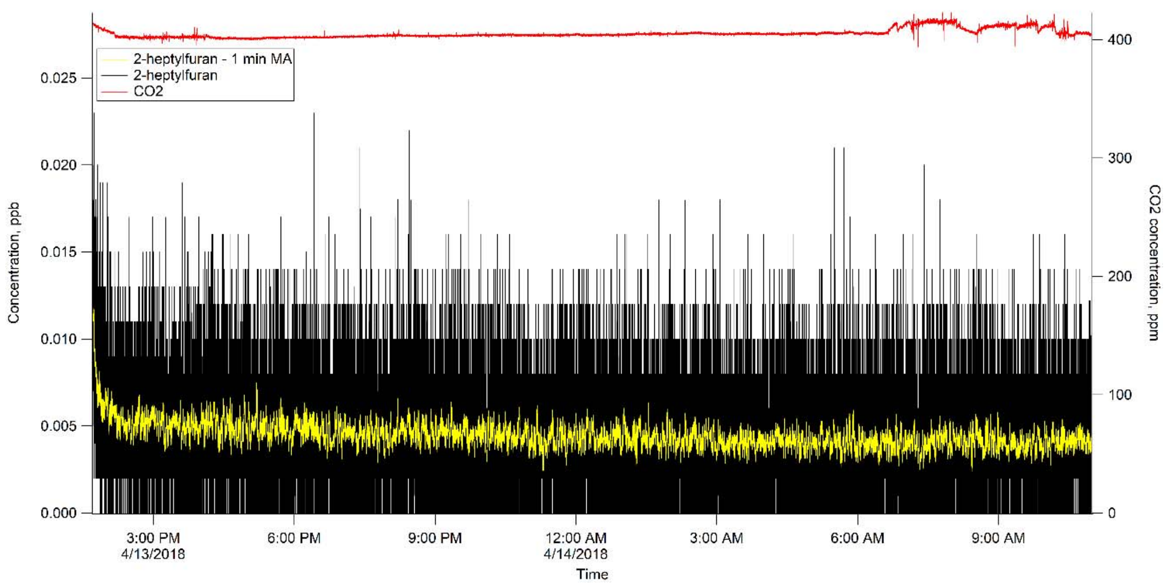

Figure 5-9. 2-heptylfuran.

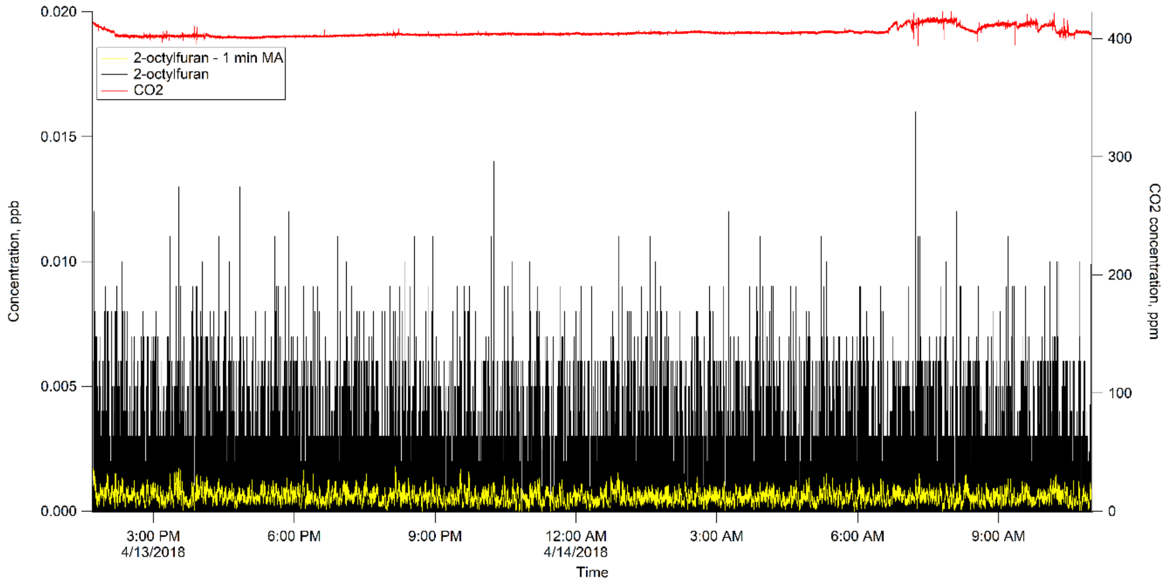

Figure 5-10. 2-octylfuran.

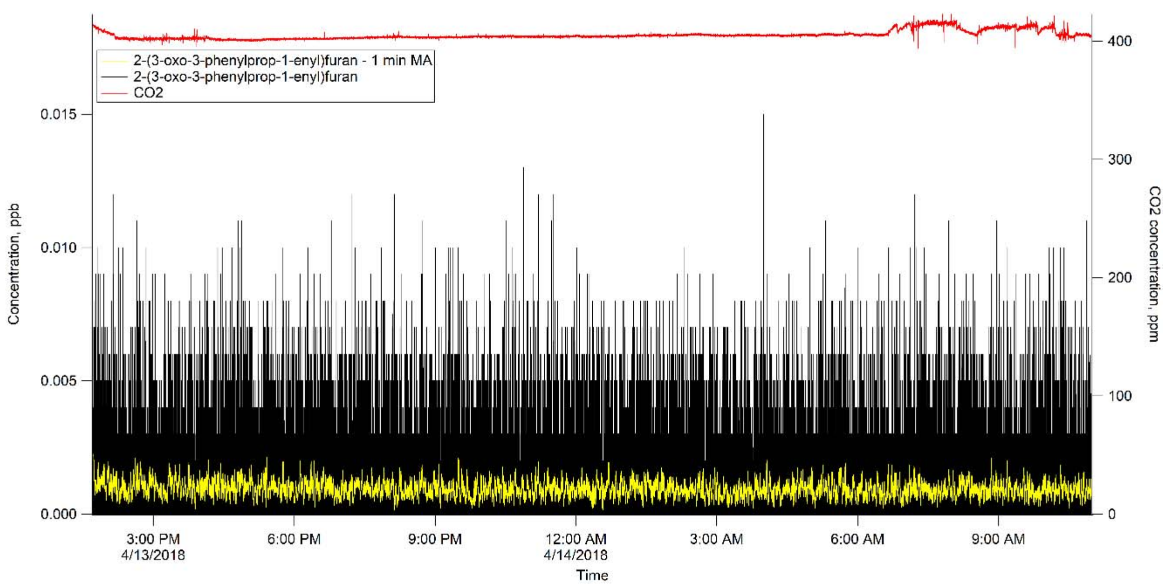

Figure 5-11. 2-(3-oxo-3-phenylprop-1-enyl)furan.

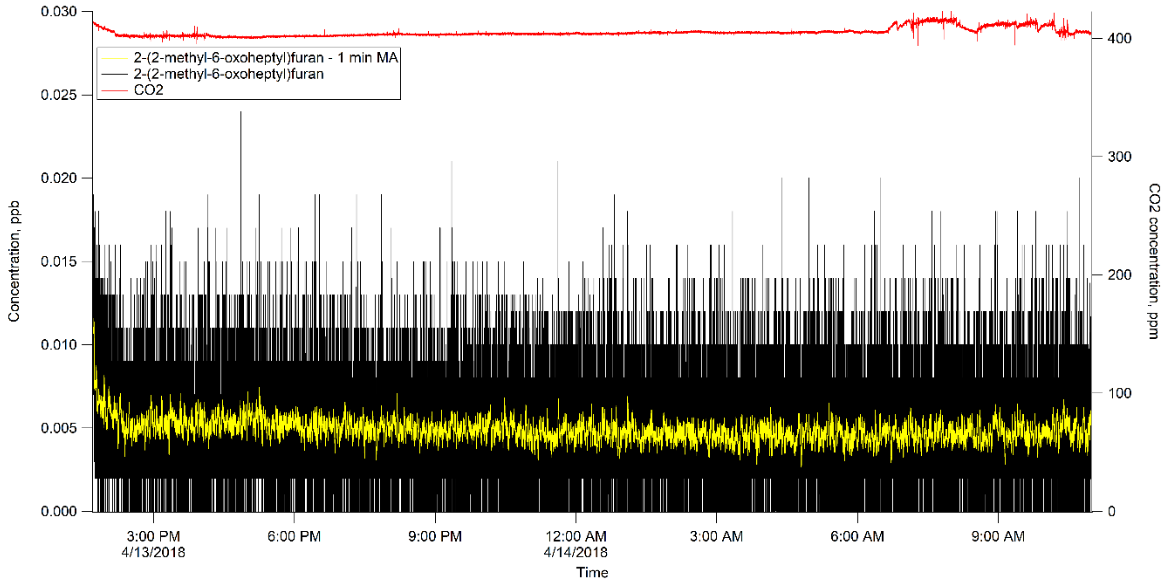

Figure 5-12. 2-(2-methyl-6-oxoheptyl)furan.

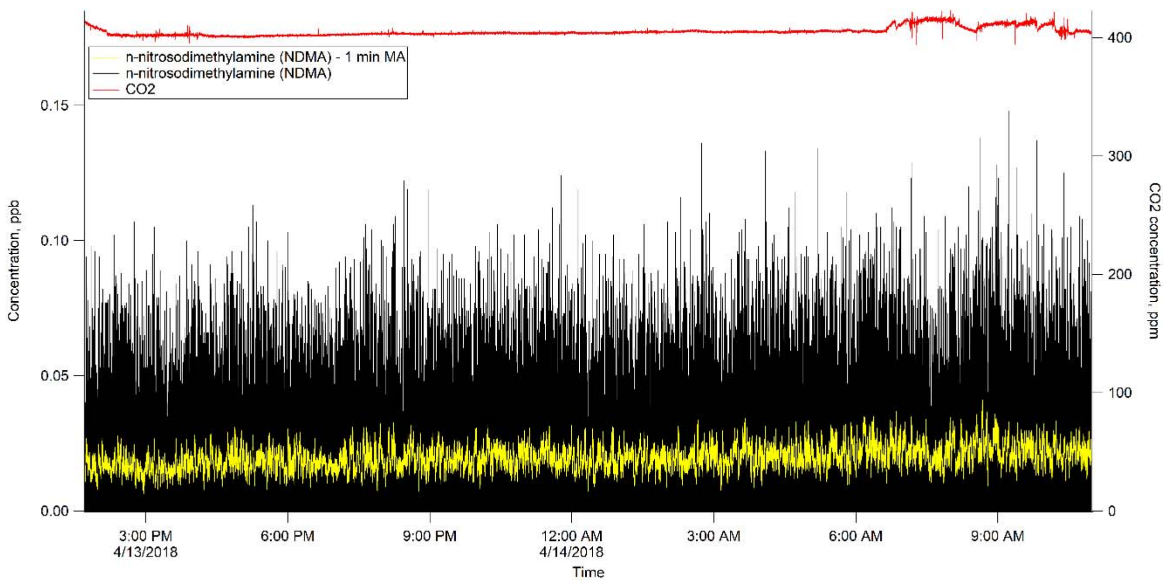

Figure 5-13. N-nitrosodimethylamine (NDMA).

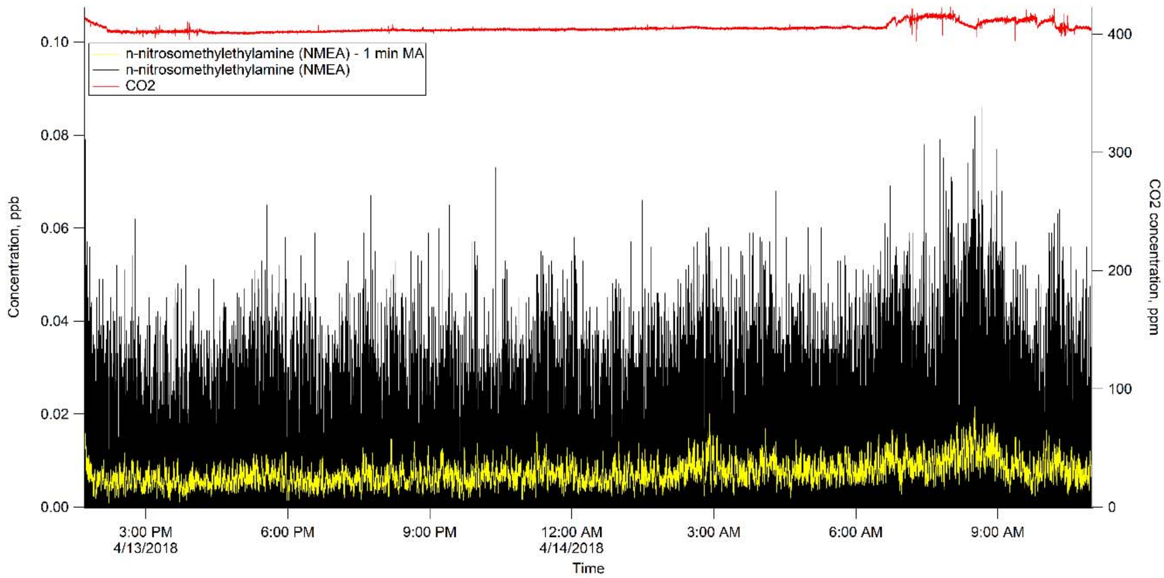

Figure 5-14. N-nitrosomethylethylamine (NMEA).

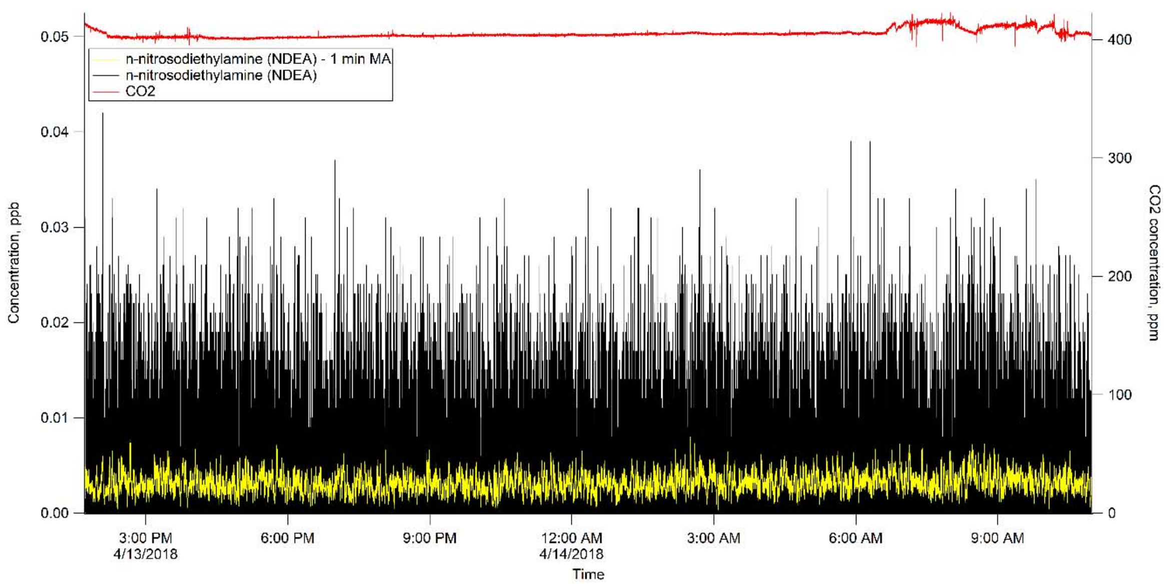

Figure 5-15. N-nitrosodiethylamine (NDEA).

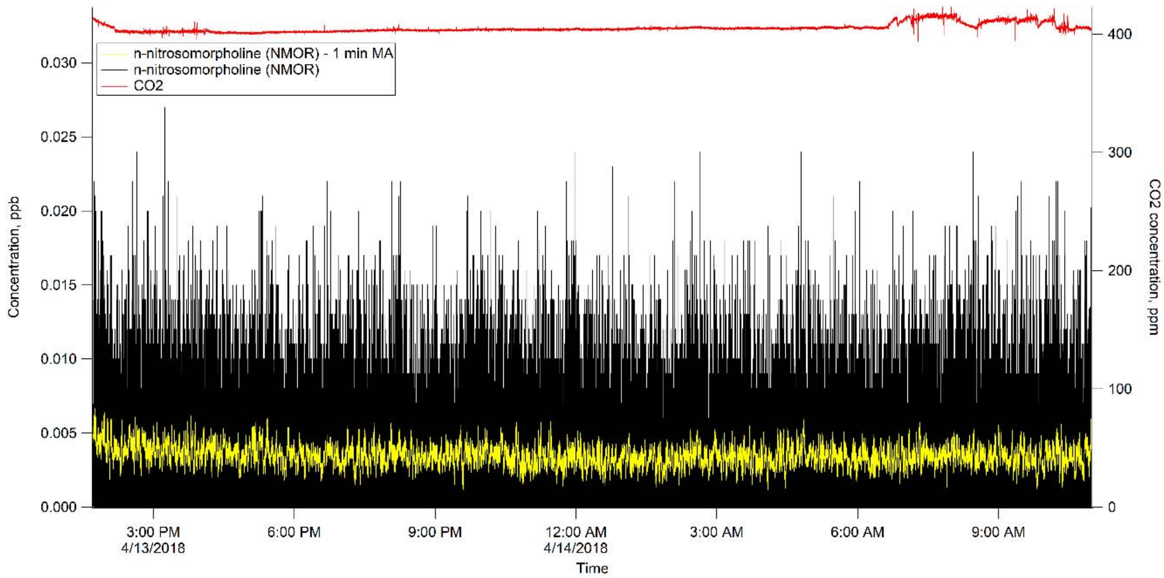

Figure 5-16. N-nitrosomorpholine (NMOR).

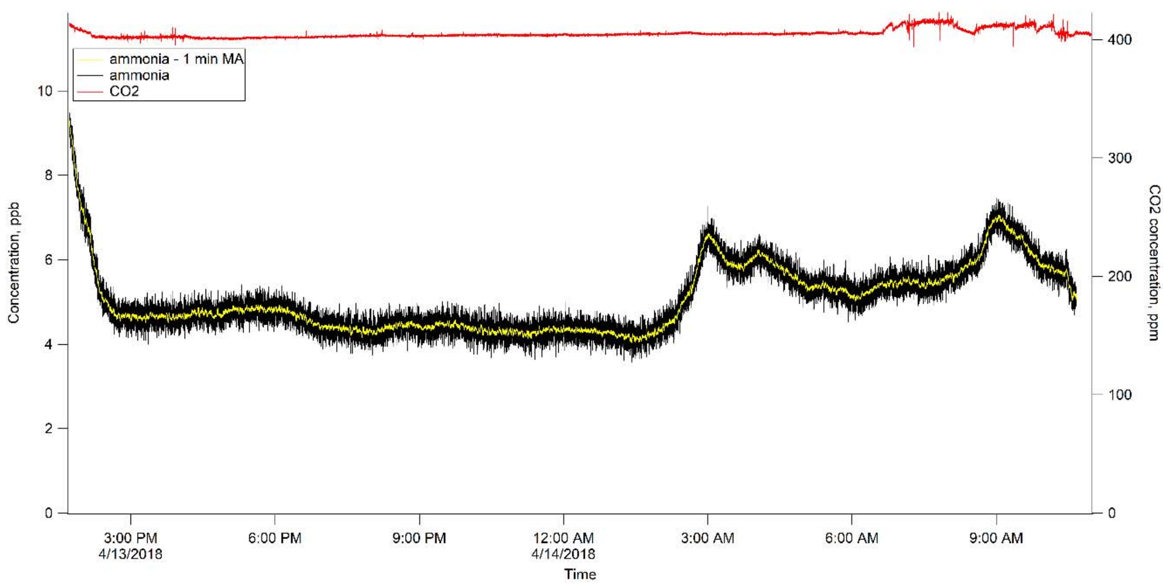

Figure 5-17. Ammonia.

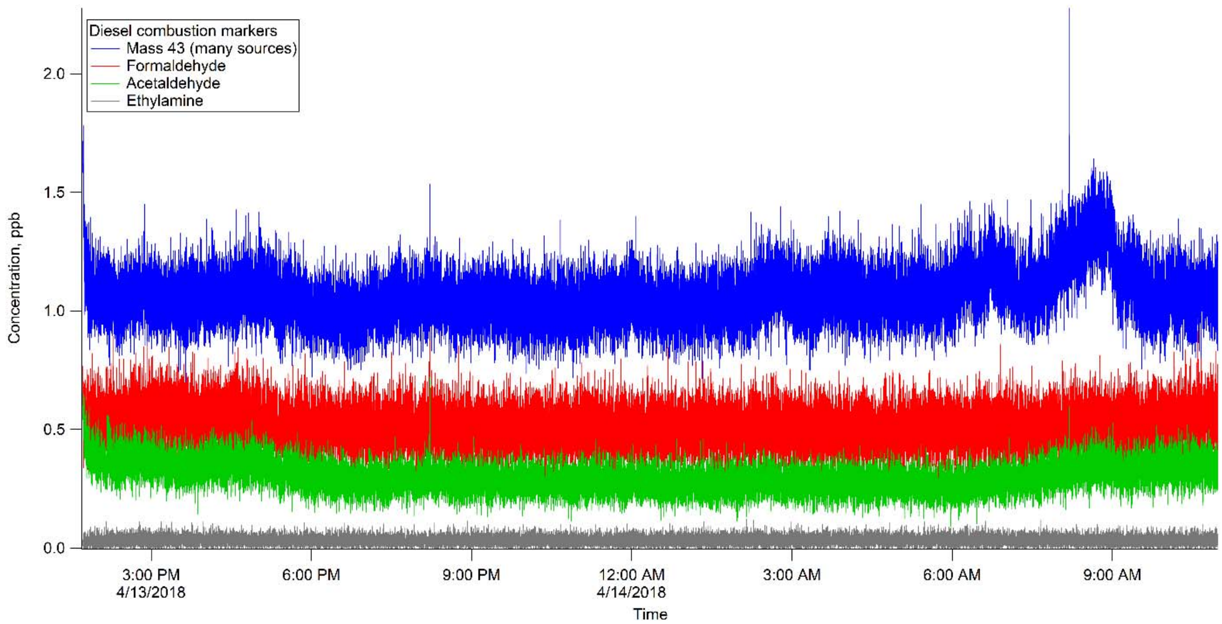

Figure 5-18. Diesel Combustion Markers.

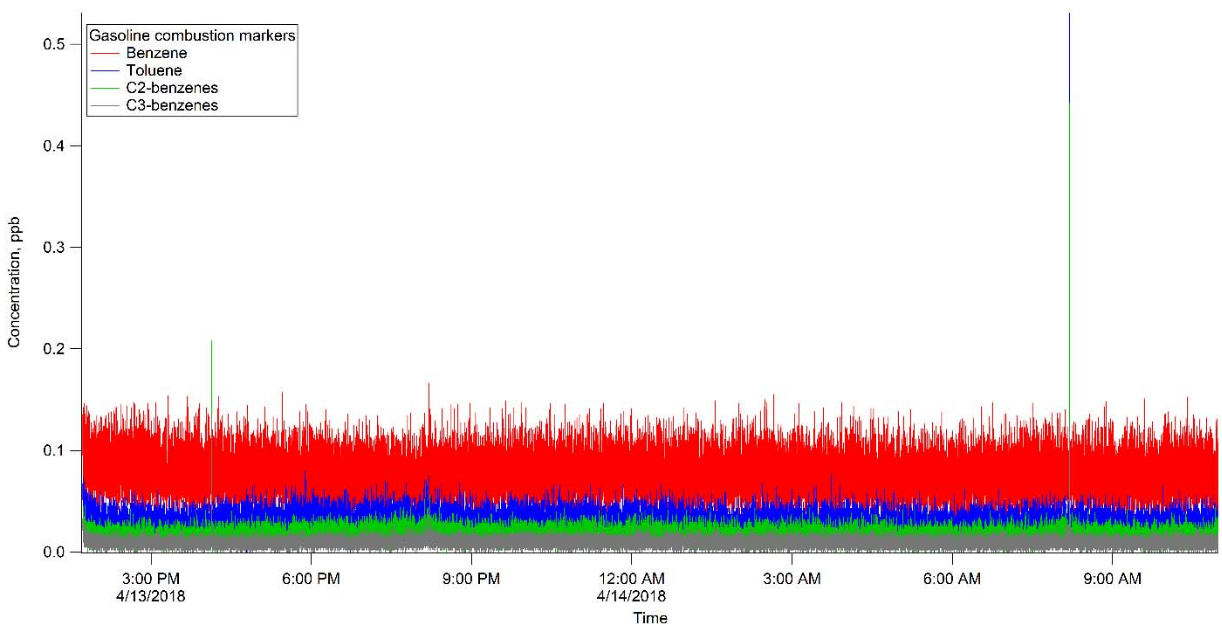

Figure 5-19. Gasoline Combustion Markers.

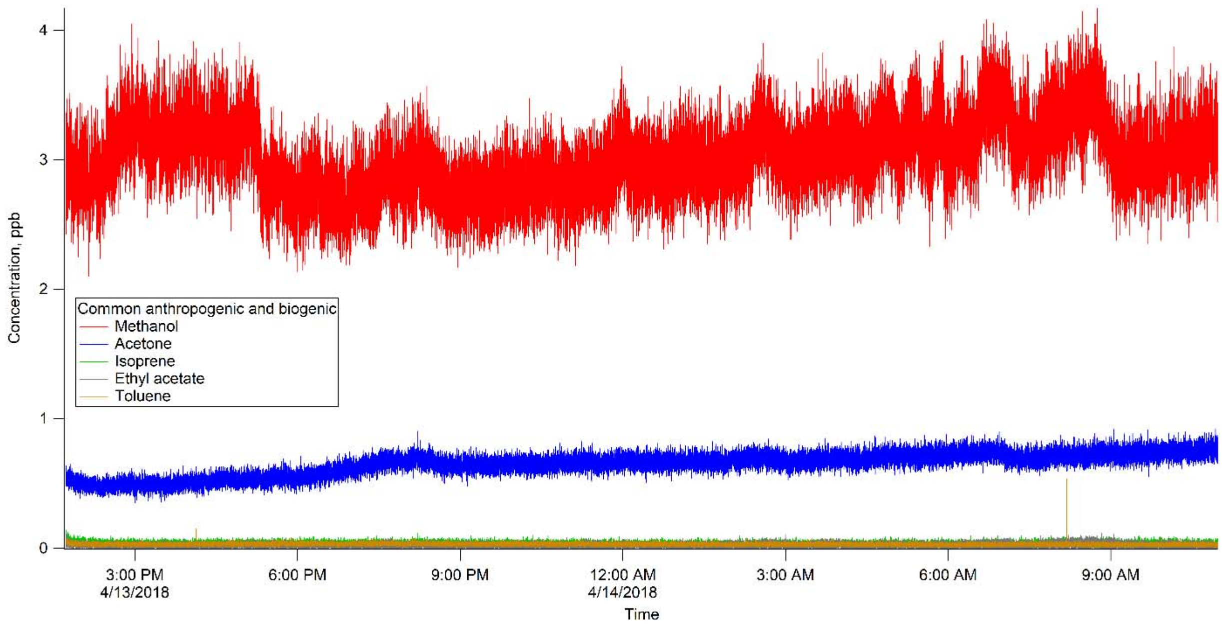

Figure 5-20. Plant and Human Markers.

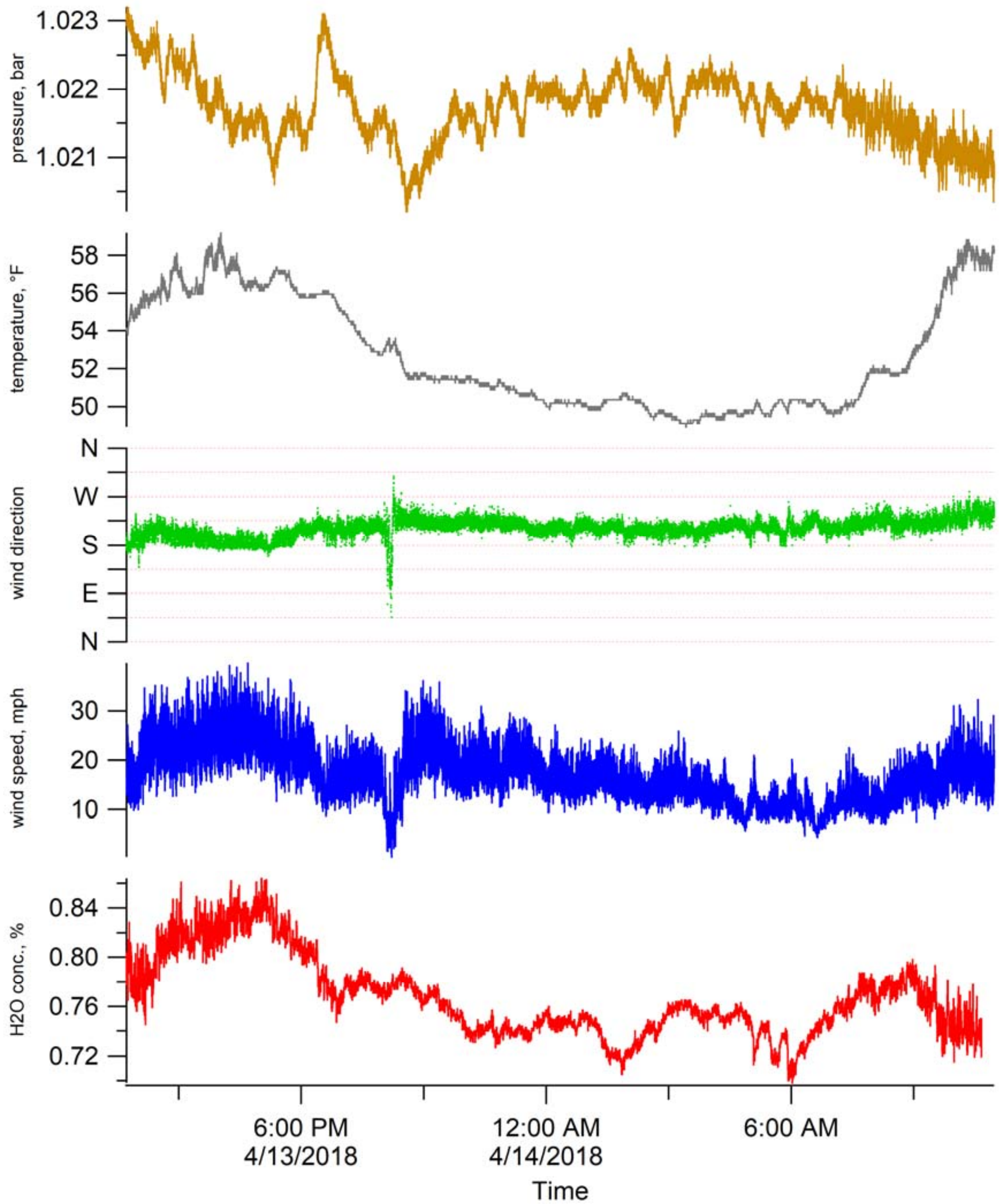

Figure 5-21. Weather Data.

6.0 APRIL 14, 2018 – APRIL 15, 2018 – STUDY SITE #2

6.1 Quality Assessment

Data from April 14, 2018, were transferred to TerraGraphics via the WRPS FTP site on April 19, 2018. Data were assessed using Procedure 17124-DOE-HS-102. A completed Data Exchange Checklist was sent to WRPS on April 23, 2018. The data were accepted by TerraGraphics with the following comments. All startup, shutdown, and calibration procedures were adequately documented and all other checks passed the acceptance limits.

6.2 Summary

The Mobile Laboratory personnel performed background sampling using the Mobile Laboratory from April 14, 2018, to April 15, 2018, at Study Site 2. Site 2 is located near the northern end of the 200W Tank Farms. The Mobile Laboratory arrived at Site 2 at 11:46 on April 14, 2018. The initial QA/QC zero air/sensitivity checks were performed on the CO_2 monitor, NH_3 monitor, and the PTR-MS beginning at 11:46. The data file names were confirmed and routine data collection resumed by 12:36. The Mobile Laboratory staff departed the monitoring site at after 15:00.

The Mobile Laboratory staff returned to Site 2 at 06:55 on April 15, 2018, and began confirmatory sample collection by 07:01. Closeout zero air/sensitivity checks were performed at 10:40. The Mobile Laboratory moved to Site 3 by 11:30.

Figure 6-1. Mobile Lab Site #2 for the Duration of the Monitoring Period.

6.3 Samples Collected

Continuous air monitoring was performed using the following instrumentation:

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

Confirmatory air samples were collected as follows:

Table 6-1. Alternative Media Samples Taken.

Site	Date	Sample Type	ID	Start	Stop	Sample Time (min)
2	14-Apr	Thermosorb/N	EL22185	11:55	14:55	180
2	14-Apr	CarboTrap-300	A022018	12:03	13:13	70
2	15-Apr	Thermosorb/N	EL22238	07:01	10:01	180
2	15-Apr	CarboTrap-300	A007574	07:05	08:15	70

Table 6-2 displays the statistical information for the monitoring period of April 14, 2018, to April 15, 2018. By definition, the OEL is an 8-hour, time-weighted average that establishes a limit for personnel exposures to hazardous chemicals. It is the exposure level to which a person may be exposed for 8 hours/day, 40 hours/week for 40 years and have no expectation of adverse health effects. In this study, area vapor concentration measurements were made to better understand the hazardous vapor exposures that workers may receive. These measurements are only compared to OEL concentrations to give them context. It is neither accurate nor appropriate to interpret these short duration measurements (2 seconds) as worker exposure levels. Since the OEL is defined as a time-weighted average, it is more appropriate to compare them to daily average vapor concentrations. Short duration excursions above the OEL concentration are not significant.

Table 6-2. Statistical Information for the Monitoring Period of April 14, 2018 – April 15, 2018.

COPC #	COPC Name	Reporting Limit (ppb)	OEL (ppb)	Ave. (ppb)	St. Dev. (ppb)	Rel. St. Dev. (%)	Max (ppb)	Median (ppb)	Sec. over 50% OEL	Sec. over OEL
1	ammonia	1	25000	5.59	1.402	25.1%	11.48	5.58	0	0
2	furan	0.09	1	0.045	0.010	69.0%	0.099	0.014	0	0
3	but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran	0.22	1	0.110	0.008	45.5%	N/A*	N/A*	N/A	N/A
4	NDMA**	0.06	0.3	0.034	0.024	111.1%	0.163	0.014	12	0
5	2-methylfuran	0.05	1	0.025	0.008	67.5%	0.068	0.011	0	0
6	NEMA	0.02	0.3	0.013	0.012	164.1%	0.083	0.000	0	0
7	2,5-dimethylfuran	0.05	1	0.025	0.007	80.9%	0.065	0.008	0	0
8	NDEA	0.01	0.1	0.007	0.006	182.2%	0.042	0.000	0	0
9	2-propylfuran + 2-ethyl-5-methylfuran	0.02	1	0.010	0.005	117.3%	0.042	0.003	0	0
10	NMOR	0.05	0.6	0.025	0.004	106.2%	0.033	0.003	0	0
11	2-ethyl-2-hexenal + 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1,1-dimethylethyl)-2,3-dihydrofuran	0.04	1	0.020	0.005	66.1%	0.053	0.007	0	0
12	2-pentylfuran	0.04	1	0.020	0.006	43.0%	0.046	0.013	0	0
13	2-heptylfuran	0.02	1	0.010	0.003	64.8%	0.026	0.004	0	0
14	2-octylfuran	0.01	1	0.005	0.001	231.2%	0.013	0.000	0	0
15	6-(2-furanyl)-6-methyl-2-heptanone	0.01	1	0.005	0.002	169.7%	0.016	0.000	0	0
16	furfural acetophenone	0.07	1	0.035	0.003	61.9%	0.026	0.004	0	0

* The maximum peak value for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran was 0.242 ppb and the median value was 0.017 ppb. The PTR-MS results for but-3-en-2-one + 2,3 dihydrofuran + 2,5 dihydrofuran are not compared to OEL concentrations because: 1) the result is suspect due to a known biogenic interferant (methacrolein) that is expected to be in concentrations that occasionally exceed the dihydrofuran OEL, and 2) this combination of COPCs have OEL concentrations that differ by a factor of 200, which provide widely variant bases for these numbers.

**Nitrosamine results are also suspect due to interferants identified during the background study.

The following figures display COPC signal, overlaid with the same signal smoothed using a 1-minute moving average, and CO_2, for the monitoring period April 14, 2018, to April 15, 2018.

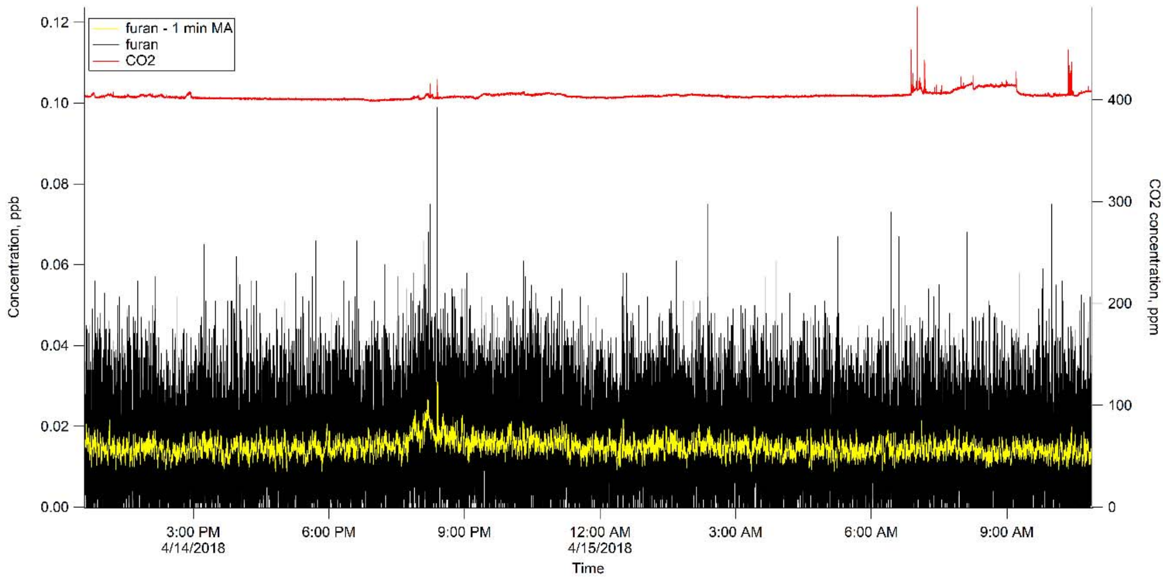

Figure 6-2. Furan.

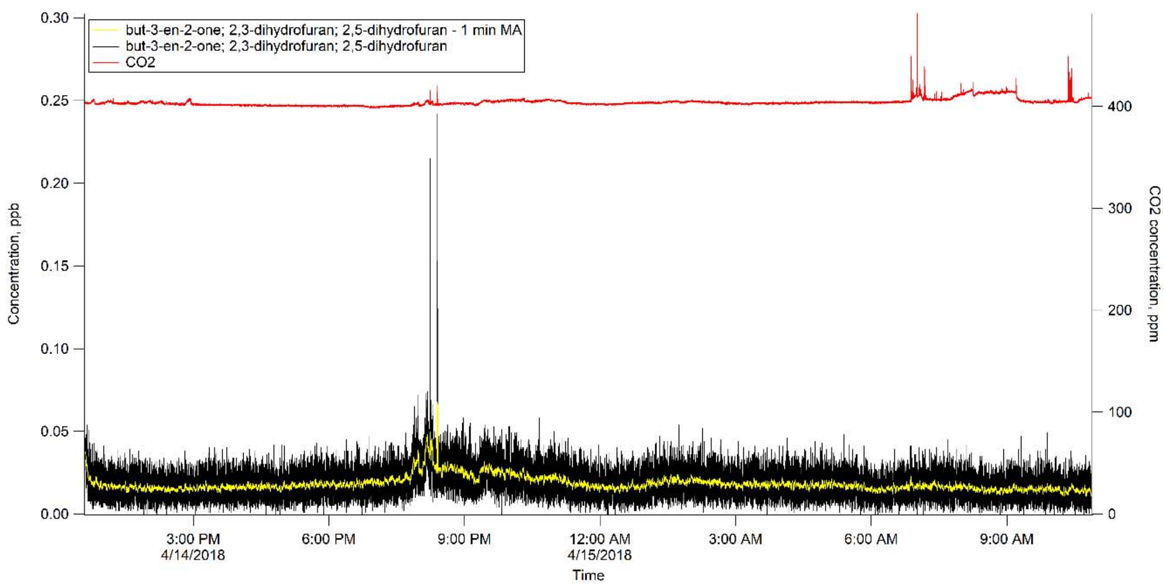

Figure 6-3. but-3-en-2-one + 2,3-dihydrofuran + 2,5-dihydrofuran.

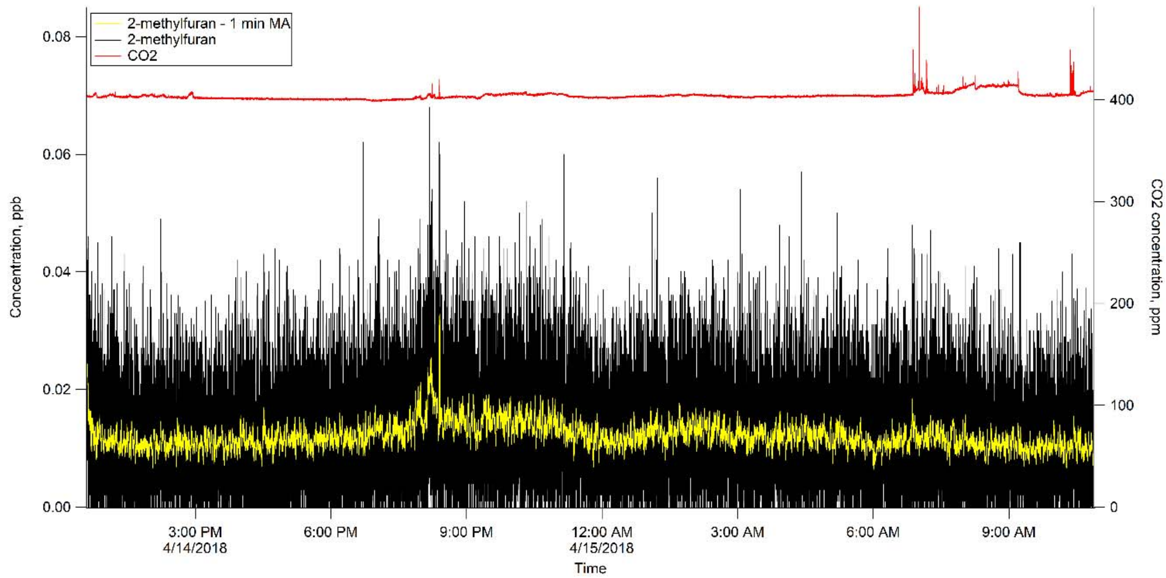

Figure 6-4. 2-methylfuran.

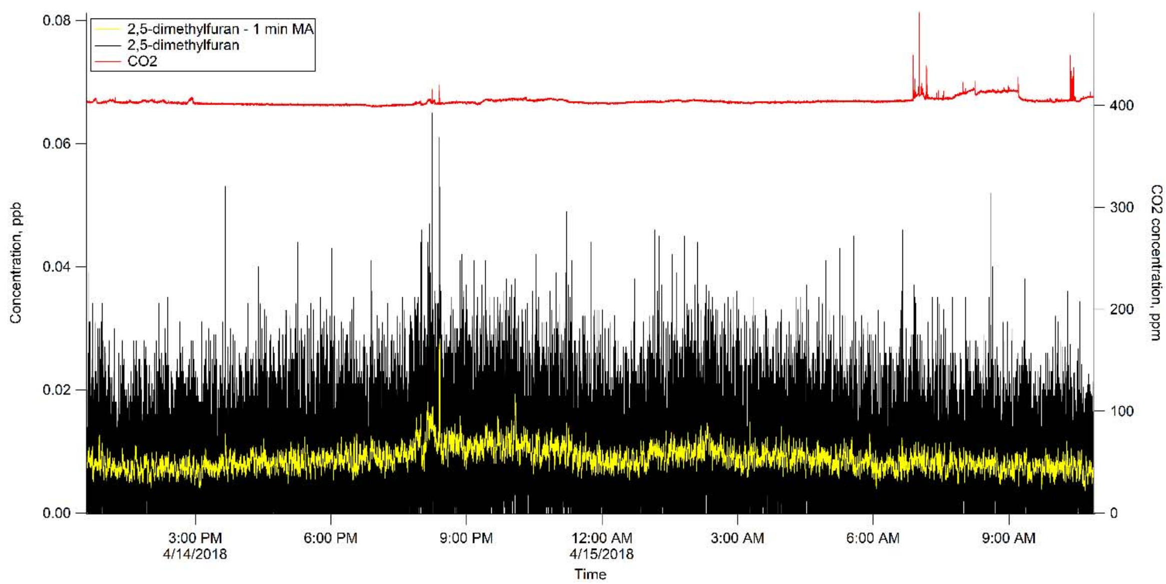

Figure 6-5. 2,5-dimethylfuran.

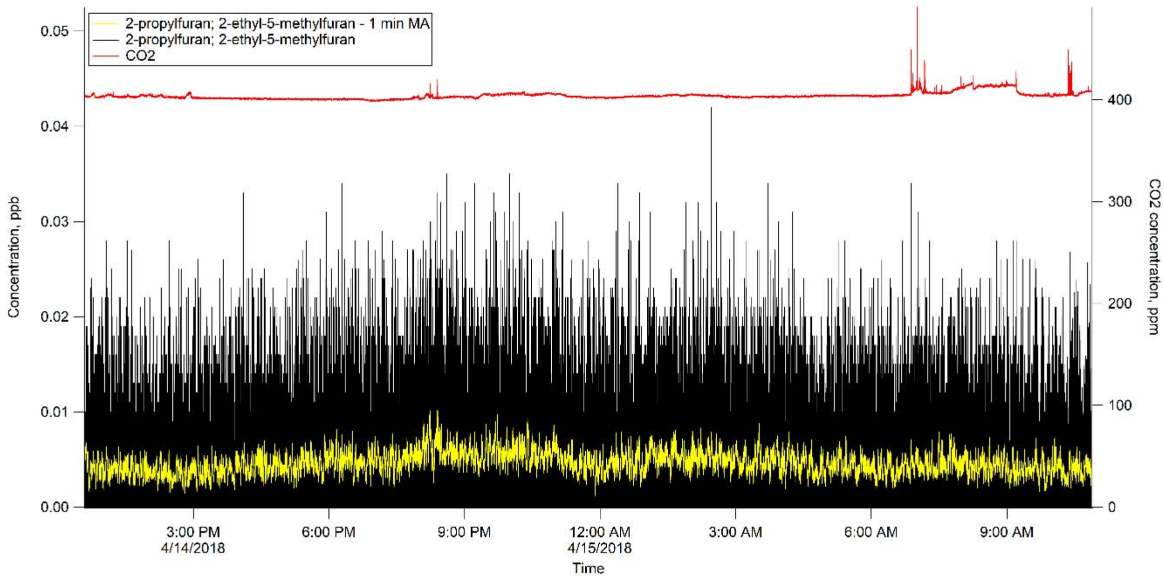

Figure 6-6. 2-propylfuran + 2-ethyl-5-methylfuran.

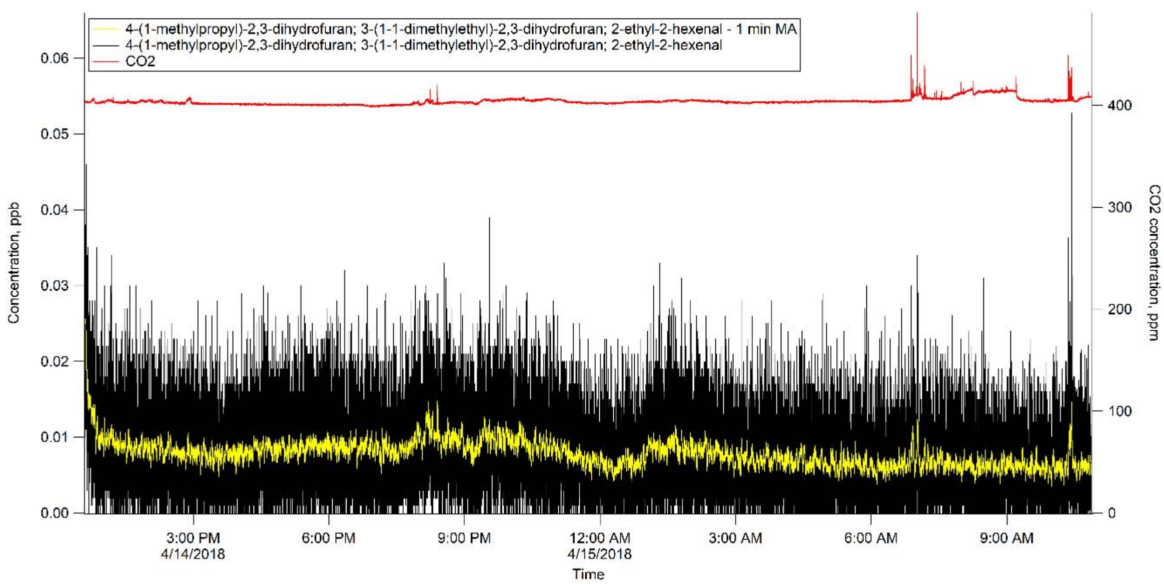

Figure 6-7. 4-(1-methylpropyl)-2,3-dihydrofuran + 3-(1-1-dimethylethyl)-2,3-dihydrofuran + 2-ethyl-2-hexenal.

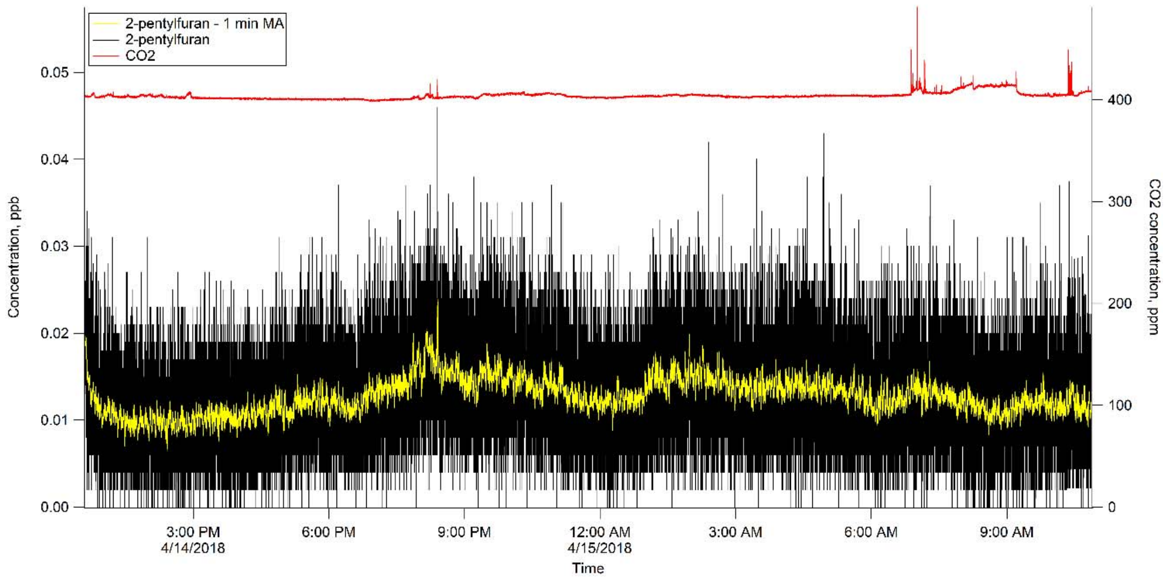

Figure 6-8. 2-pentylfuran.

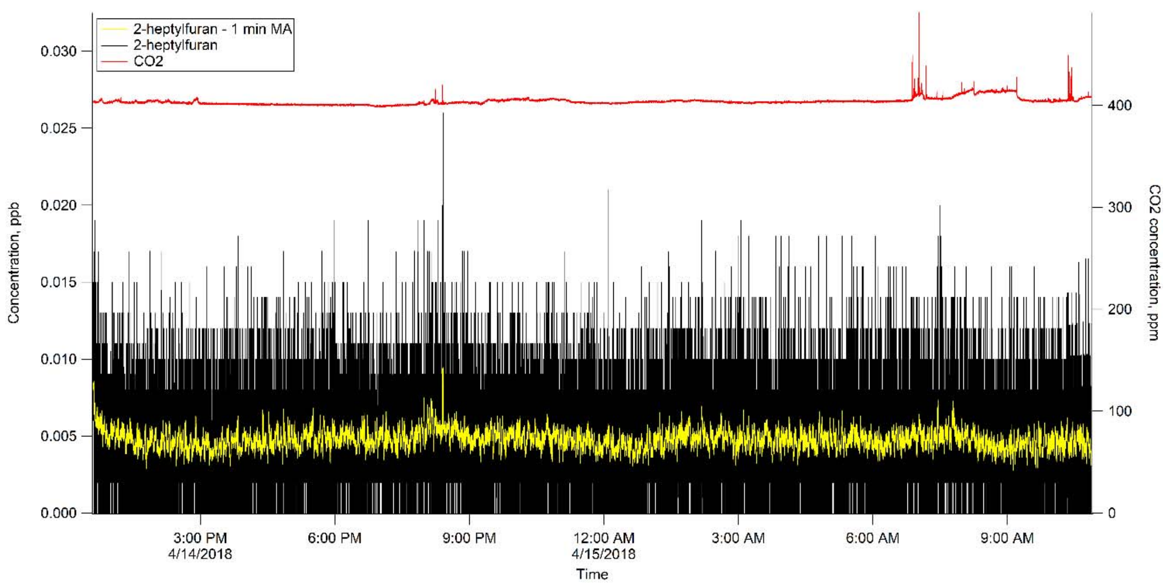

Figure 6-9. 2-heptylfuran.

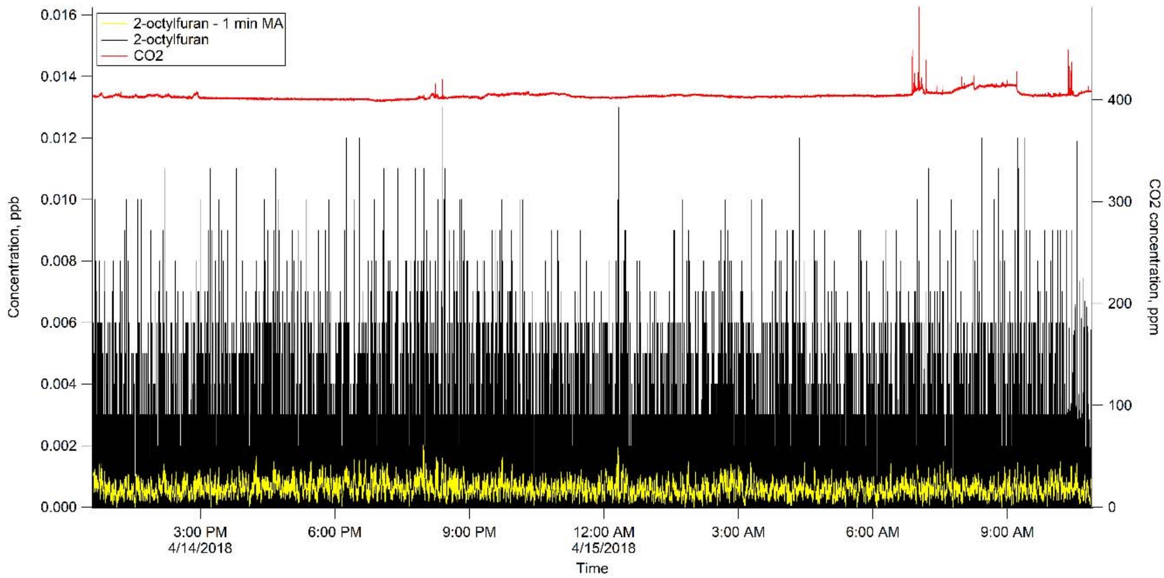

Figure 6-10. 2-octylfuran.

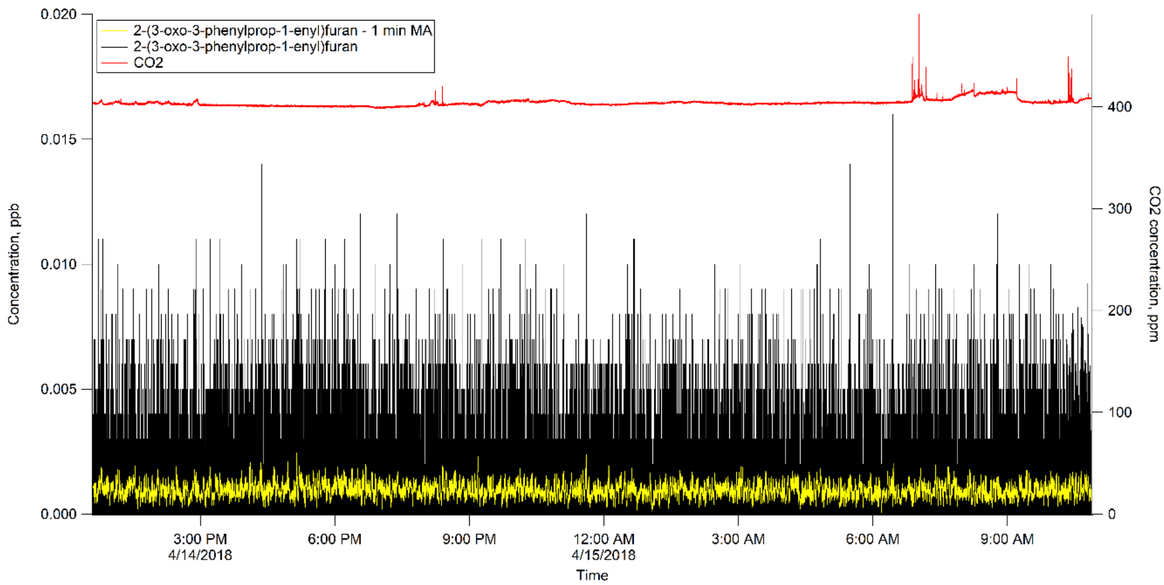

Figure 6-11. 2-(3-oxo-3-phenylprop-1-enyl)furan.

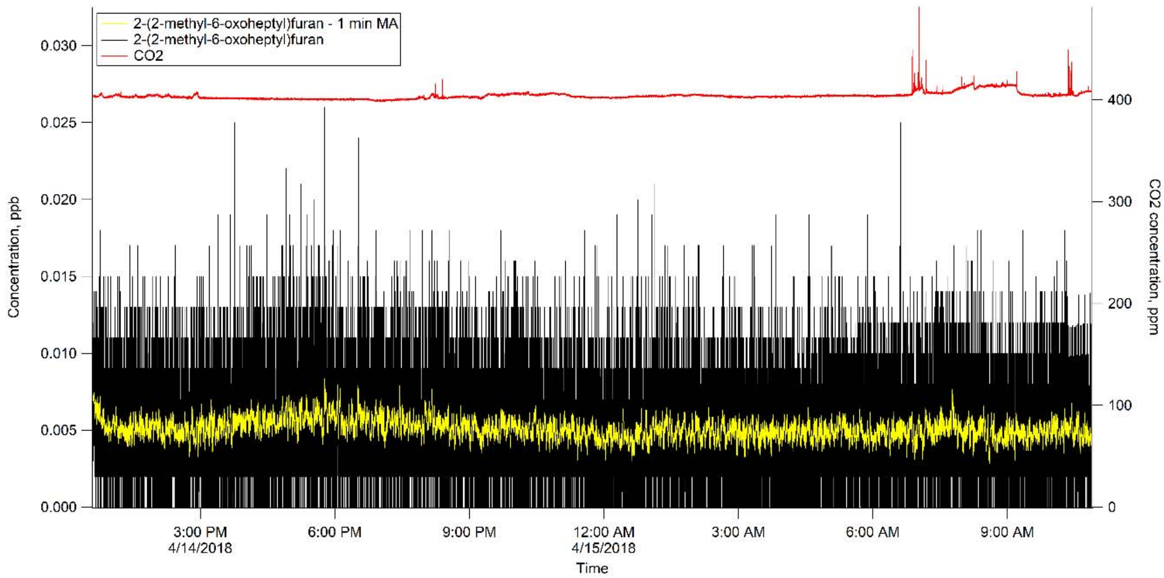

Figure 6-12. 2-(2-methyl-6-oxoheptyl)furan.

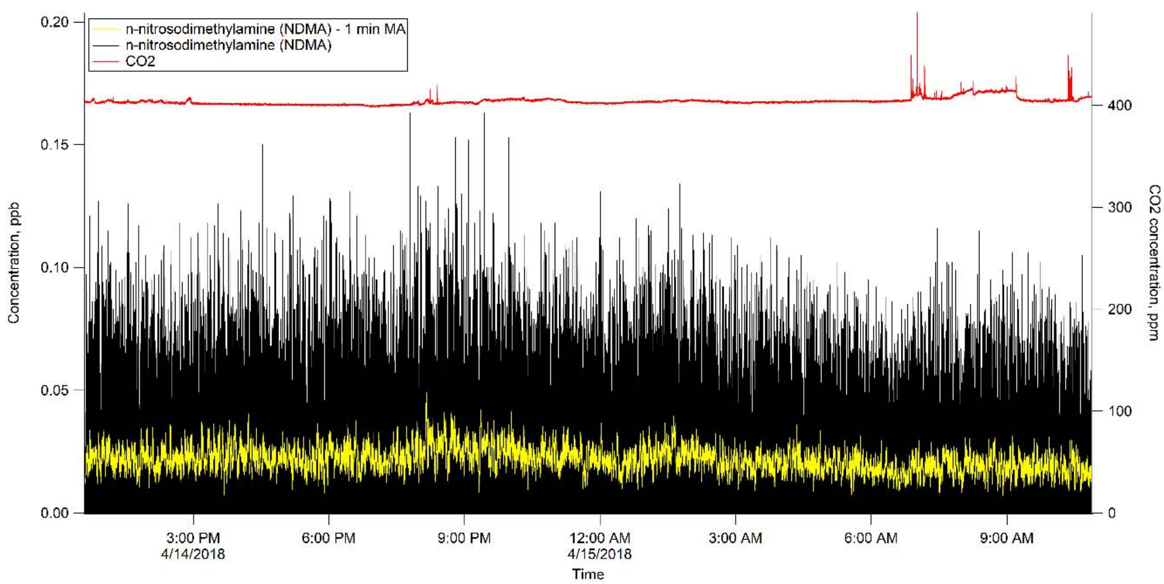

Figure 6-13. N-nitrosodimethylamine (NDMA).

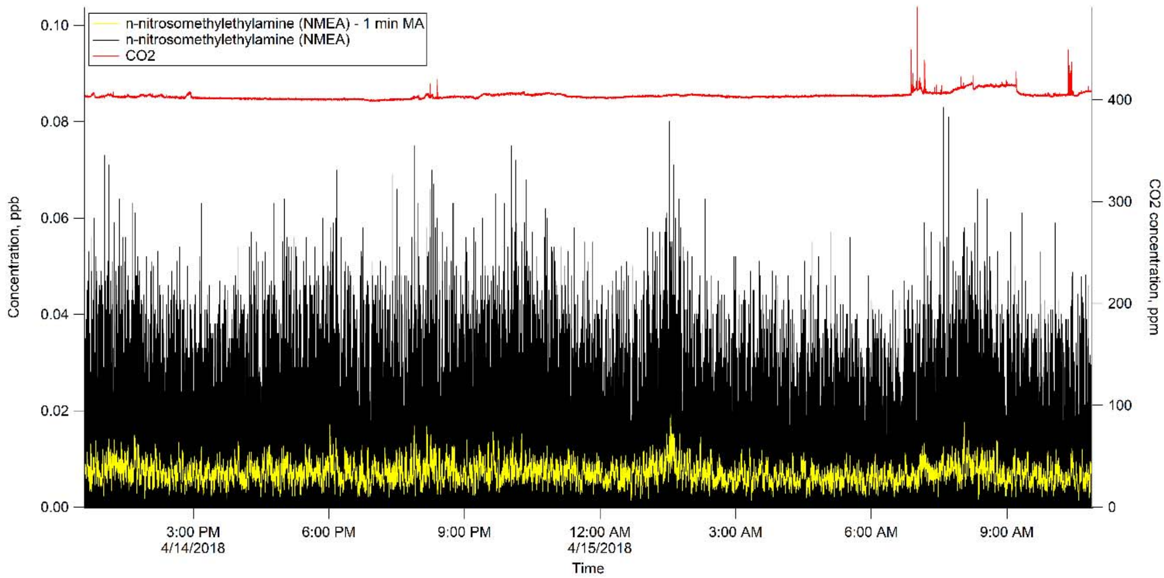

Figure 6-14. N-nitrosomethylethylamine (NMEA).

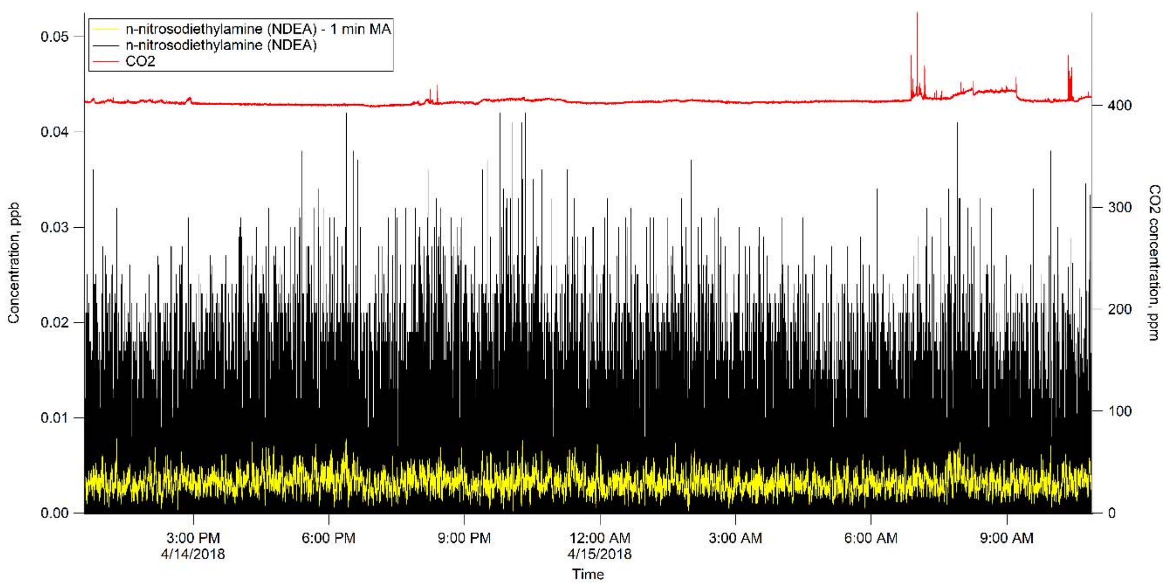

Figure 6-15. N-nitrosodiethylamine (NDEA).

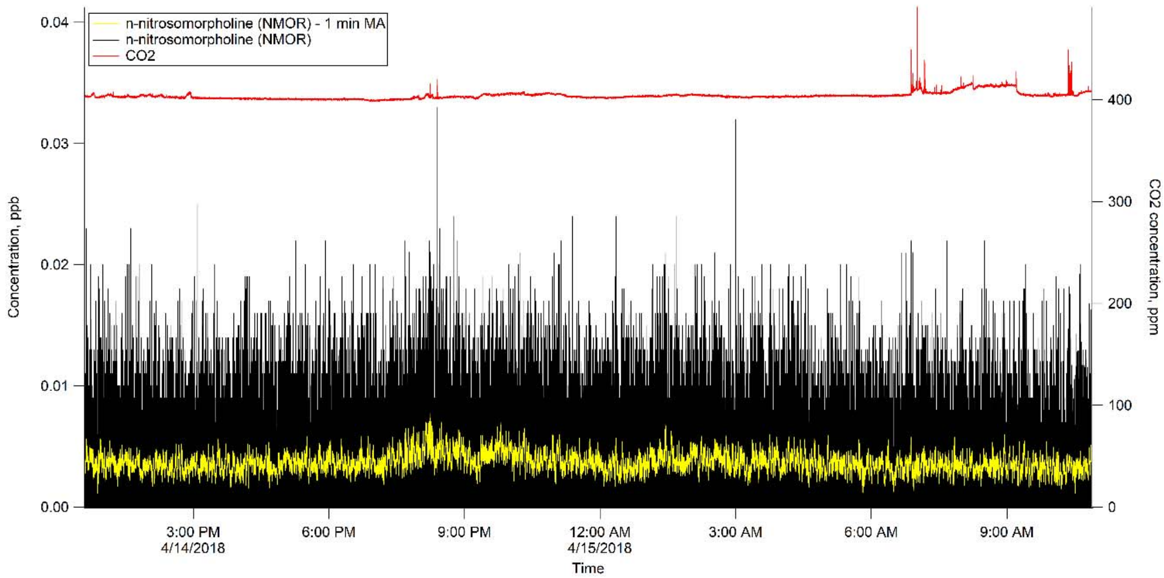

Figure 6-16. N-nitrosomorpholine (NMOR).

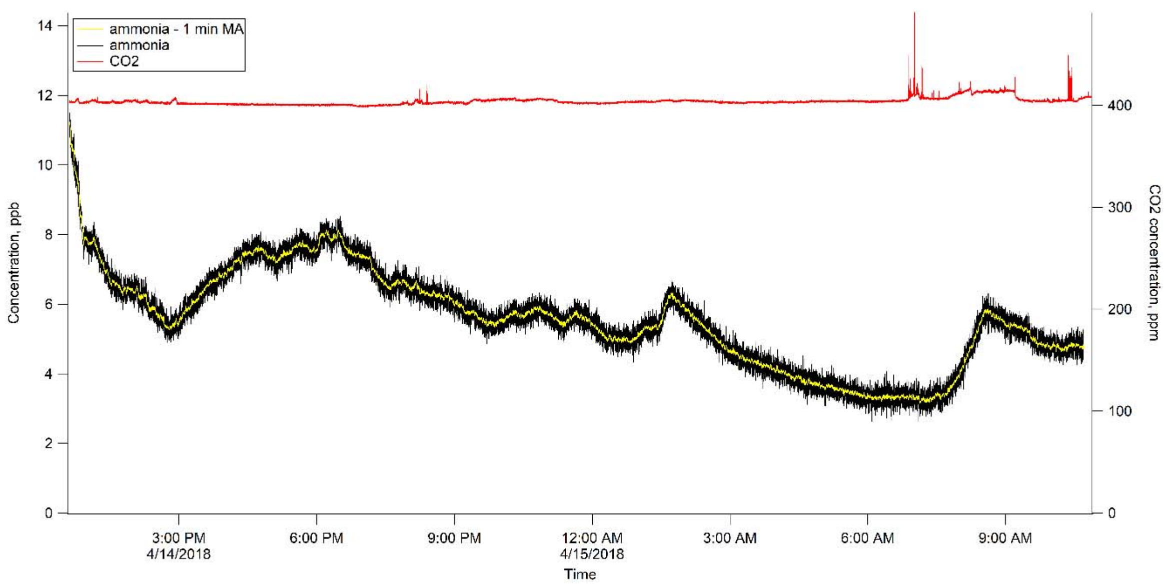

Figure 6-17. Ammonia.

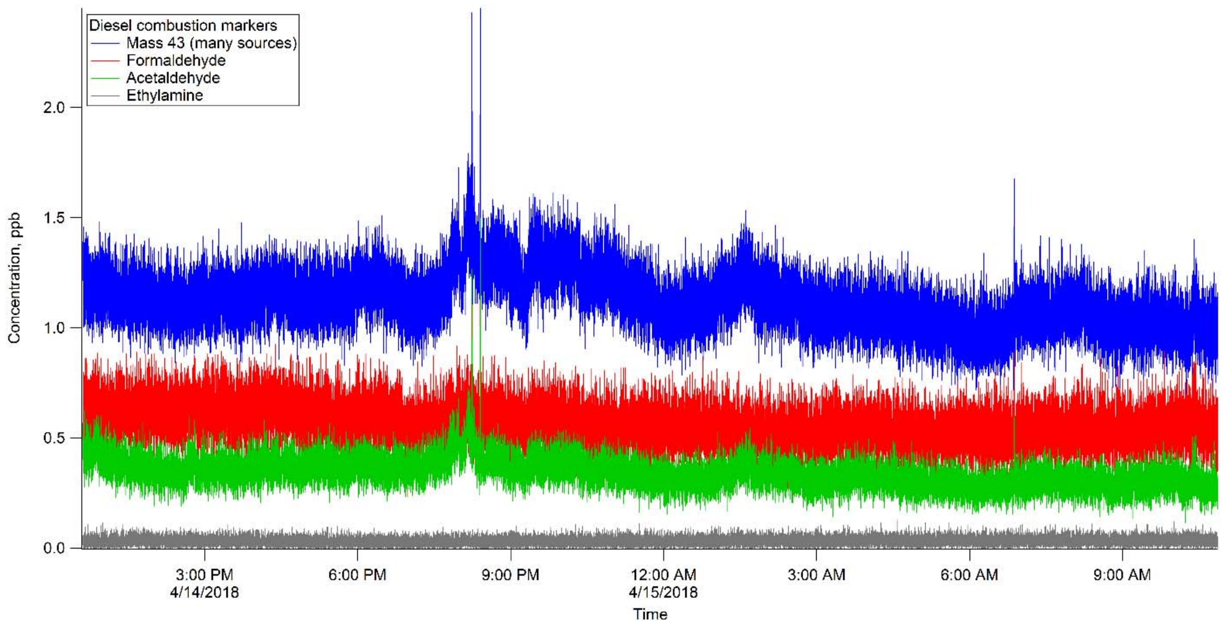

Figure 6-18. Diesel Combustion Markers.

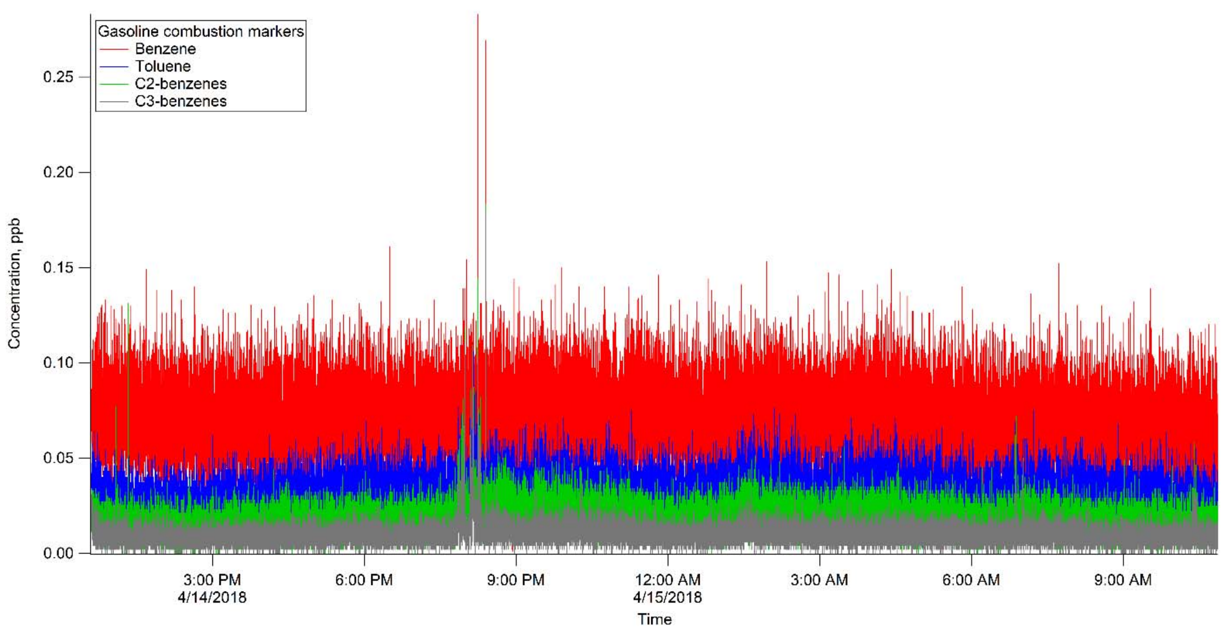

Figure 6-19. Gasoline Combustion Markers.

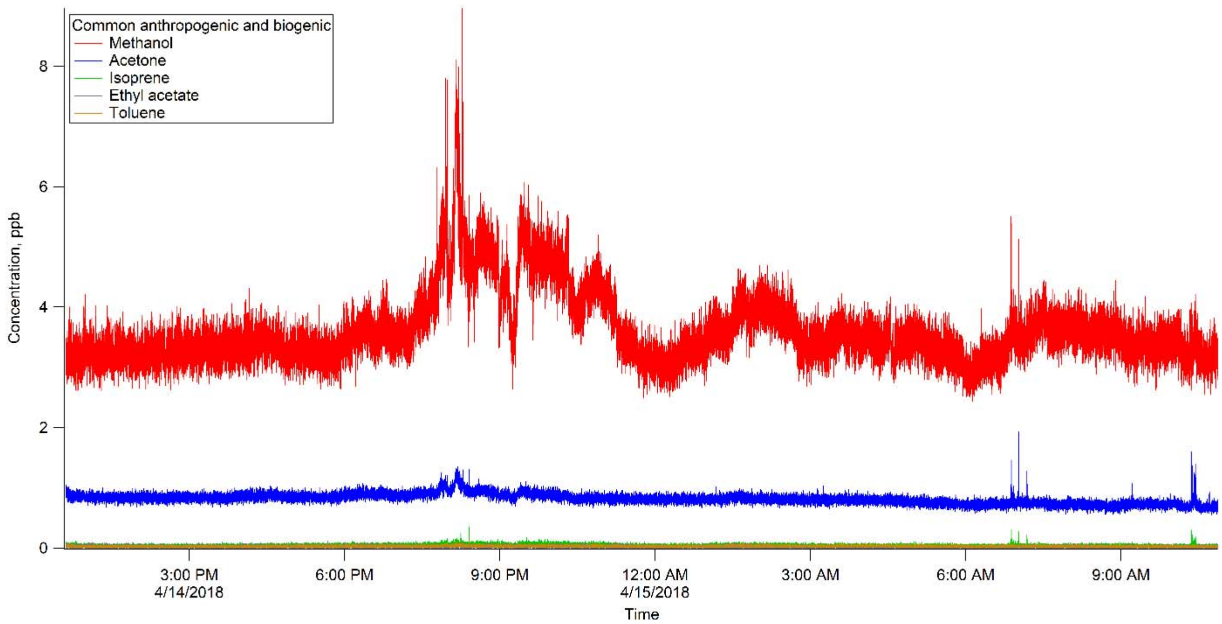

Figure 6-20. Plant and Human Markers.

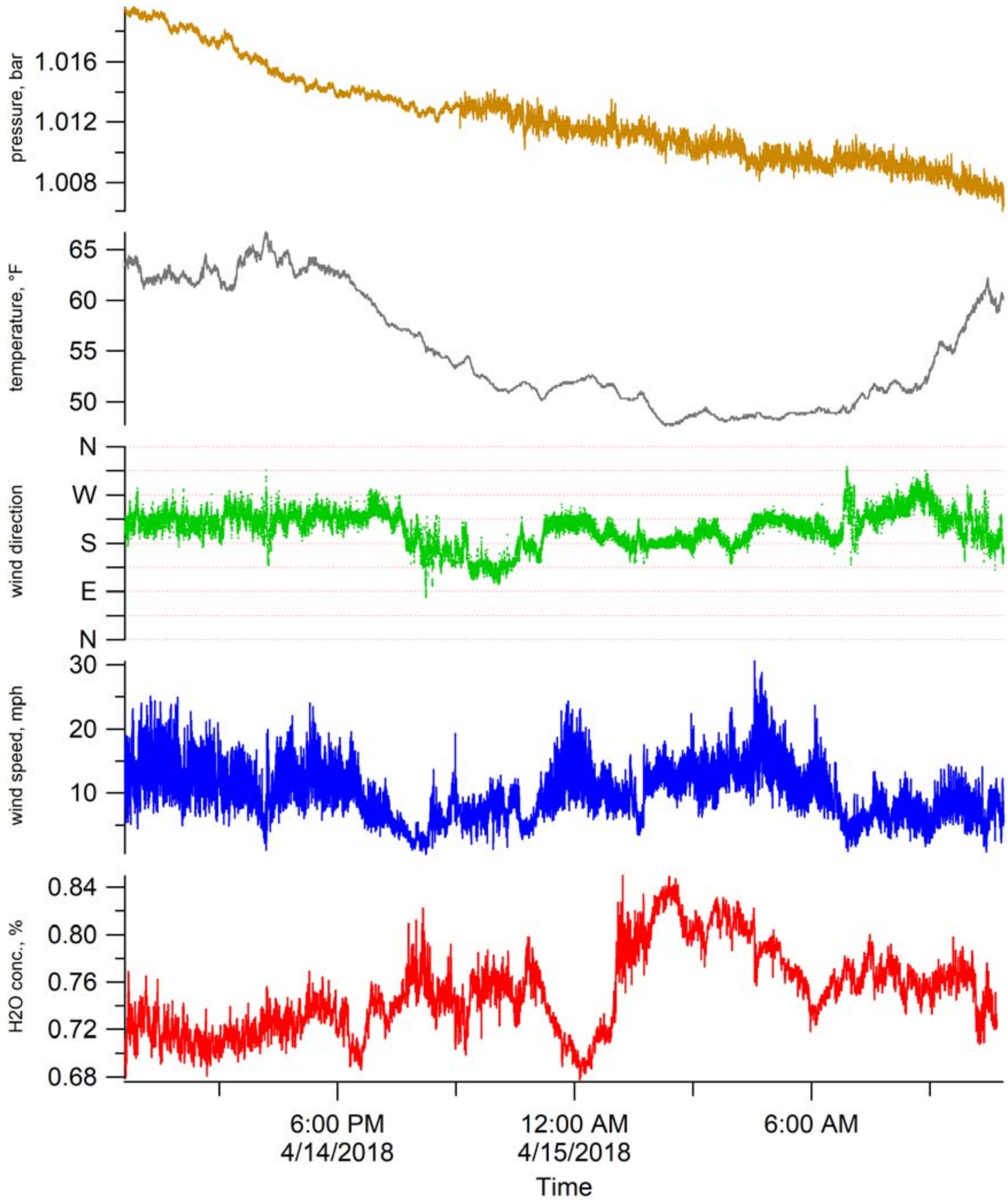

Figure 6-21. Weather Data.

7.0 REFERENCES

Procedure 17124-DOE-HS-102, 2018, "Mobile Laboratory Data Processing – Analysis," Revision 0, TerraGraphics Environmental Engineering, Inc., Pasco, Washington.