Monitoring Particulate Matter with Sensor Technology

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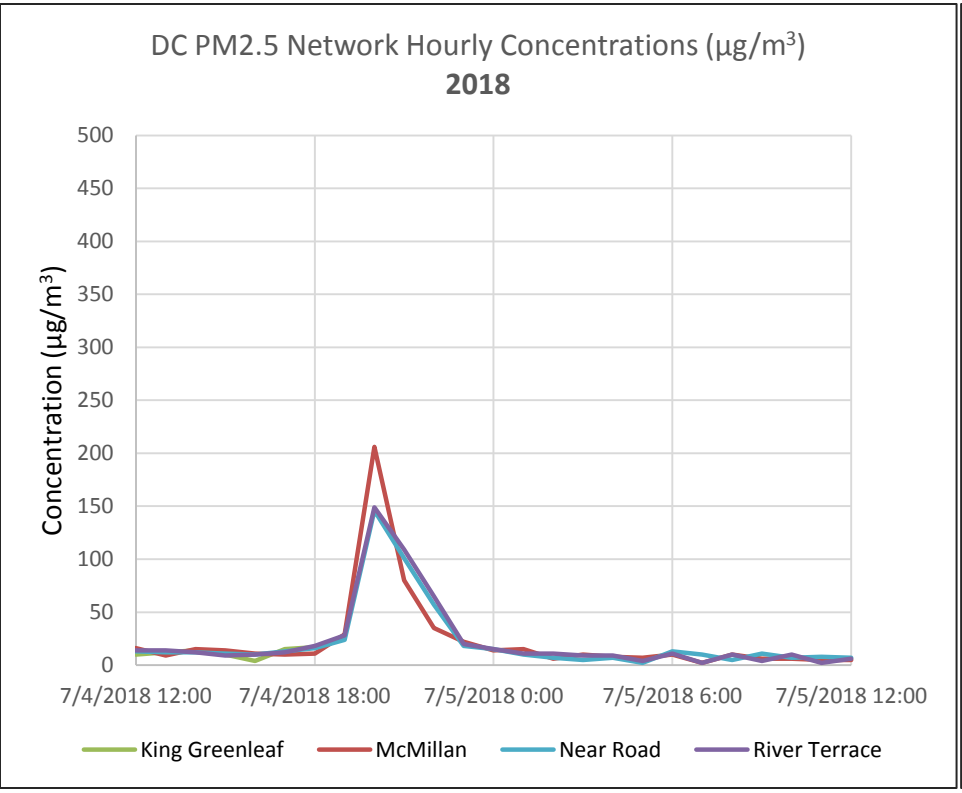
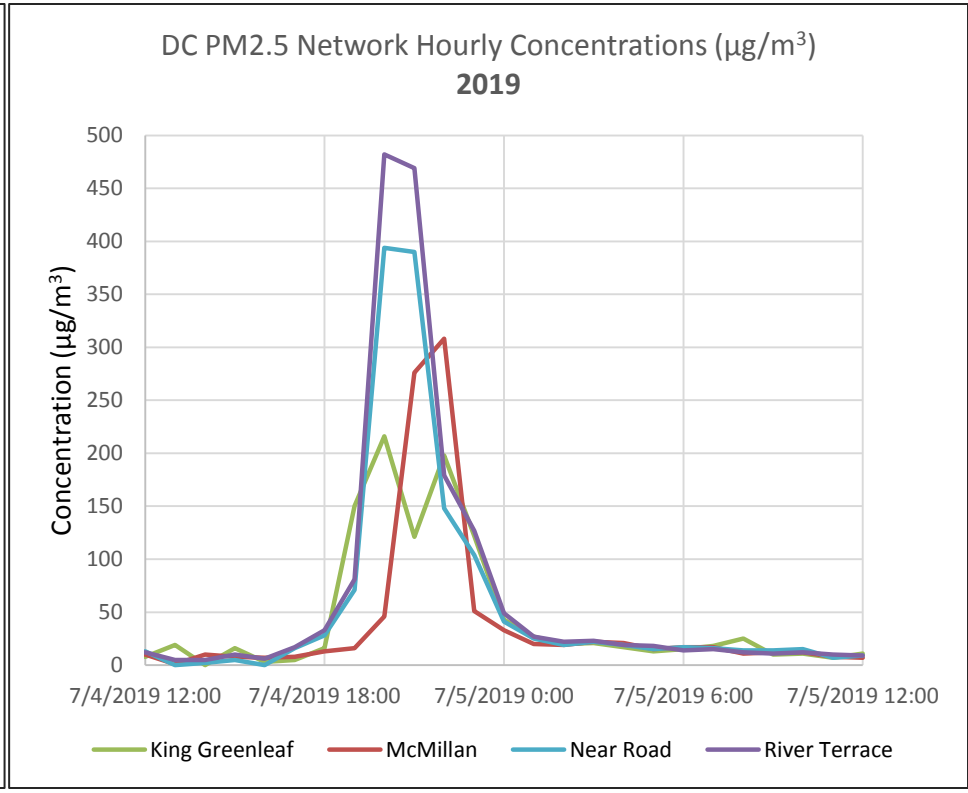
DEPARTMENT OF ENERGY & ENVIRONMENT

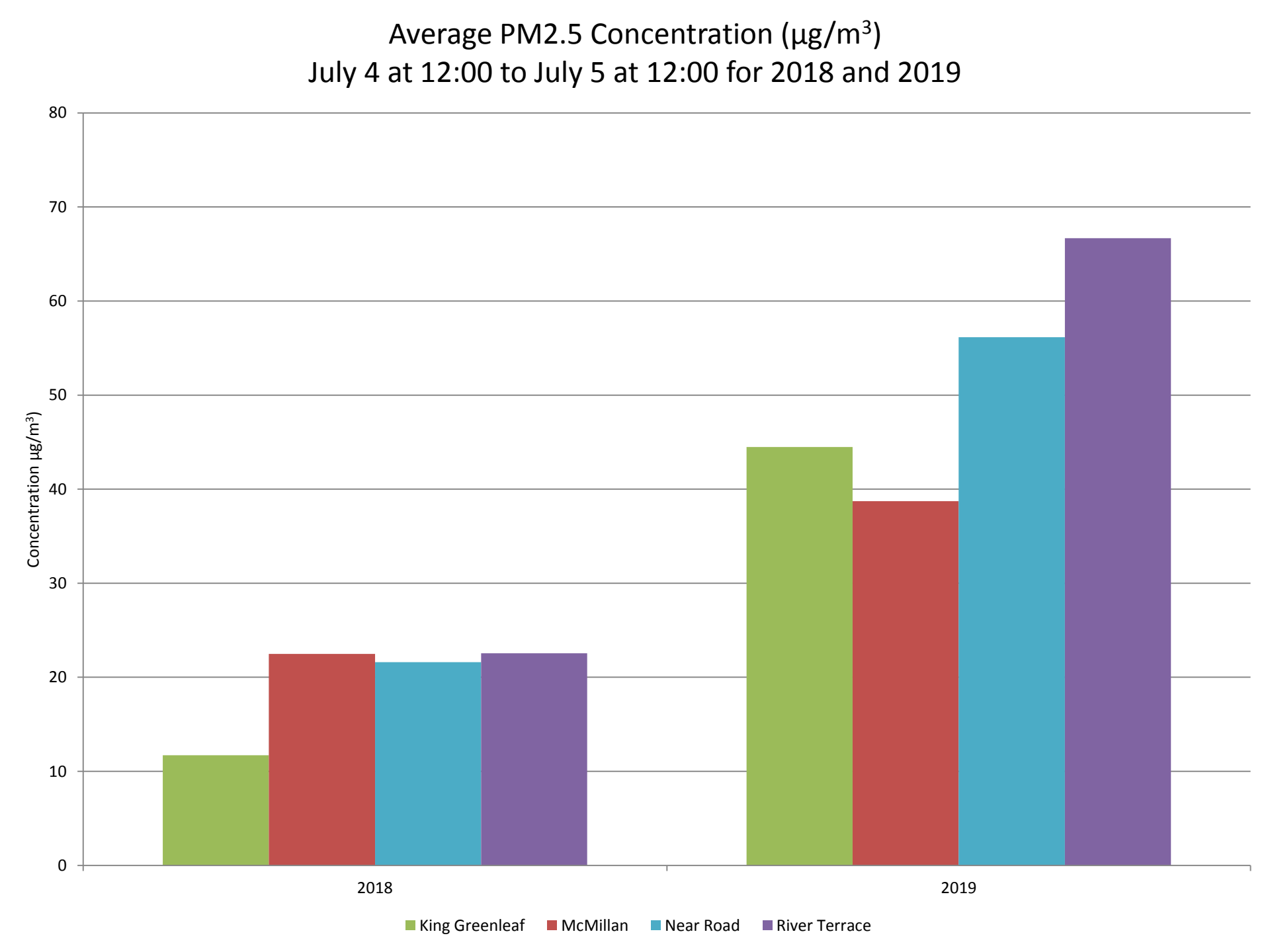
July 4th Case Study

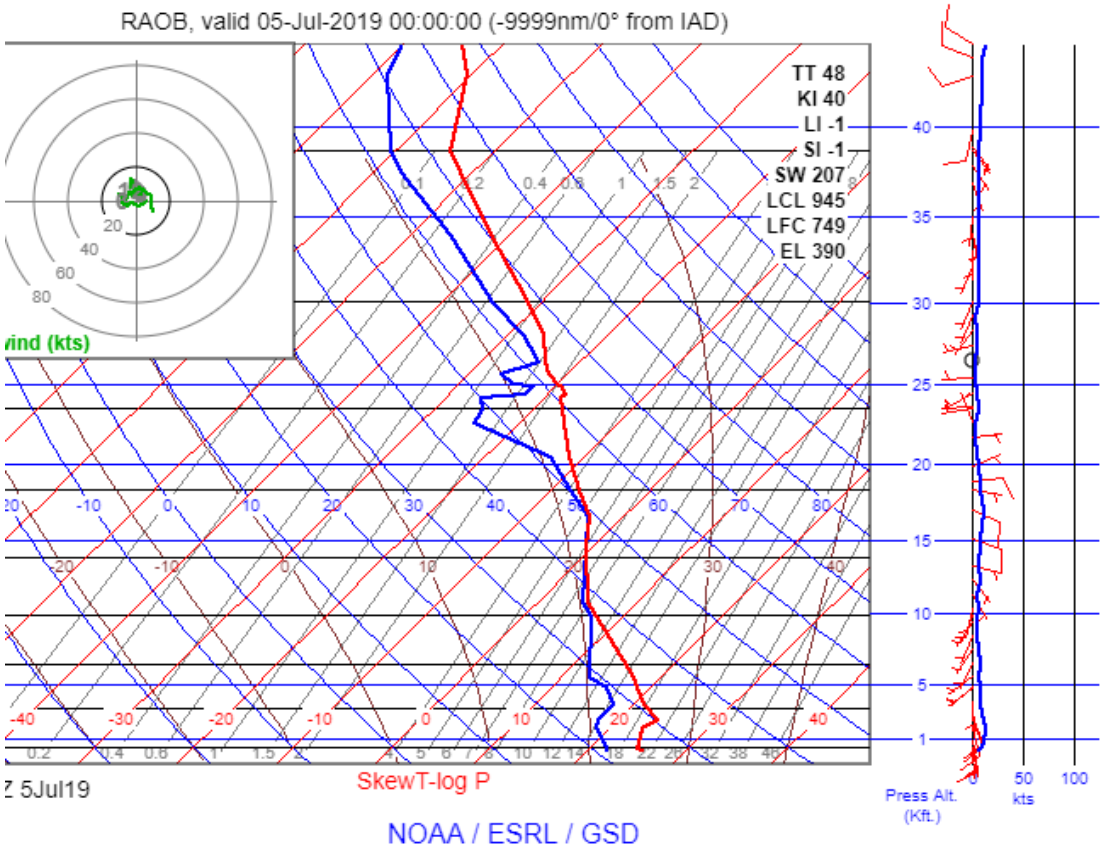
Photo by Kevin Ambrose, Washington Post

July 4th Case Study






Average PM2.5 Concentration (µg/m3)
July 4 at 12:00 to July 5 at 12:00 for 2018 and 2019
Concentration µg/m3)
80
70
60
50
40
30
20
10
0
2018
2019
King Greenleaf
McMillan
Near Road
River Terrace



Meteorological Influence

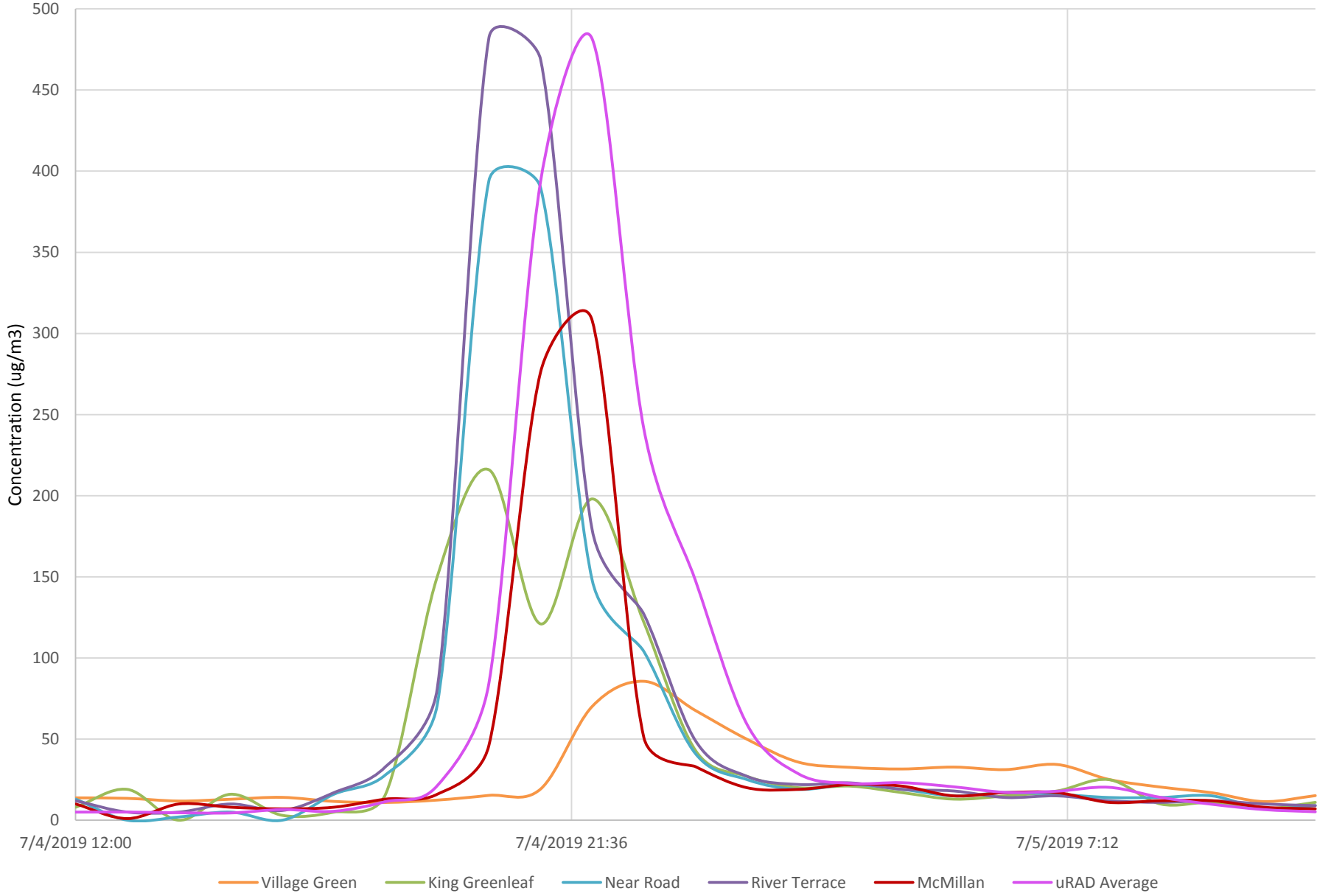
- Low wind speed
- High relative humidity
- Inversion layer

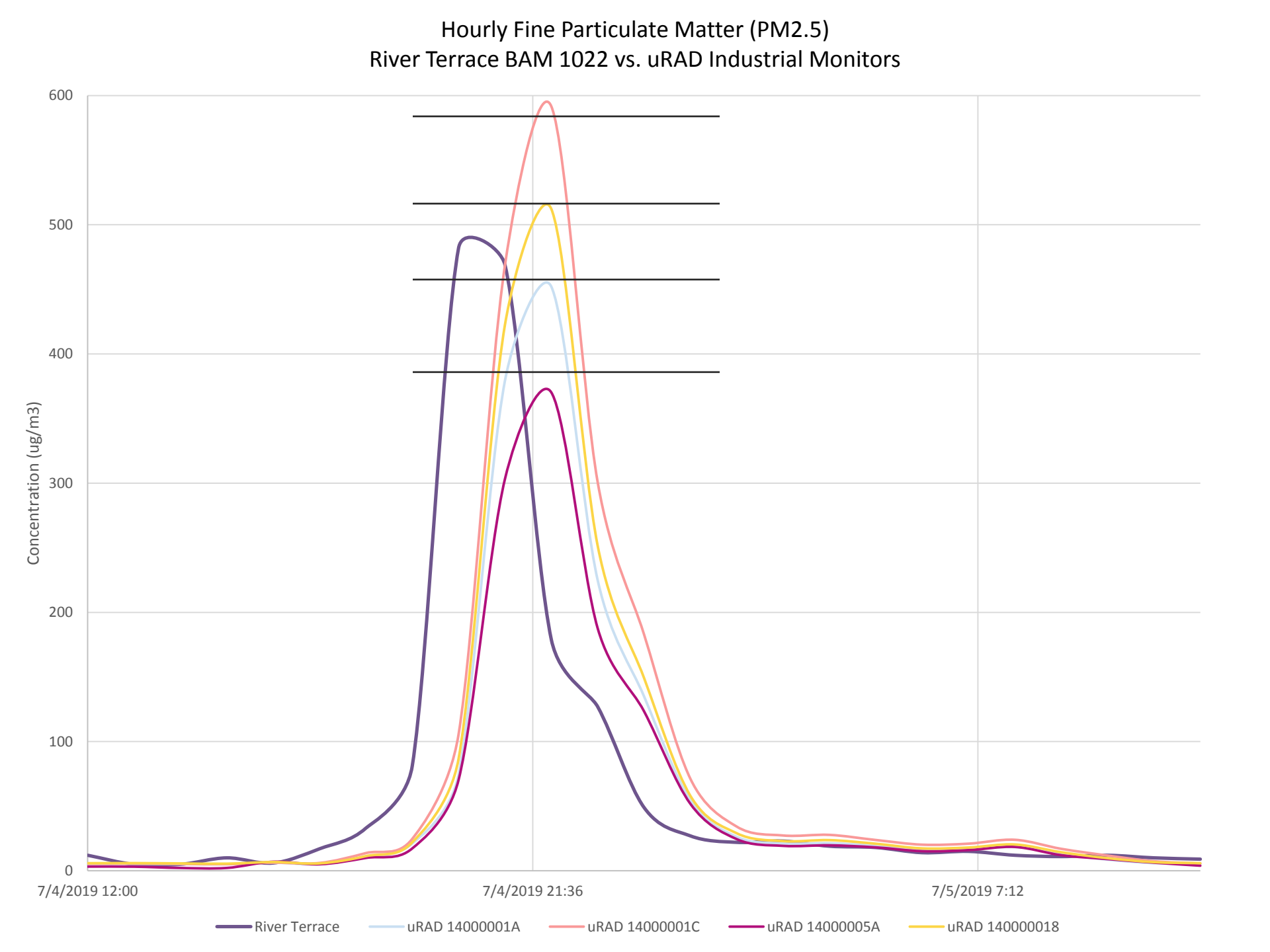
Sensor Monitoring in DC

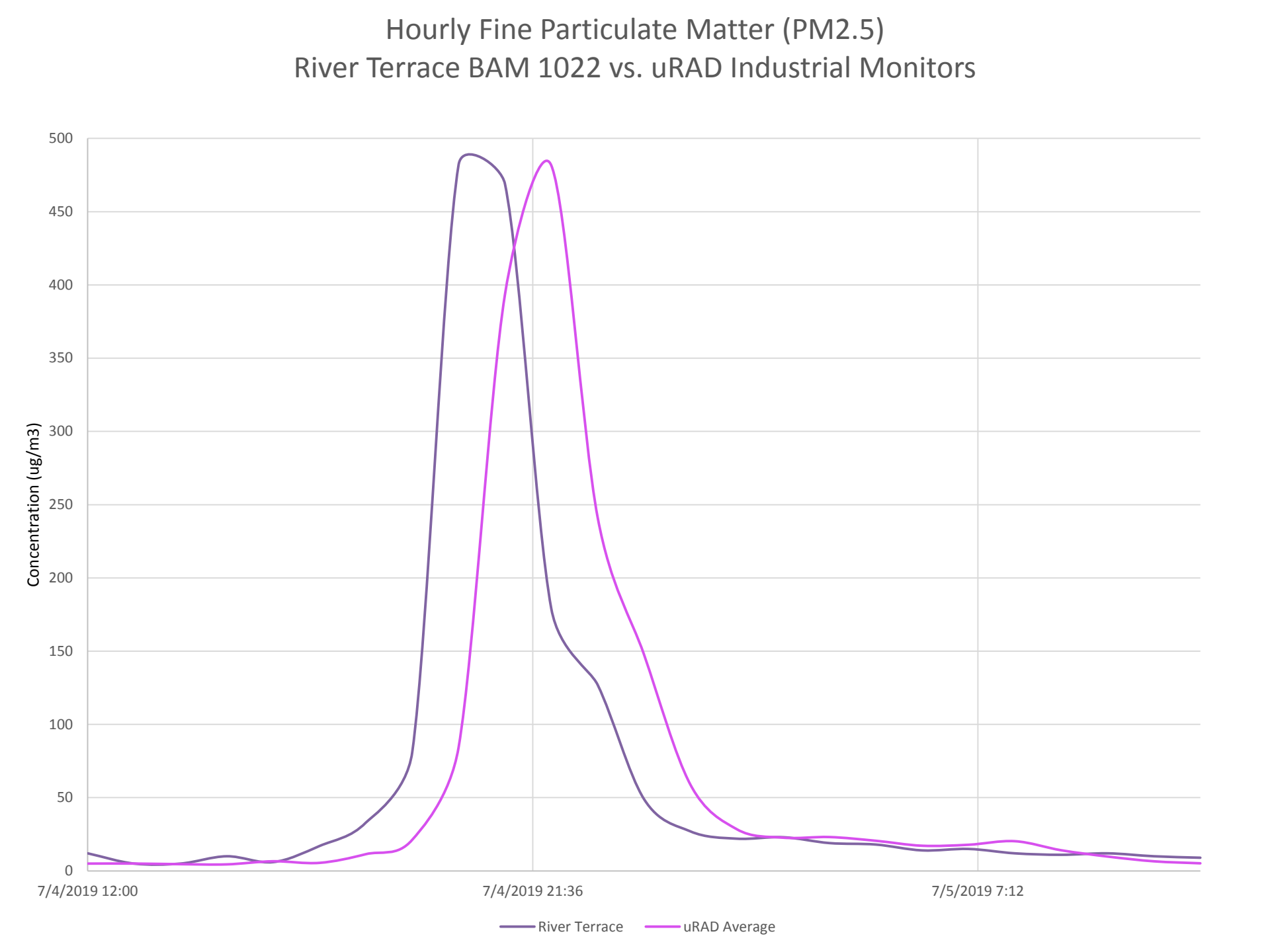
uRAD Monitor

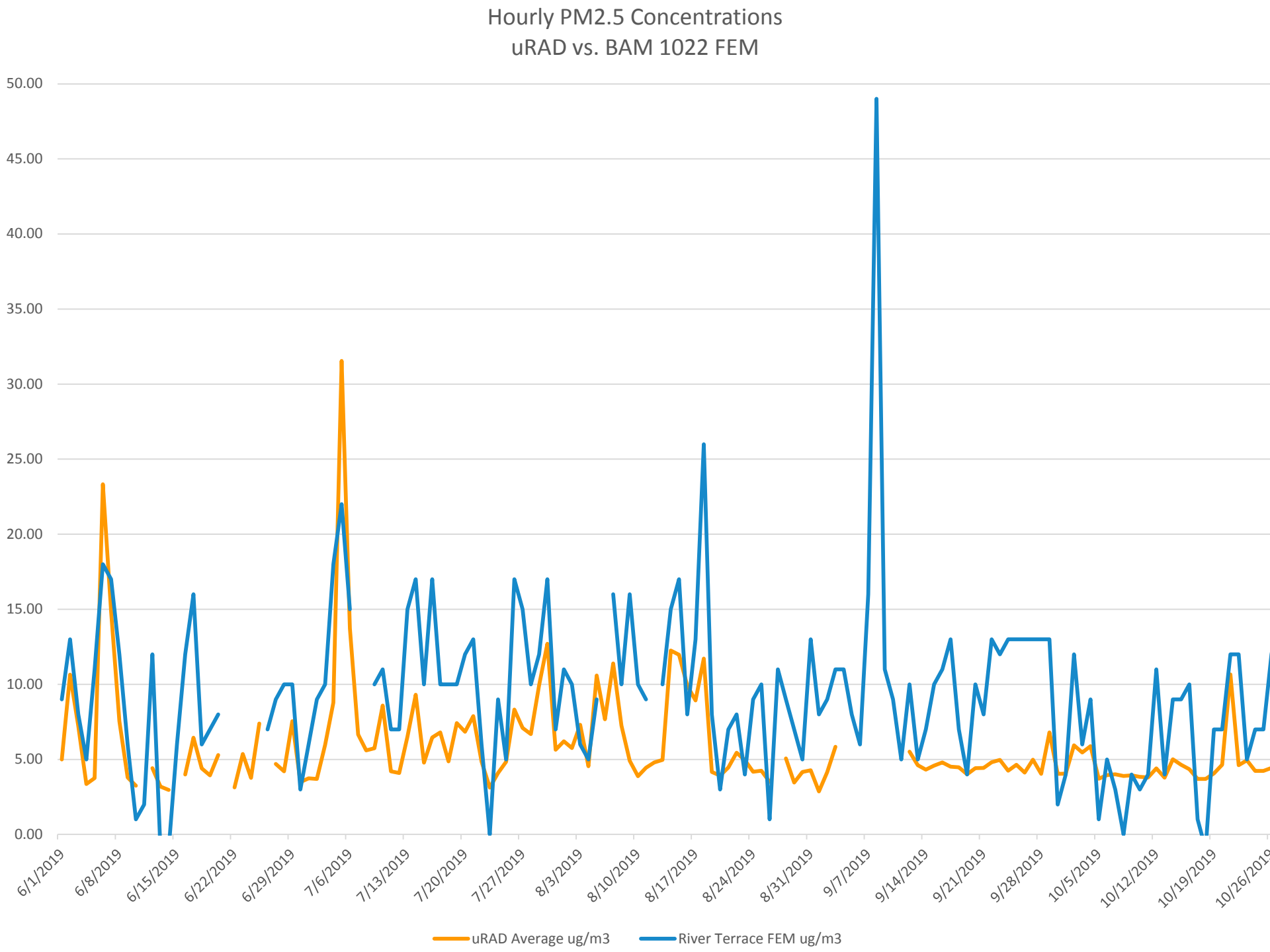
- $1500
- Laser scattering sensor to measure PM1, PM2.5 and PM10
- Four electrochemical sensors measure CO, SO2, NO2, and O3

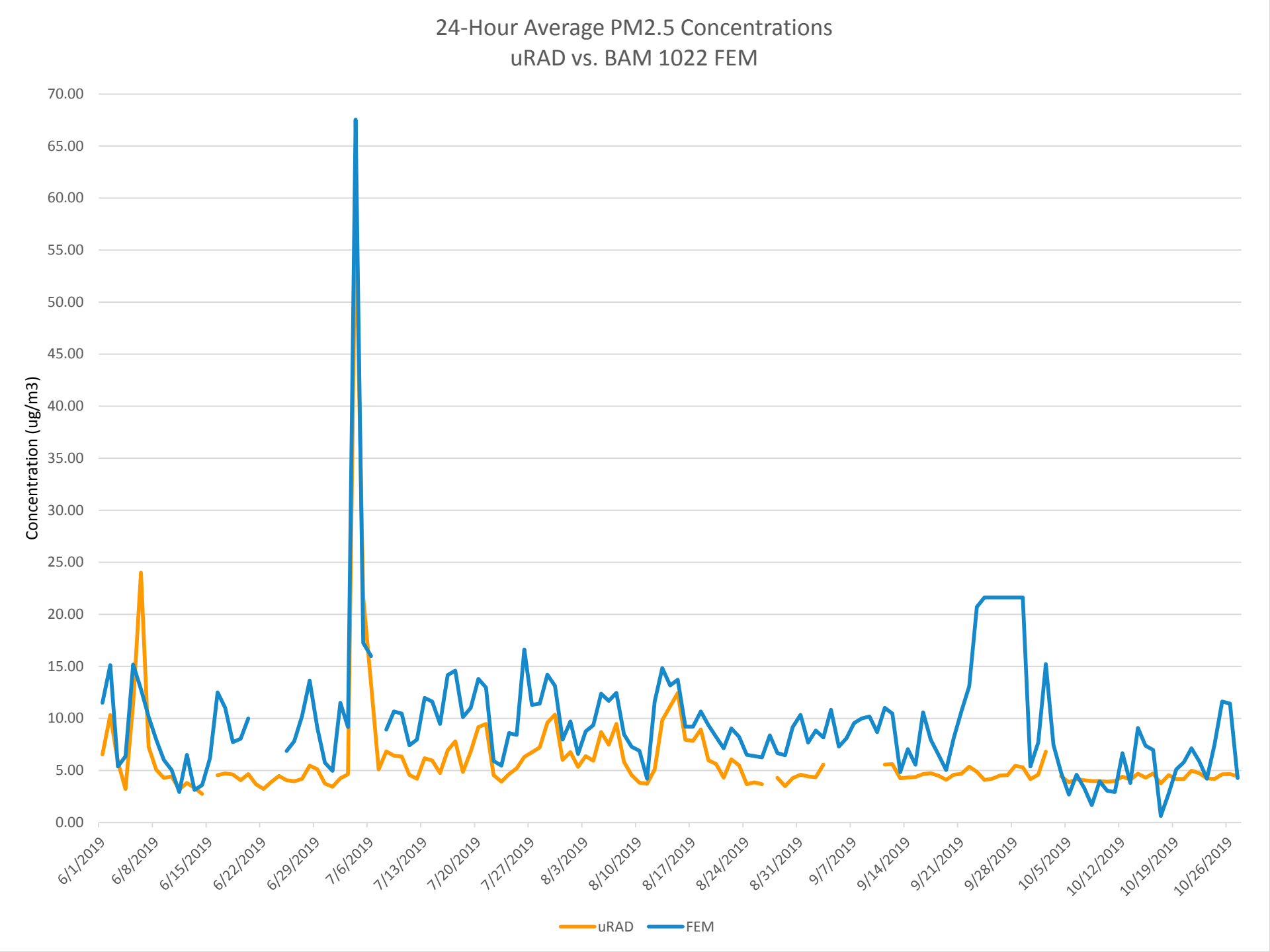
DC PM2.5 Network Hourly Concentrations (µg/m^3)
July 4th 2019




Hourly Fine Particulate Matter (PM2.5)
River Terrace BAM 1022 vs. uRAD Industrial Monitors
600
500
400
300
200
100
0
Concentration (ug/m3)
7/4/2019 12:00
7/4/2019 21:36
7/5/2019 7:12
River Terrace
uRAD 14000001A
uRAD 14000001C
uRAD 14000005A
uRAD 140000018


Hourly Fine Particulate Matter (PM2.5)
River Terrace BAM 1022 vs. uRAD Industrial Monitors
Concentration (ug/m3)
500
450
400
350
300
250
200
150
100
50
0
7/4/2019 12:00
7/4/2019 21:36
7/5/2019 7:12
River Terrace
uRAD Average


Hourly PM2.5 Concentrations
uRAD vs. BAM 1022 FEM
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
6/1/2019
6/8/2019
6/15/2019
6/22/2019
6/29/2019
7/6/2019
7/13/2019
7/20/2019
7/27/2019
8/3/2019
8/10/2019
8/17/2019
8/24/2019
8/31/2019
9/7/2019
9/14/2019
9/21/2019
9/28/2019
10/5/2019
10/12/2019
10/19/2019
10/26/2019
uRAD Average ug/m3
River Terrace FEM ug/m3


24-Hour Average PM2.5 Concentrations
uRAD vs. BAM 1022 FEM
Concentration (ug/m3)
70.00
65.00
60.00
55.00
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
6/1/2019
6/8/2019
6/15/2019
6/22/2019
6/29/2019
7/6/2019
7/13/2019
7/20/2019
7/27/2019
8/3/2019
8/10/2019
8/17/2019
8/24/2019
8/31/2019
9/7/2019
9/14/2019
9/21/2019
9/28/2019
10/5/2019
10/12/2019
10/19/2019
10/26/2019
uRAD
FEM

Bumps Along the Way

What's Next?

octo

DC Office of the
Chief Technology Officer

Acknowledgements

- George Washington University
  - Royce Francis, Andrew Burwell, Lihua Pei

All data are preliminary and are not for publication until further evaluation.

Thank You!