

# MIDWEST OZONE GROUP OUTLOOK FOR FUTURE OZONE TRANSPORT PROGRAM DESIGN

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# *OVERVIEW of OUTLOOK*

”Midwest Ozone Group Outlook for Future Ozone Transport Program Design”

[http://www.midwestozonegroup.com/files/MOGFuture\\_Outlook.pdf](http://www.midwestozonegroup.com/files/MOGFuture_Outlook.pdf)

- 2008 GNS: resolved
- 2015 GNS:
  - Only 1 remaining NA monitor (Harford at 71.1 ppb)
  - Likely to eliminate even Harford’s nonattainment
    - 4 km source apportionment modeling with Can/Mex impact
    - Updated base case
    - Recognition of local controls not currently in the model
    - Recognition of impact of exceptional events
  - Even if Harford remains, the emission reduction process can be dramatically simplified
  - Key issue: EPA guidance on alternative handling of maintenance areas
  - In support of 2015 Good Neighbor SIPs, MOG will have TSD available late spring

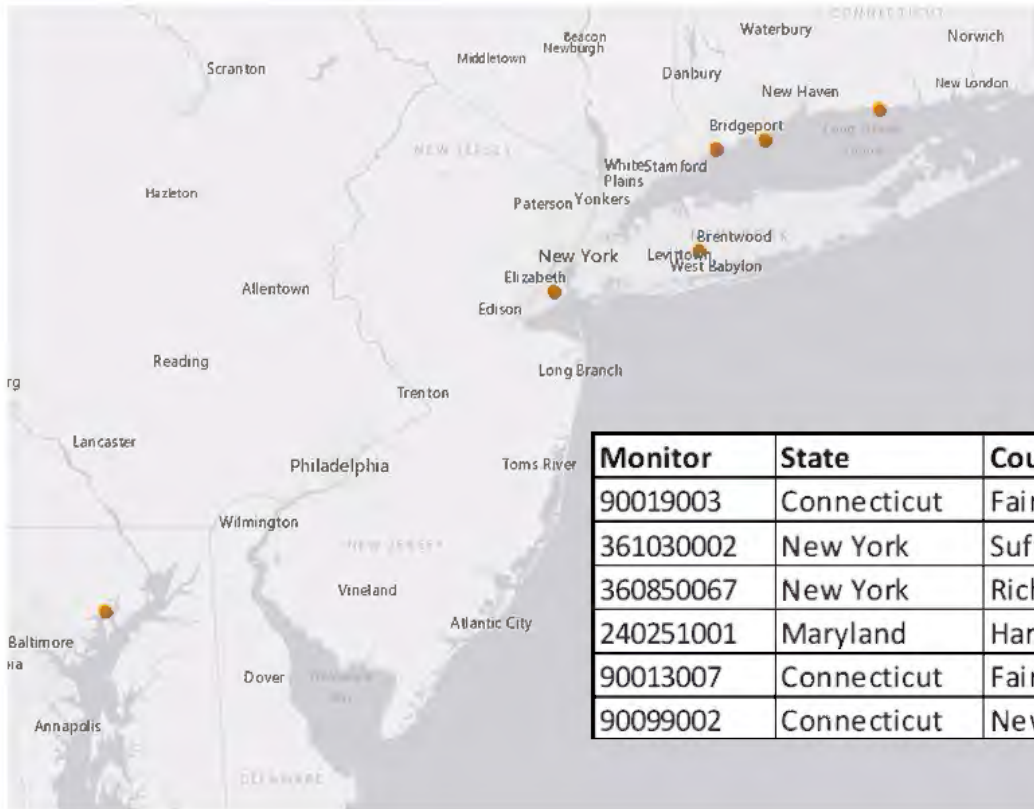
# *EPA's 4 Step Process*

- Step 1 – Identify problem monitors
- Step 2 – Determine state linkages
- Step 3 – Identify cost effective emission reductions
- Step 4 – Establish enforceable measures

# Step 1

Identify problem monitors

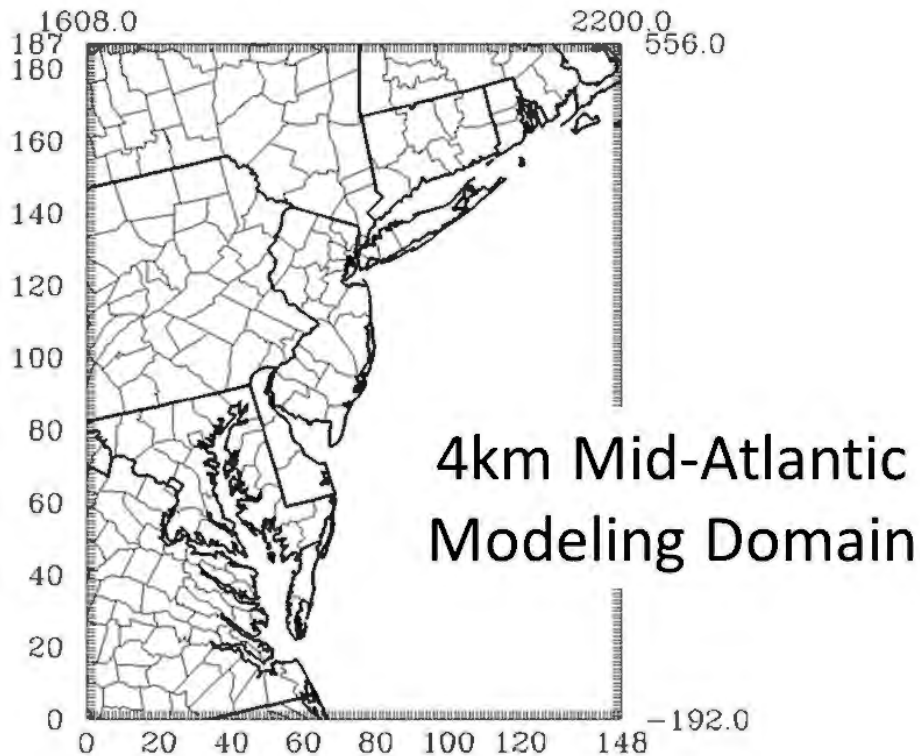
# No “Problem” Monitors Exist in the East for 2008 Ozone NAAQS -- Only 6 Monitors for 2015 Ozone NAAQS



Monitor	State	County	DVb (2011)	DVf ave (2023)	Dvf max (2023)
90019003	Connecticut	Fairfield	83.7	72.7	75.6
361030002	New York	Suffolk	83.3	72.5	74.0
360850067	New York	Richmond	81.3	71.9	73.4
240251001	Maryland	Harford	90.0	71.4	73.8
90013007	Connecticut	Fairfield	84.3	71.2	75.2
90099002	Connecticut	New Haven	85.7	71.2	73.9

Final OSAT contributions were calculated from the 12km simulation for the remaining six nonattainment monitors from the 2023en projection analysis

# Additional 4km Modeling



EPA ozone attainment modeling guidance states that "The use of grid resolution finer than 12 km would generally be more appropriate for areas with a combination of complex meteorology, strong gradients in emissions sources, and/or land-water interfaces in or near the nonattainment area(s)."

# 4km Platform Configuration

- Emissions
  - EPA merged 2011en and 2023en platform
  - Flexi-nested to 4km grid (in CAMx)
  - Windowed to 4km grid (in OSAT)
- Meteorology
  - 12km from EPA platform
  - New 4km WRF simulation
    - WRFCAMx conversion
    - Kv patch
- All Other Inputs
  - BC, IC, etc. from EPA 2023en platform

# Residual Nonattainment Monitors MDA8 Ozone Design Values (ppb)

Monitor	State	County	DVb (2011)	12km Modeling		4km Modeling	
				DVf ave (2023)	Dvf max (2023)	DVf ave (2023)	Dvf max (2023)
90019003	Connecticut	Fairfield	83.7	72.7	75.6	69.9	72.7
361030002	New York	Suffolk	83.3	72.5	74.0	70.7	72.1
360850067	New York	Richmond	81.3	71.9	73.4	69.6	71.0
240251001	Maryland	Harford	90.0	71.4	73.8	71.1	73.5
90013007	Connecticut	Fairfield	84.3	71.2	75.2	69.7	73.6
90099002	Connecticut	New Haven	85.7	71.2	73.9	70.3	73.0

Of all residual CSAPR 2023 eastern U.S. 70 ppb nonattainment monitors, only Edgewood monitor in Harford, Maryland remains in nonattainment with 4km simulation @ 71.1 ppb



# Local Control Programs

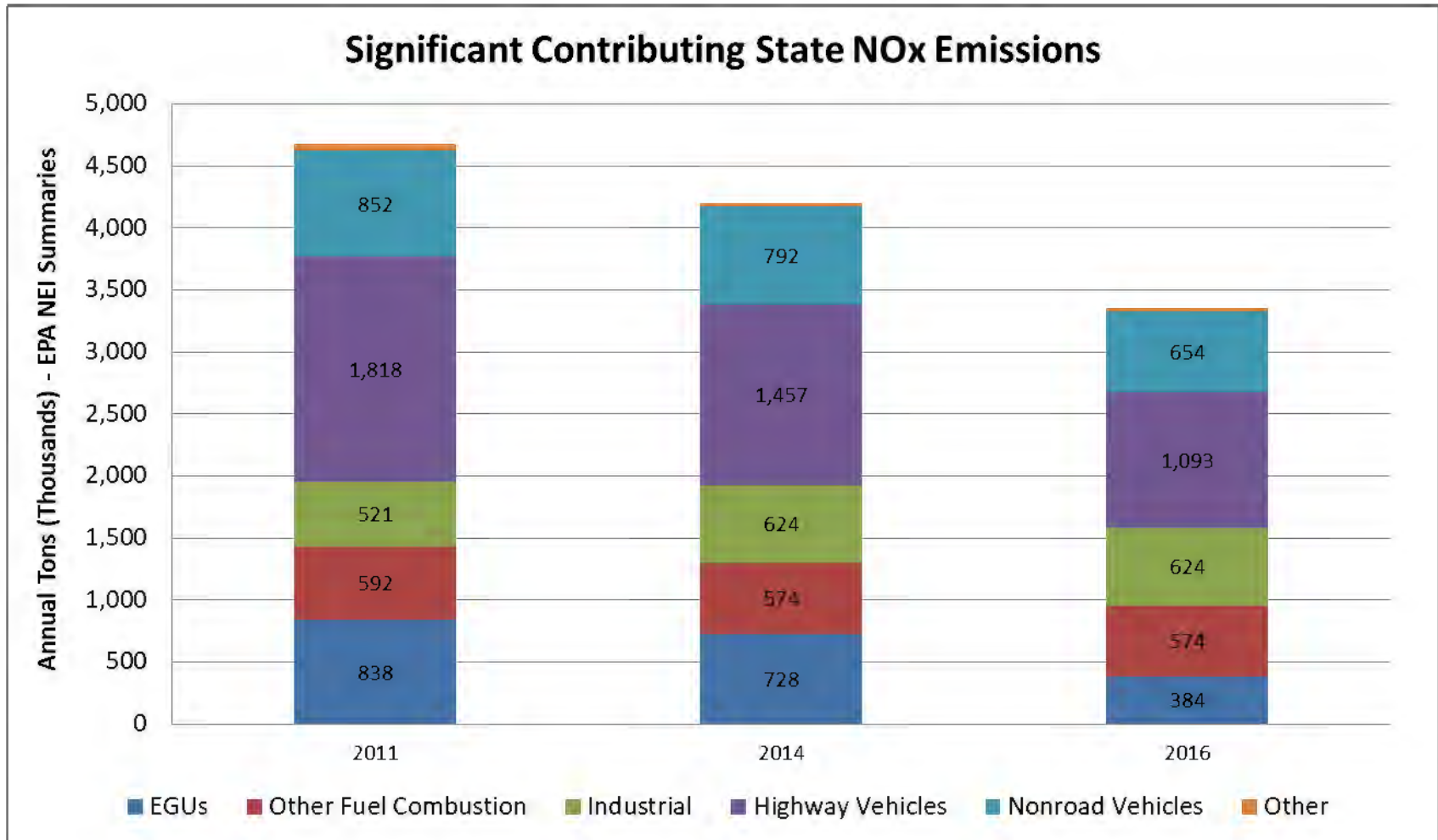
- With 2023 design values so close to level of 70 ppb NAAQS, the inclusion of missing local control programs from modeling platform could bring many monitors into attainment. Many existing, promulgated programs still have not been quantified and included in recent modeling efforts.
- Additional control programs are legally mandated in downwind nonattainment areas that must be addressed as part of Good Neighbor SIP's to avoid over-control. As EPA stated:

*However, if an area is designated “nonattainment,” additional planning requirements become applicable. In the case of ozone, areas are classified by operation of law at the time of designation based on the seriousness of ozone pollution. The nonattainment areas have progressively more stringent control requirements and longer attainment dates for higher levels of noncompliance with the NAAQS under CAA sections 181 and 182. 42 U.S.C. §§ 7511, 7511a. In addition, upon designation as “nonattainment,” stricter new source review permitting requirements are triggered, replacing the less stringent prevention of significant deterioration permitting provisions applicable in undesignated, “attainment,” and “unclassifiable” areas. Id. §§ 7502(c)(5), 7503.*

# *Local Controls Identified by MD*

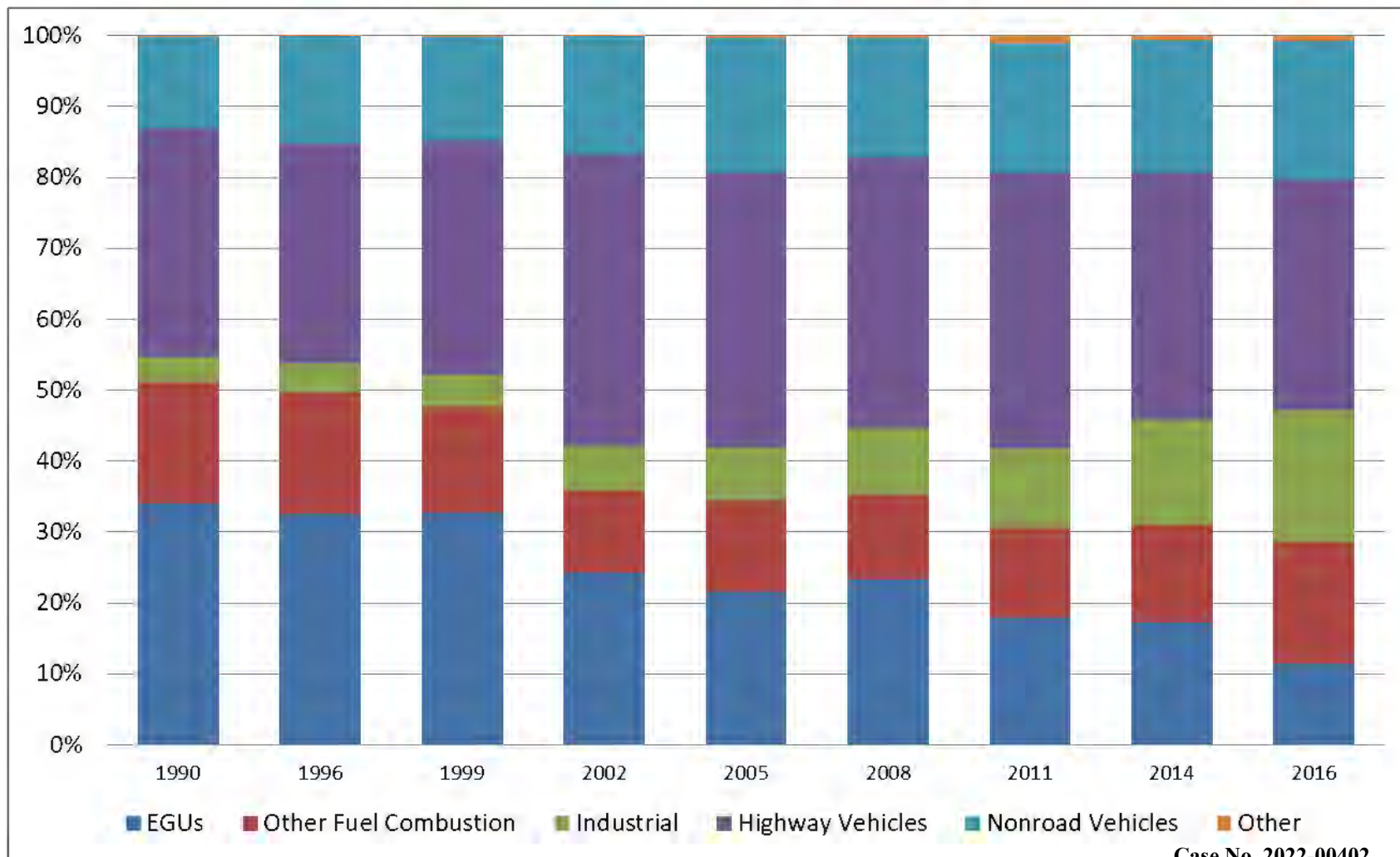
- **Other Fuel Combustion**
  - New NY rules on small generators
- **Industrial**
  - MD Municipal Waste Combustors RACT rule
- **Highway Vehicles**
  - New OTC initiative on idle reduction
  - Electric and other zero emission vehicles
  - OTC aftermarket catalyst initiative
  - Idle Free Maryland Initiative

# Indicators of Potential Control Options at Harford, MD Monitor



Annual NOx emissions from significant contributing states (plus MD) to Harford, MD Monitor

# Relative Contribution of Significant Contributing State NOx Emissions



Annual NOx emissions from significant contributing states (plus MD) to 240,251,004

# Update Base Year Modeling Platform

- Utilize EPA's 2014 modeling platform
  - Possibly incorporate 2016 EGUs, onroad, fires, etc.
- Use 2011 MET to support “ozone conducive year” conditions
- Allows use of most current design value data (2014-16) that incorporates significant improvement in controls and impact of exceptional event modifications
- Use of this updated base case is likely to show improved 2023 modeled projections at many locations

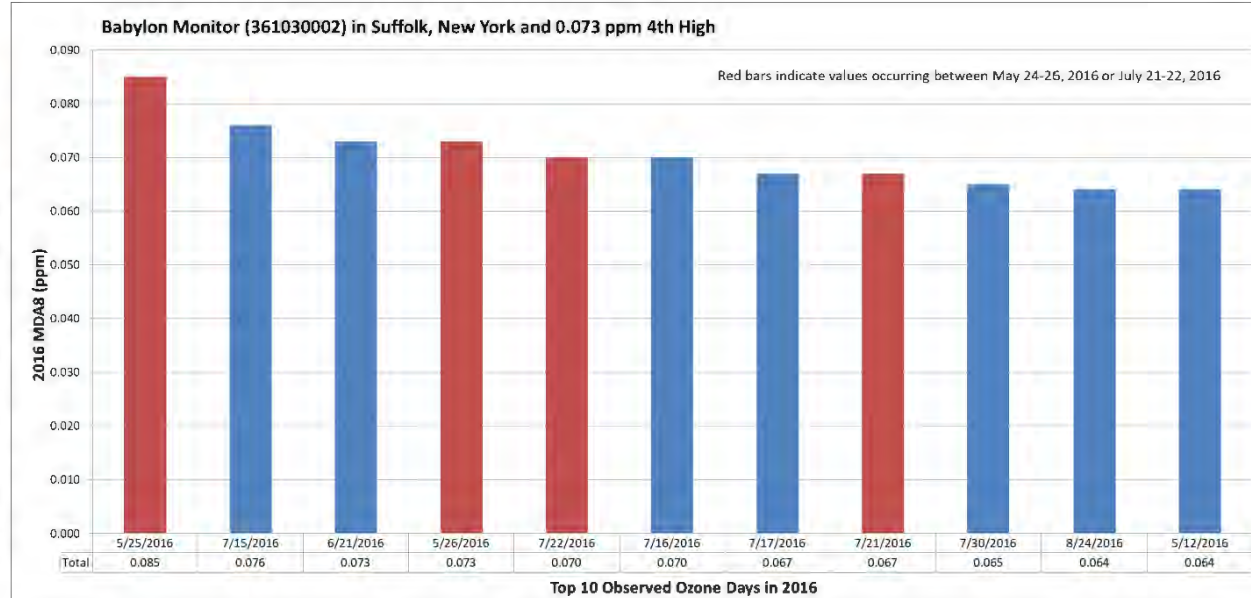
# *Exceptional Events Authorities*

- Clean Air Act §319(b)(3)(B): must be provided by Federal, State, or local agencies
  - States that did not request relief from 2016 events: New York Illinois, Indiana, Michigan, Wisconsin
- CAA section 110(a)(2)(D)(i)(I) – this section “gives EPA no authority to force an upwind state to share the burden of reducing other upwind states’ emissions.” *North Carolina v. EPA*, 531 F 2d at 921.

# Exceptional Events – Removal of Wildfire Impacted Days in 2016

AQS\_SITE\_ID 361030002

Sum of Daily MDA8	
Date	(ppm)
5/25/2016	0.085
7/15/2016	0.076
6/21/2016	0.073
5/26/2016	0.073
7/22/2016	0.070
7/16/2016	0.070
7/17/2016	0.067
7/21/2016	0.067
7/30/2016	0.065
8/24/2016	0.064
5/12/2016	0.064



Value	Ozone MDA8 (ppb)
2016 4th (fire)	73
2016 4th (no fire)	67
2014-16 DV (fire)	72
2014-16 DV (no fire)	70

AQS Site ID	State	County	2014-2016 Design Value (ppb)	No Fire 2014-2016 Design Value (ppb)
90010017	Connecticut	Fairfield	80	79
90013007	Connecticut	Fairfield	81	79
90019003	Connecticut	Fairfield	85	82
90099002	Connecticut	New Haven	76	75
240251001	Maryland	Harford	73	72
260050003	Michigan	Allegan	75	75
261630019	Michigan	Wayne	72	72
360810124	New York	Queens	69	67
360850067	New York	Richmond	76	74
361030002	New York	Suffolk	72	70
551170006	Wisconsin	Sheboygan	79	78

Case No. 2022-09402  
 Attachment 1 to Response to KCA-2 Question No. 27  
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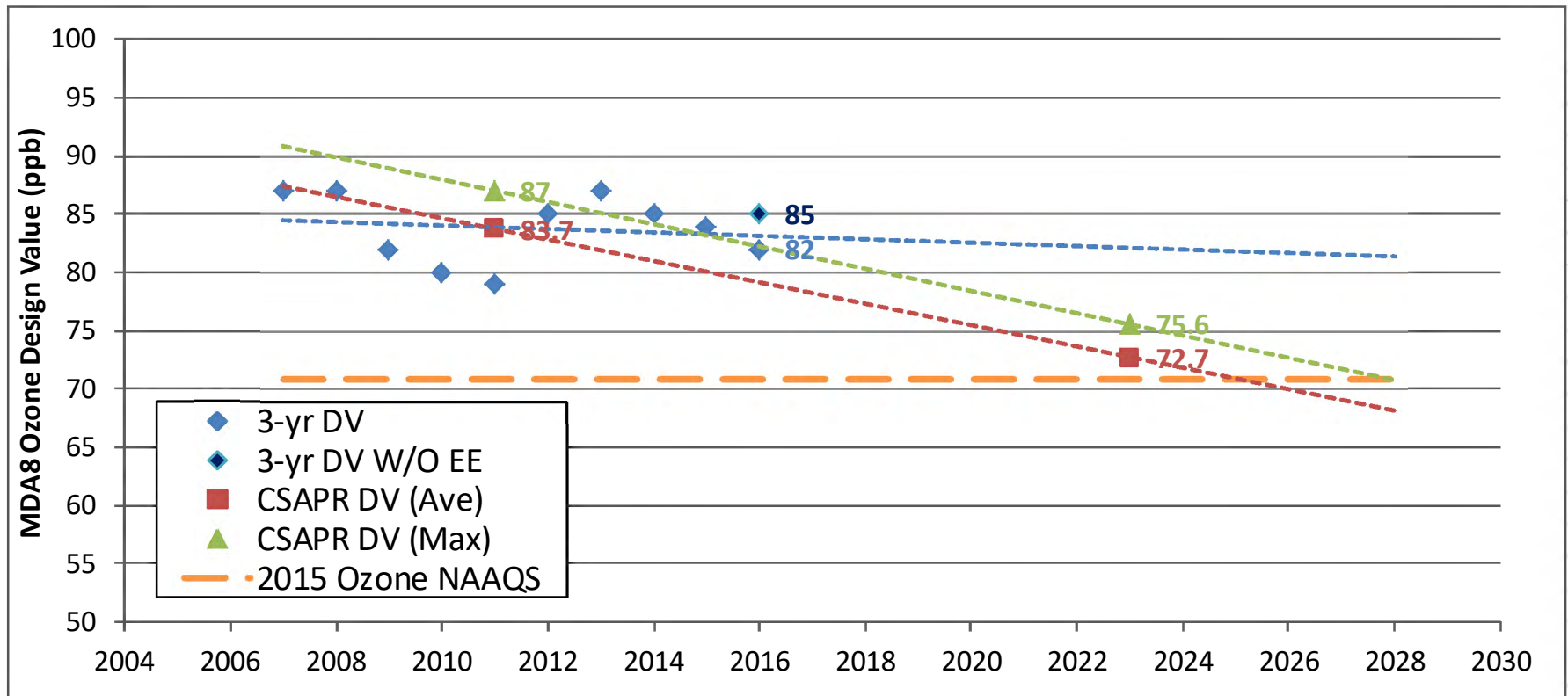


# Example Where Improvements May Not Be Seen With Updated Base Year

Monitor

90019003

Fairfield, CT



2014-16 MDA8 DV shown excluding (blue) and including (purple) exceptional event fire day impact.

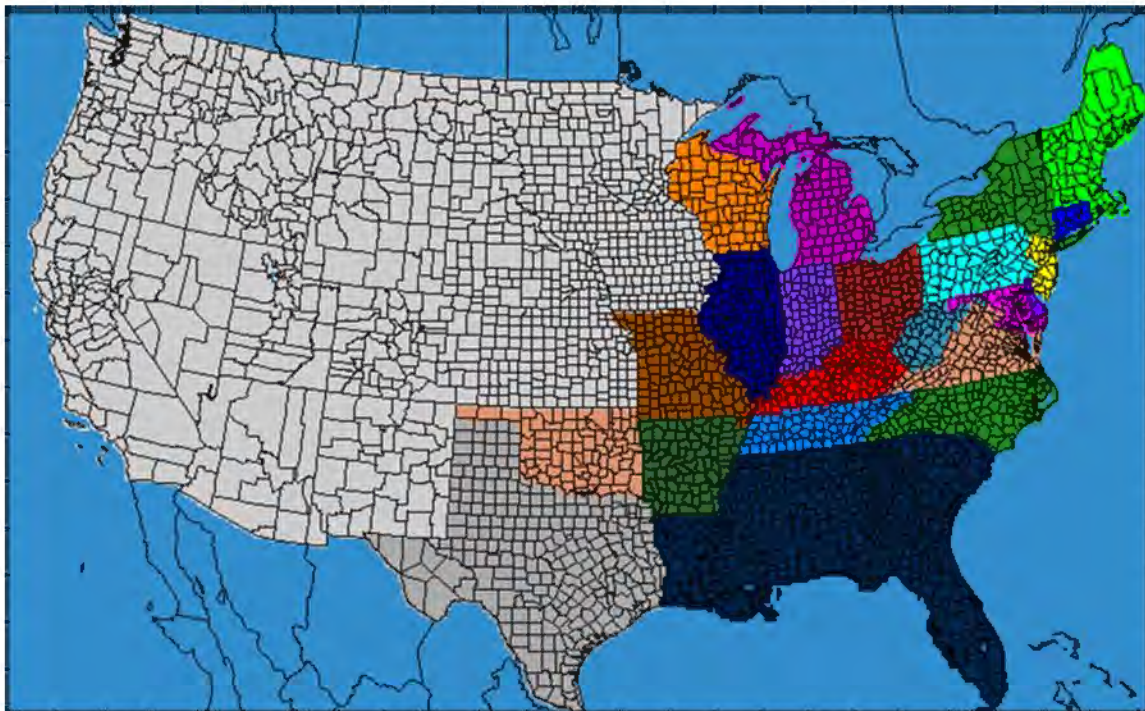


# Step 2

## Significant Contribution

# Good Neighbor SIP Modeling of 2023 Platform

- MOG processed entire 12km domain with OSAT source apportionment calculations for all key eastern states and source categories



## Categories

Biogenic/Fires

Onroad Mobile

Nonroad/Area

EGU Point

Non-EGU Point

Boundary/Initial

Canada/Mexico/Water

Case No. 2022-00402

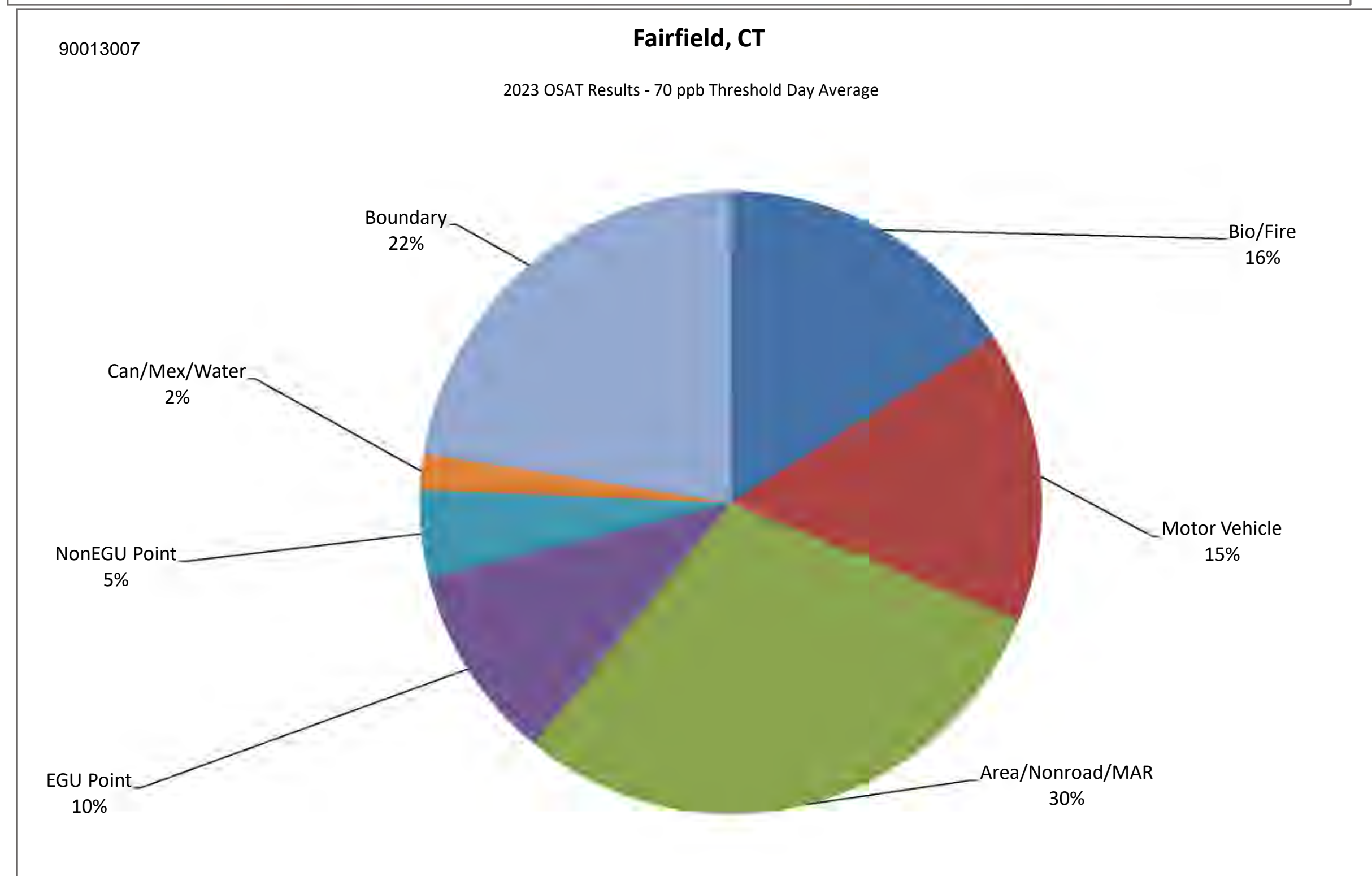
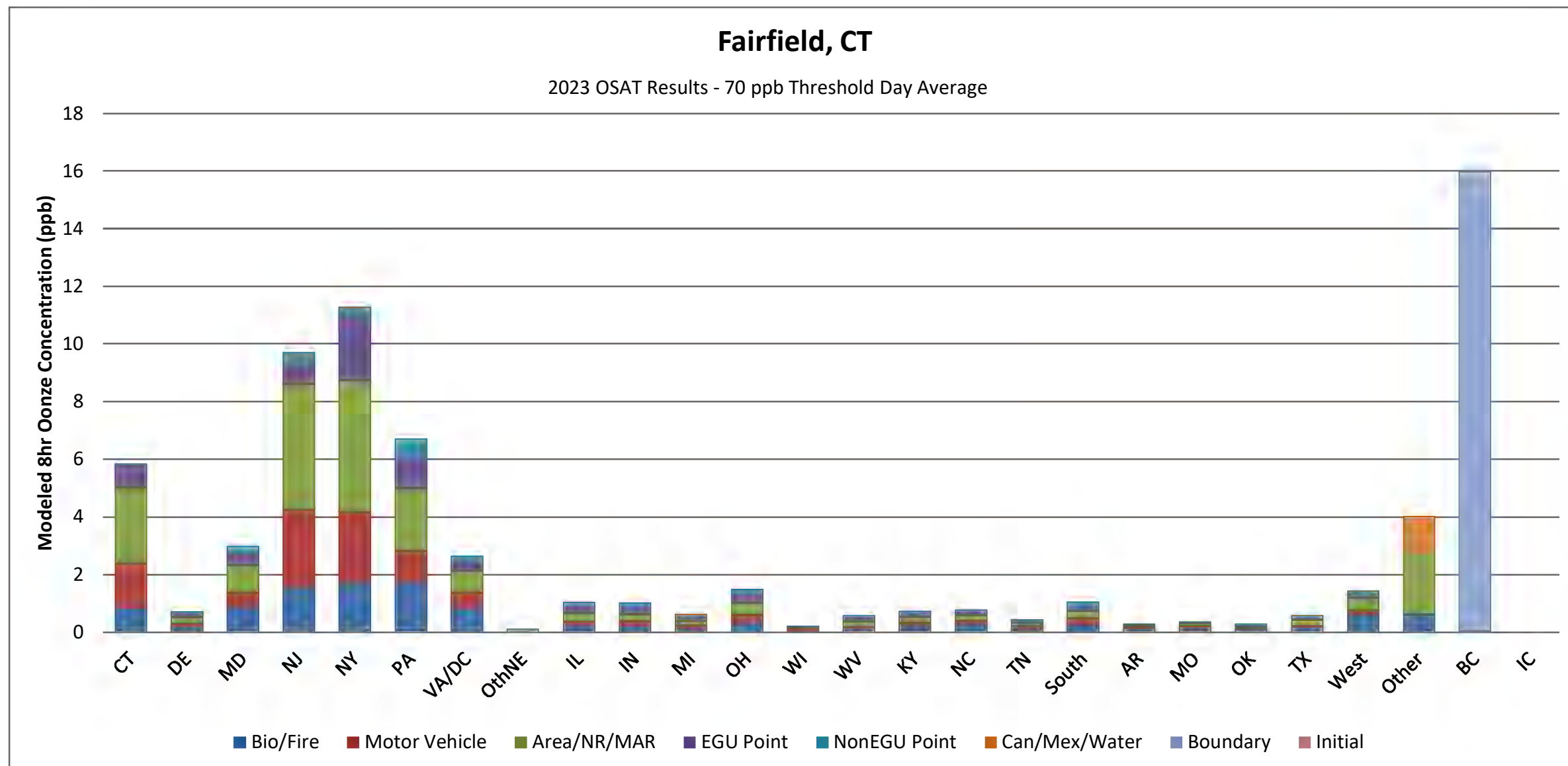
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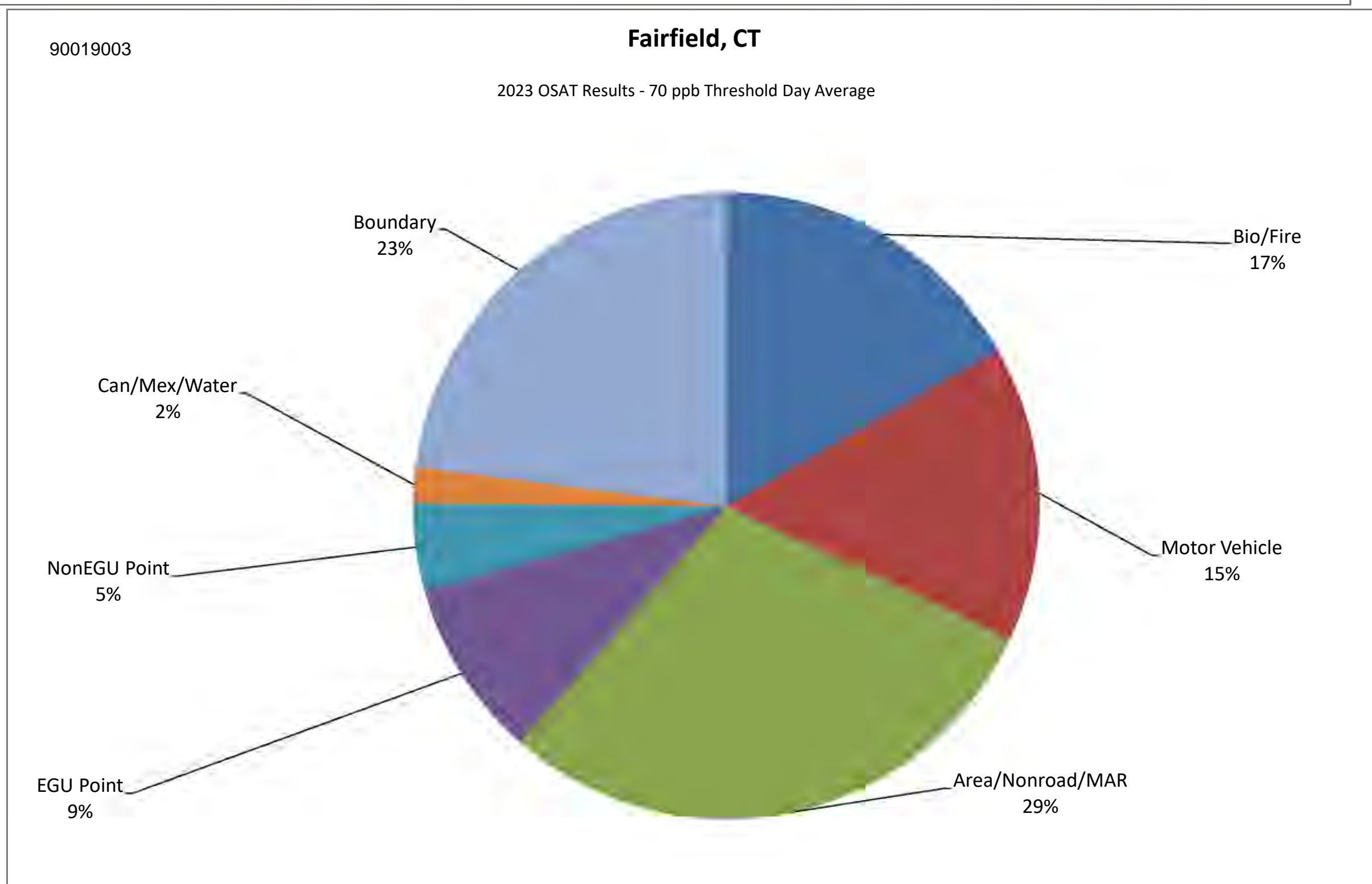
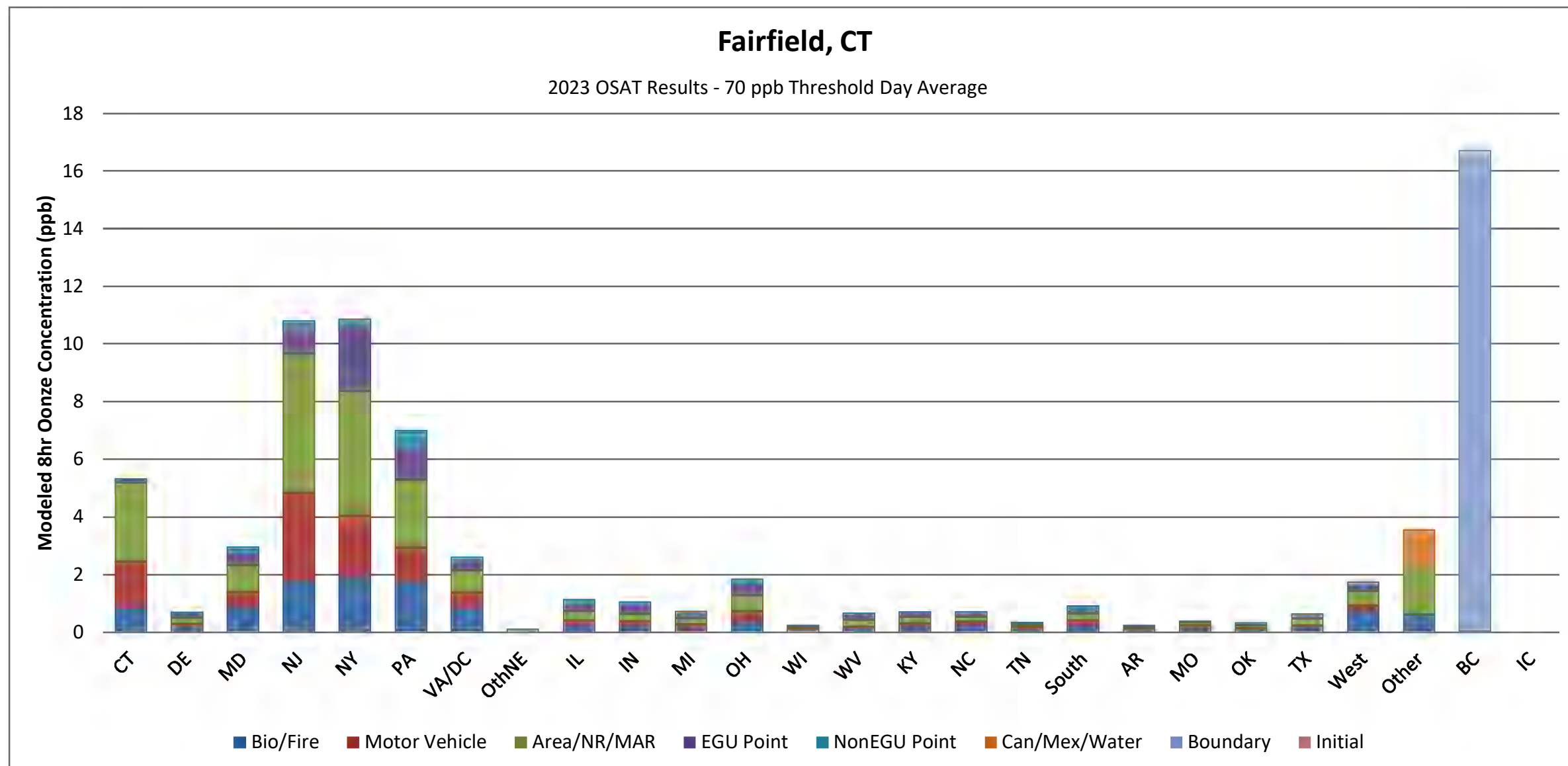
Monitor 90013007 Fairfield, CT

2023 OSAT Results (Modeled ppb) -- 70 ppb Threshold												
Row Labels	Bio/Fire	Motor Vehicle	Area/NR/MAR	EGU Point	NonEGU Point	Can/Mex/Water	Boundary	Initial	Anthro	Total	% of Total	
CT	0.83	1.55	2.66	0.79	0.04	0.00	0.00	0.00	5.04	5.87	8%	
DE	0.19	0.12	0.22	0.12	0.08	0.00	0.00	0.00	0.55	0.73	1%	
MD	0.85	0.53	0.96	0.41	0.25	0.00	0.00	0.00	2.15	3.00	4%	
NJ	1.55	2.70	4.37	0.67	0.41	0.00	0.00	0.00	8.14	9.70	14%	
NY	1.74	2.42	4.60	2.20	0.32	0.01	0.00	0.00	9.53	11.28	16%	
PA	1.73	1.10	2.19	1.09	0.60	0.00	0.00	0.00	4.98	6.71	9%	
VA/DC	0.82	0.55	0.79	0.29	0.19	0.00	0.00	0.00	1.83	2.65	4%	
OthNE	0.03	0.02	0.05	0.01	0.01	0.00	0.00	0.00	0.09	0.11	0%	
IL	0.25	0.13	0.31	0.20	0.17	0.00	0.00	0.00	0.81	1.06	1%	
IN	0.20	0.19	0.26	0.25	0.15	0.00	0.00	0.00	0.84	1.04	1%	
MI	0.12	0.11	0.18	0.10	0.09	0.04	0.00	0.00	0.48	0.64	1%	
OH	0.31	0.30	0.43	0.30	0.18	0.00	0.00	0.00	1.21	1.52	2%	
WI	0.06	0.05	0.06	0.03	0.03	0.00	0.00	0.00	0.17	0.23	0%	
WV	0.12	0.05	0.21	0.12	0.08	0.00	0.00	0.00	0.47	0.59	1%	
KY	0.19	0.14	0.22	0.11	0.08	0.00	0.00	0.00	0.56	0.74	1%	
NC	0.31	0.11	0.19	0.12	0.06	0.00	0.00	0.00	0.49	0.79	1%	
TN	0.11	0.12	0.12	0.04	0.04	0.00	0.00	0.00	0.34	0.44	1%	
South	0.26	0.23	0.27	0.12	0.19	0.00	0.00	0.00	0.81	1.07	1%	
AR	0.12	0.04	0.07	0.04	0.04	0.00	0.00	0.00	0.19	0.31	0%	
MO	0.17	0.06	0.10	0.04	0.01	0.00	0.00	0.00	0.20	0.37	1%	
OK	0.10	0.03	0.09	0.03	0.06	0.00	0.00	0.00	0.20	0.30	0%	
TX	0.16	0.05	0.23	0.06	0.08	0.02	0.00	0.00	0.42	0.60	1%	
West	0.63	0.16	0.41	0.12	0.11	0.01	0.00	0.00	0.81	1.45	2%	
Other	0.62	0.01	2.14	0.00	0.00	1.26	0.00	0.00	2.15	4.03	6%	
BC	0.00	0.00	0.00	0.00	0.00	0.00	15.98	0.00	0.00	15.98	22%	
IC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	
<b>Grand Total</b>	<b>11.44</b>	<b>10.78</b>	<b>21.15</b>	<b>7.26</b>	<b>3.25</b>	<b>1.33</b>	<b>15.98</b>	<b>0.00</b>	<b>36.86</b>	<b>71.20</b>	<b>100%</b>	



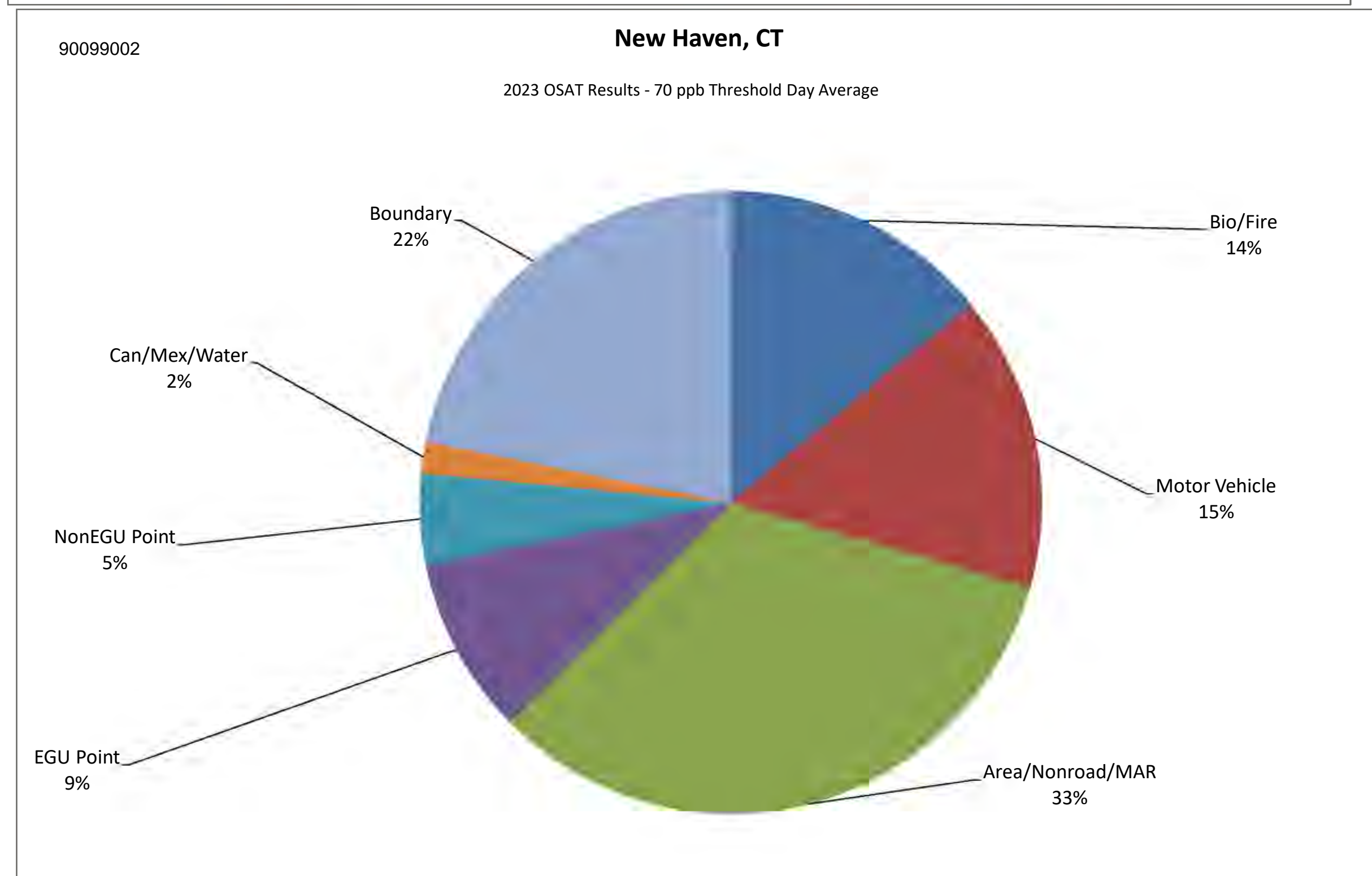
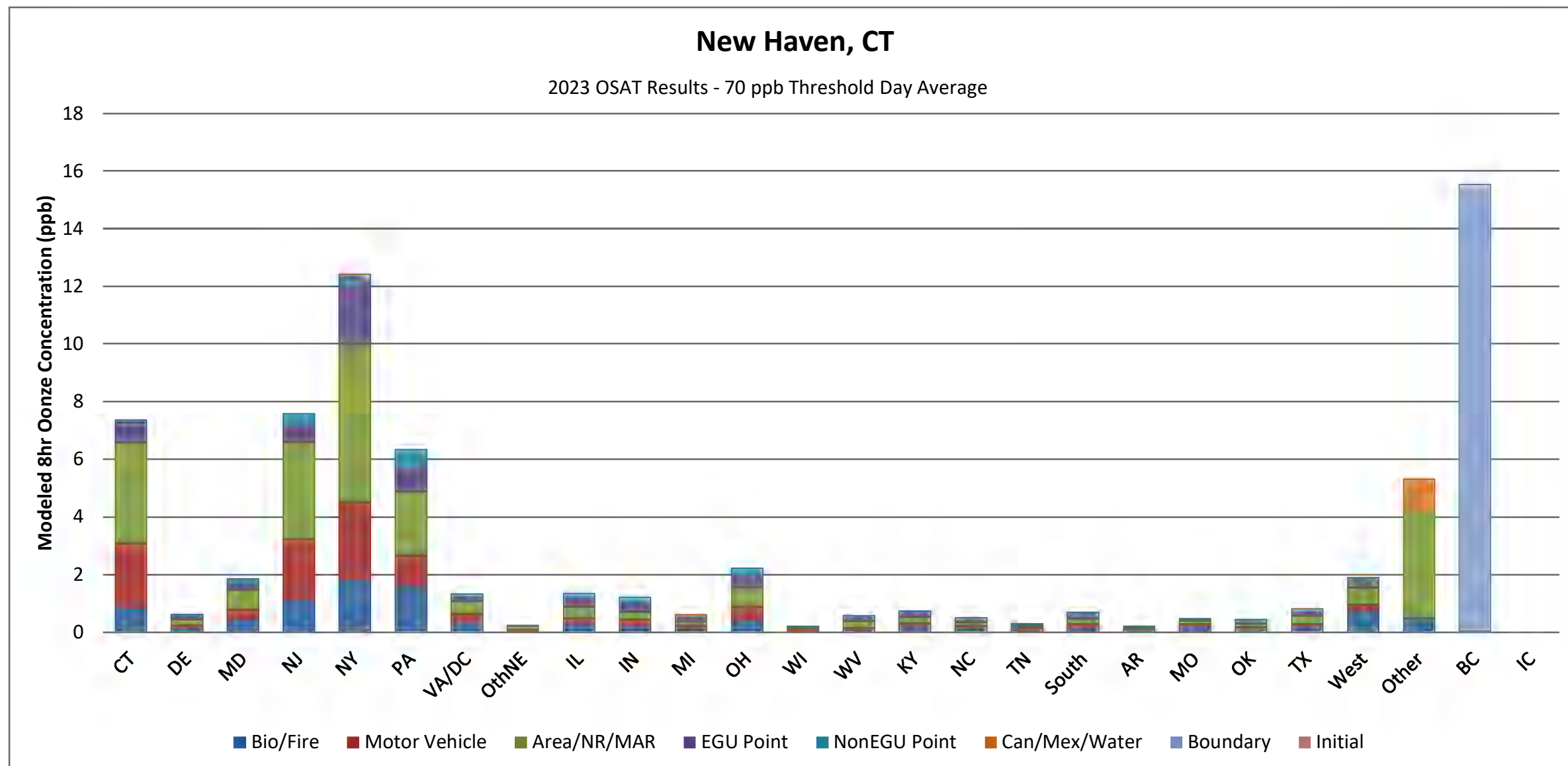
Monitor 90019003 Fairfield, CT

2023 OSAT Results (Modeled ppb) -- 70 ppb Threshold												
Row Labels	Bio/Fire	Motor Vehicle	Area/NR/MAR	EGU Point	NonEGU Point	Can/Mex/Water	Boundary	Initial	Anthro	Total	% of Total	
CT	0.85	1.61	2.74	0.11	0.03	0.00	0.00	0.00	4.49	5.34	7%	
DE	0.19	0.12	0.21	0.12	0.07	0.00	0.00	0.00	0.52	0.71	1%	
MD	0.87	0.53	0.94	0.40	0.24	0.00	0.00	0.00	2.10	2.98	4%	
NJ	1.79	3.04	4.84	0.72	0.41	0.00	0.00	0.00	9.01	10.80	15%	
NY	1.92	2.13	4.32	2.19	0.30	0.01	0.00	0.00	8.93	10.86	15%	
PA	1.77	1.18	2.36	1.07	0.62	0.00	0.00	0.00	5.24	7.00	10%	
VA/DC	0.84	0.55	0.78	0.28	0.18	0.00	0.00	0.00	1.79	2.63	4%	
OthNE	0.03	0.02	0.05	0.01	0.01	0.00	0.00	0.00	0.09	0.12	0%	
IL	0.27	0.15	0.35	0.22	0.18	0.00	0.00	0.00	0.89	1.17	2%	
IN	0.21	0.19	0.25	0.25	0.16	0.00	0.00	0.00	0.87	1.07	1%	
MI	0.14	0.15	0.22	0.11	0.10	0.04	0.00	0.00	0.57	0.75	1%	
OH	0.36	0.38	0.55	0.35	0.22	0.00	0.00	0.00	1.49	1.86	3%	
WI	0.07	0.05	0.07	0.03	0.03	0.00	0.00	0.00	0.18	0.25	0%	
WV	0.14	0.05	0.25	0.15	0.09	0.00	0.00	0.00	0.55	0.68	1%	
KY	0.18	0.14	0.23	0.11	0.08	0.00	0.00	0.00	0.56	0.74	1%	
NC	0.28	0.10	0.17	0.12	0.05	0.00	0.00	0.00	0.45	0.73	1%	
TN	0.09	0.10	0.10	0.04	0.04	0.00	0.00	0.00	0.27	0.36	1%	
South	0.23	0.20	0.25	0.11	0.15	0.00	0.00	0.00	0.71	0.94	1%	
AR	0.10	0.04	0.05	0.04	0.03	0.00	0.00	0.00	0.15	0.25	0%	
MO	0.18	0.07	0.11	0.04	0.01	0.00	0.00	0.00	0.23	0.41	1%	
OK	0.11	0.04	0.11	0.03	0.07	0.00	0.00	0.00	0.25	0.36	0%	
TX	0.17	0.06	0.25	0.07	0.08	0.02	0.00	0.00	0.46	0.66	1%	
West	0.73	0.20	0.52	0.15	0.15	0.01	0.00	0.00	1.02	1.76	2%	
Other	0.62	0.00	1.68	0.00	0.00	1.27	0.00	0.00	1.68	3.56	5%	
BC	0.00	0.00	0.00	0.00	0.00	0.00	16.71	0.00	0.00	16.71	23%	
IC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	
<b>Grand Total</b>	<b>12.15</b>	<b>11.10</b>	<b>21.39</b>	<b>6.70</b>	<b>3.31</b>	<b>1.34</b>	<b>16.71</b>	<b>0.00</b>	<b>37.49</b>	<b>72.70</b>	<b>100%</b>	



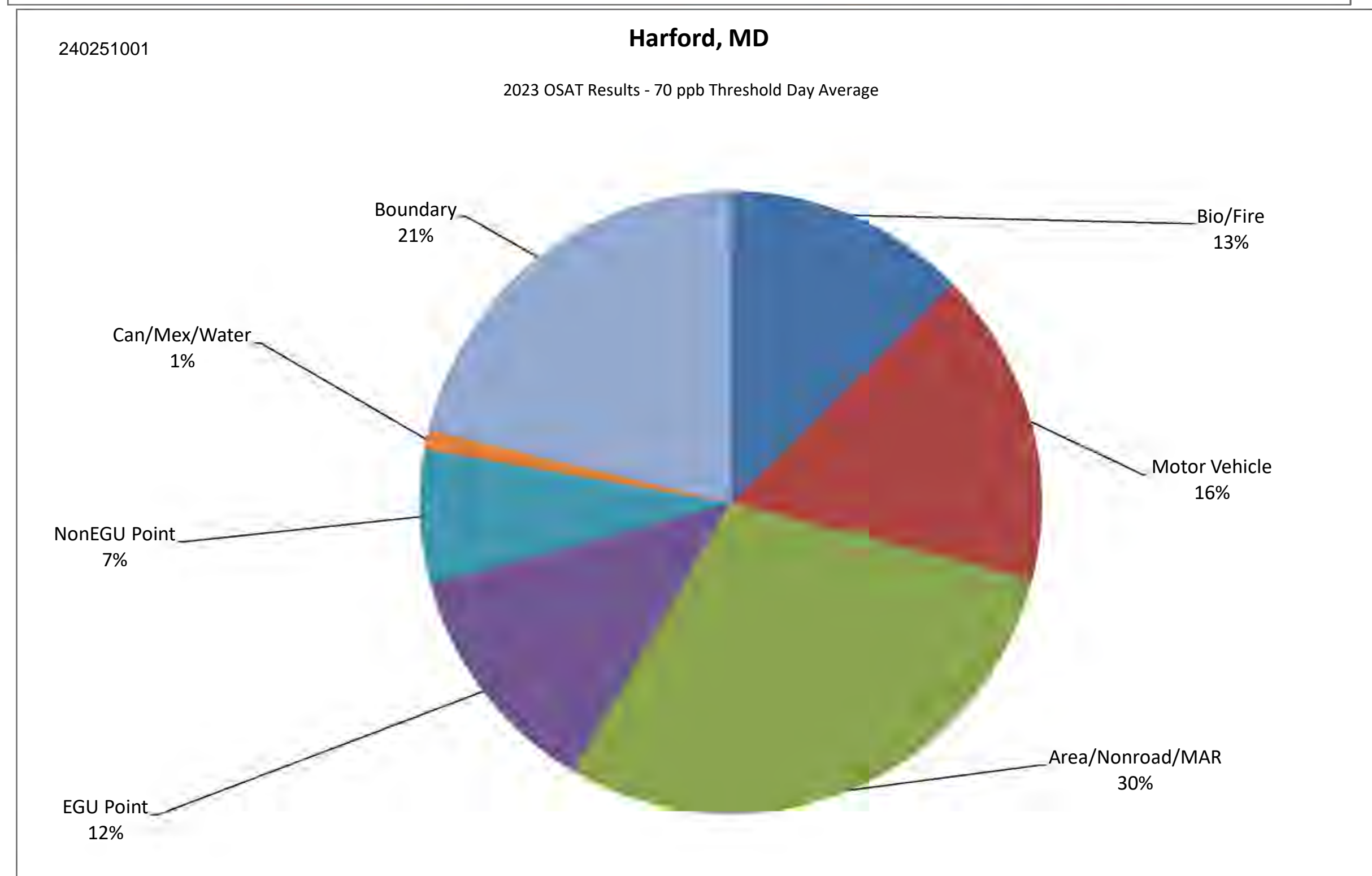
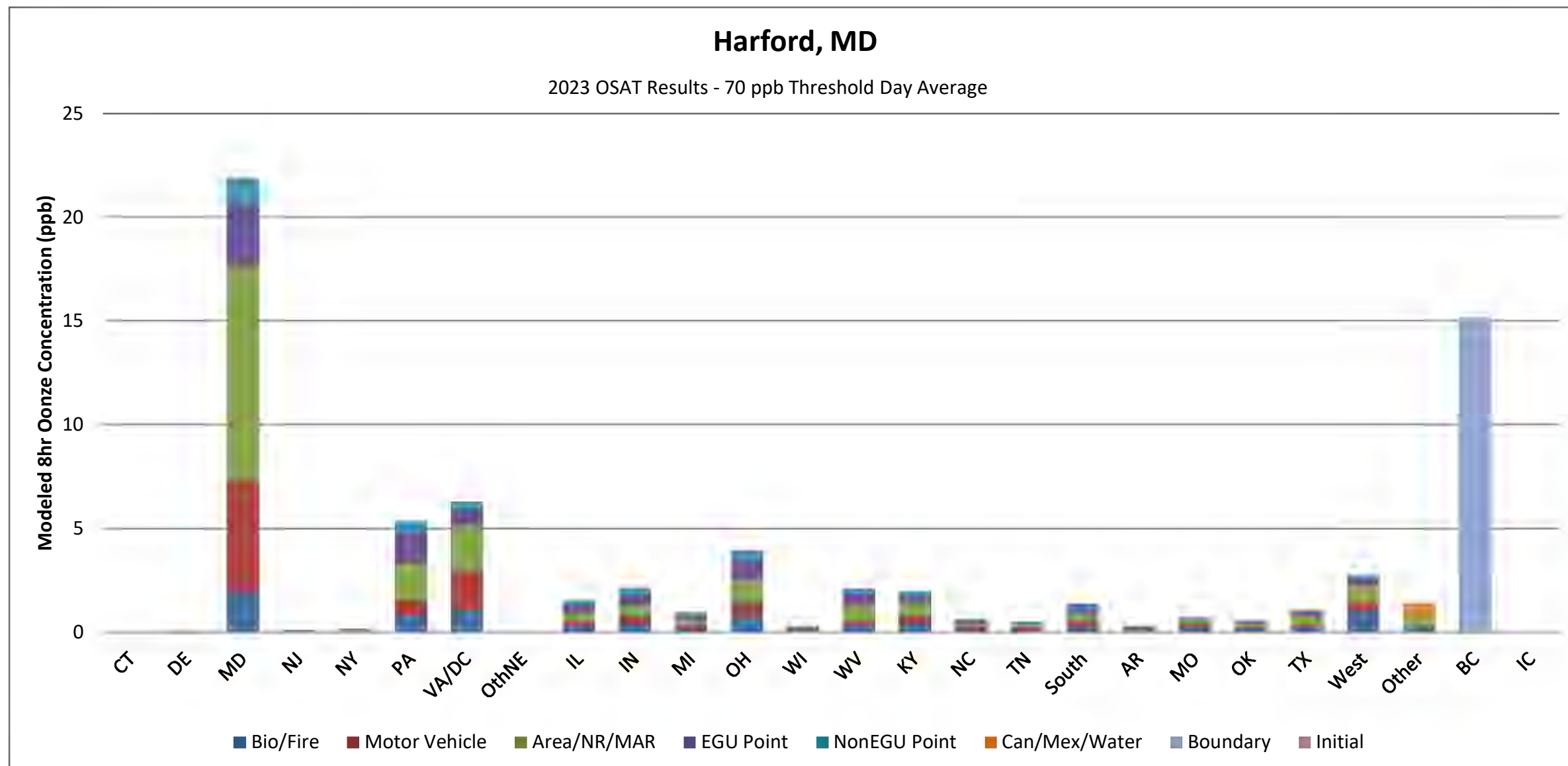
Monitor 90099002 New Haven, CT

2023 OSAT Results (Modeled ppb) -- 70 ppb Threshold											
Row Labels	Bio/Fire	Motor Vehicle	Area/NR/MAR	EGU Point	NonEGU Point	Can/Mex/Water	Boundary	Initial	Anthro	Total	% of Total
CT	0.82	2.27	3.50	0.74	0.06	0.00	0.00	0.00	6.56	7.38	10%
DE	0.13	0.12	0.21	0.11	0.07	0.00	0.00	0.00	0.52	0.65	1%
MD	0.44	0.35	0.70	0.24	0.15	0.00	0.00	0.00	1.44	1.88	3%
NJ	1.14	2.10	3.37	0.54	0.42	0.00	0.00	0.00	6.44	7.59	11%
NY	1.84	2.66	5.50	2.02	0.38	0.01	0.00	0.00	10.56	12.42	17%
PA	1.60	1.06	2.24	0.83	0.60	0.00	0.00	0.00	4.73	6.33	9%
VA/DC	0.35	0.29	0.46	0.13	0.11	0.00	0.00	0.00	1.00	1.35	2%
OthNE	0.06	0.05	0.12	0.02	0.01	0.00	0.00	0.00	0.19	0.26	0%
IL	0.32	0.17	0.41	0.26	0.21	0.00	0.00	0.00	1.04	1.36	2%
IN	0.23	0.21	0.29	0.29	0.18	0.00	0.00	0.00	0.99	1.22	2%
MI	0.10	0.12	0.18	0.11	0.07	0.04	0.00	0.00	0.48	0.62	1%
OH	0.41	0.48	0.69	0.38	0.29	0.00	0.00	0.00	1.84	2.25	3%
WI	0.06	0.06	0.06	0.03	0.03	0.00	0.00	0.00	0.18	0.23	0%
WV	0.09	0.06	0.27	0.11	0.07	0.00	0.00	0.00	0.51	0.60	1%
KY	0.18	0.15	0.23	0.11	0.09	0.00	0.00	0.00	0.58	0.76	1%
NC	0.14	0.09	0.14	0.10	0.05	0.00	0.00	0.00	0.38	0.52	1%
TN	0.07	0.09	0.08	0.04	0.03	0.00	0.00	0.00	0.24	0.31	0%
South	0.14	0.15	0.20	0.09	0.13	0.00	0.00	0.00	0.57	0.71	1%
AR	0.08	0.04	0.06	0.03	0.03	0.00	0.00	0.00	0.15	0.23	0%
MO	0.20	0.09	0.14	0.05	0.01	0.00	0.00	0.00	0.29	0.49	1%
OK	0.13	0.05	0.15	0.05	0.09	0.00	0.00	0.00	0.33	0.46	1%
TX	0.20	0.08	0.31	0.10	0.11	0.02	0.00	0.00	0.61	0.83	1%
West	0.74	0.23	0.59	0.18	0.17	0.01	0.00	0.00	1.16	1.91	3%
Other	0.49	0.00	3.71	0.01	0.01	1.10	0.00	0.00	3.73	5.32	7%
BC	0.00	0.00	0.00	0.00	0.00	0.00	15.54	0.00	0.00	15.54	22%
IC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%
<b>Grand Total</b>	<b>9.97</b>	<b>10.96</b>	<b>23.63</b>	<b>6.55</b>	<b>3.37</b>	<b>1.17</b>	<b>15.54</b>	<b>0.00</b>	<b>37.43</b>	<b>71.20</b>	<b>100%</b>



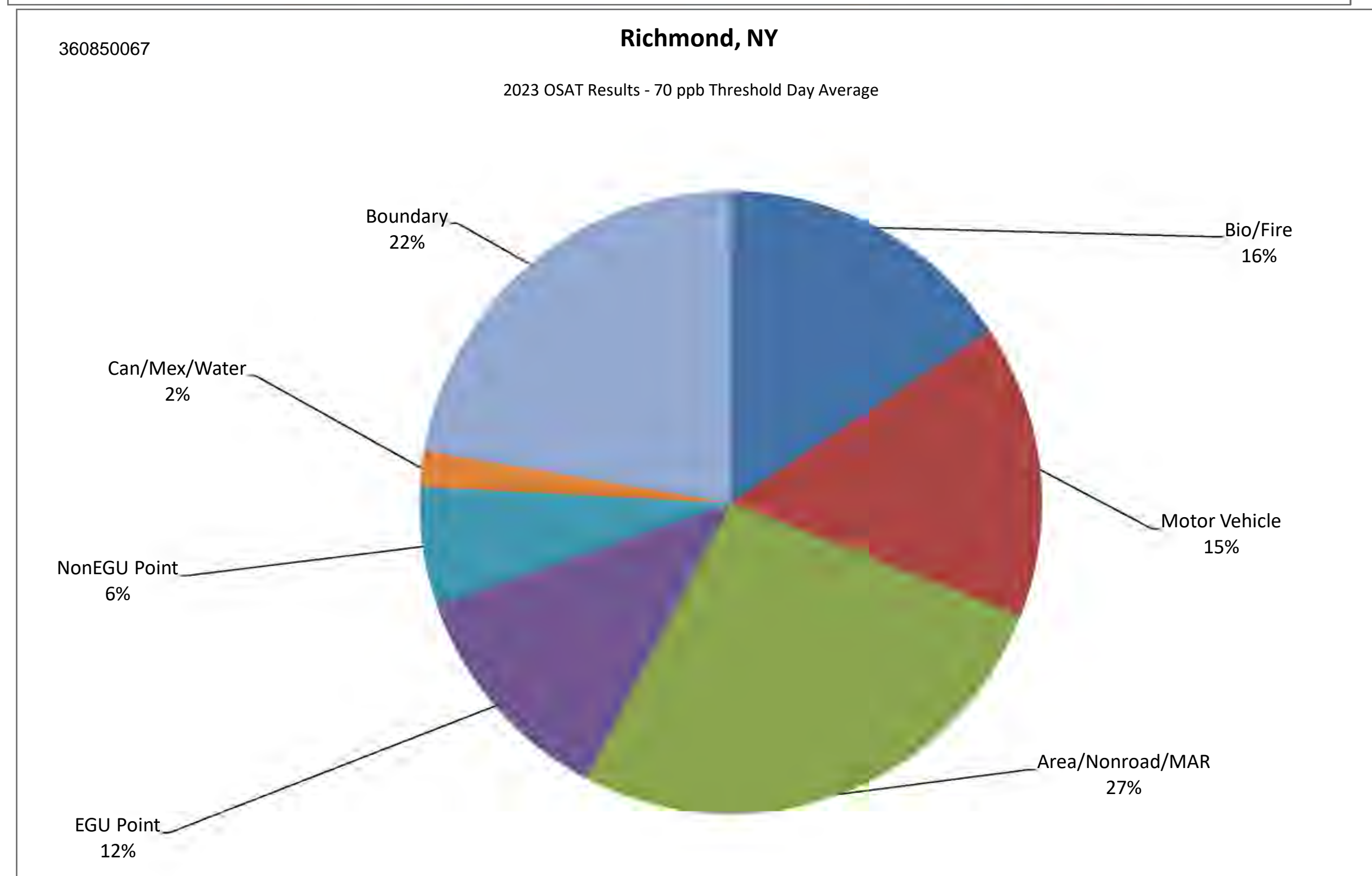
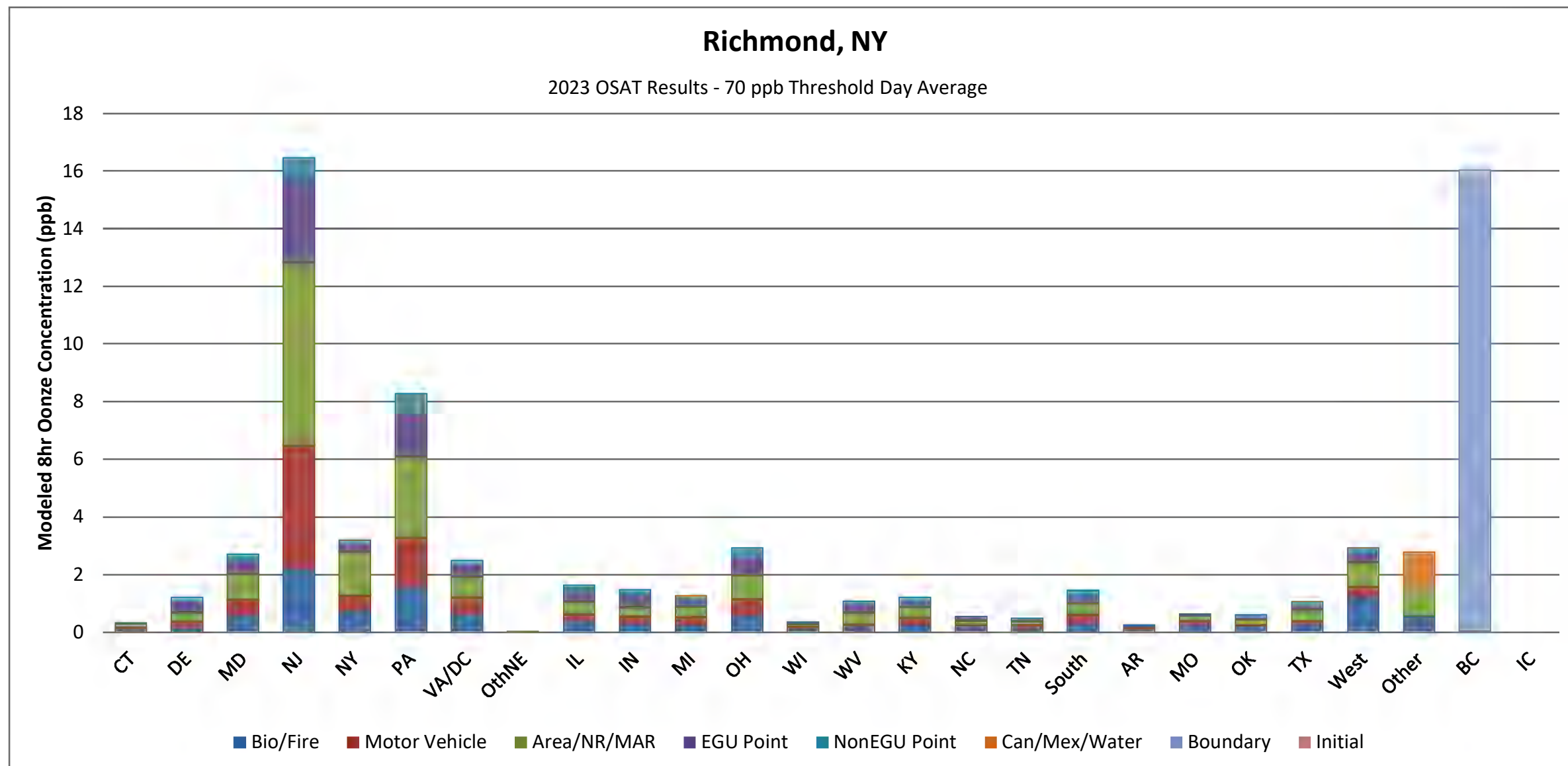
Monitor 240251001 Harford, MD

2023 OSAT Results (Modeled ppb) -- 70 ppb Threshold												
Row Labels	Bio/Fire	Motor Vehicle	Area/NR/MAR	EGU Point	NonEGU Point	Can/Mex/Water	Boundary	Initial	Anthro	Total	% of Total	
CT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	
DE	0.01	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.07	0.08	0%	
MD	1.99	5.32	10.29	2.95	1.34	0.00	0.00	0.00	19.90	21.88	31%	
NJ	0.01	0.02	0.05	0.01	0.01	0.00	0.00	0.00	0.09	0.10	0%	
NY	0.03	0.03	0.08	0.01	0.02	0.00	0.00	0.00	0.13	0.16	0%	
PA	0.84	0.75	1.73	1.47	0.57	0.00	0.00	0.00	4.52	5.36	8%	
VA/DC	1.10	1.86	2.21	0.72	0.39	0.00	0.00	0.00	5.18	6.28	9%	
OthNE	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0%	
IL	0.31	0.23	0.43	0.31	0.26	0.00	0.00	0.00	1.23	1.54	2%	
IN	0.38	0.42	0.49	0.52	0.32	0.00	0.00	0.00	1.76	2.14	3%	
MI	0.16	0.22	0.30	0.14	0.11	0.03	0.00	0.00	0.78	0.97	1%	
OH	0.67	0.83	1.09	0.89	0.48	0.00	0.00	0.00	3.29	3.95	6%	
WI	0.08	0.07	0.10	0.04	0.03	0.00	0.00	0.00	0.23	0.30	0%	
WV	0.37	0.18	0.77	0.52	0.29	0.00	0.00	0.00	1.76	2.13	3%	
KY	0.43	0.41	0.62	0.28	0.24	0.00	0.00	0.00	1.54	1.97	3%	
NC	0.17	0.13	0.14	0.13	0.06	0.00	0.00	0.00	0.47	0.64	1%	
TN	0.10	0.15	0.14	0.07	0.06	0.00	0.00	0.00	0.42	0.51	1%	
South	0.24	0.31	0.40	0.19	0.27	0.00	0.00	0.00	1.17	1.41	2%	
AR	0.10	0.05	0.07	0.04	0.05	0.00	0.00	0.00	0.20	0.29	0%	
MO	0.28	0.14	0.19	0.07	0.01	0.00	0.00	0.00	0.41	0.68	1%	
OK	0.16	0.07	0.17	0.06	0.11	0.00	0.00	0.00	0.41	0.57	1%	
TX	0.27	0.11	0.41	0.13	0.14	0.03	0.00	0.00	0.80	1.09	2%	
West	1.08	0.34	0.85	0.26	0.22	0.02	0.00	0.00	1.66	2.77	4%	
Other	0.28	0.00	0.48	0.00	0.00	0.65	0.00	0.00	0.48	1.41	2%	
BC	0.00	0.00	0.00	0.00	0.00	0.00	15.15	0.00	0.00	15.15	21%	
IC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	
<b>Grand Total</b>	<b>9.03</b>	<b>11.66</b>	<b>21.04</b>	<b>8.82</b>	<b>4.97</b>	<b>0.72</b>	<b>15.15</b>	<b>0.00</b>	<b>46.43</b>	<b>71.40</b>	<b>100%</b>	



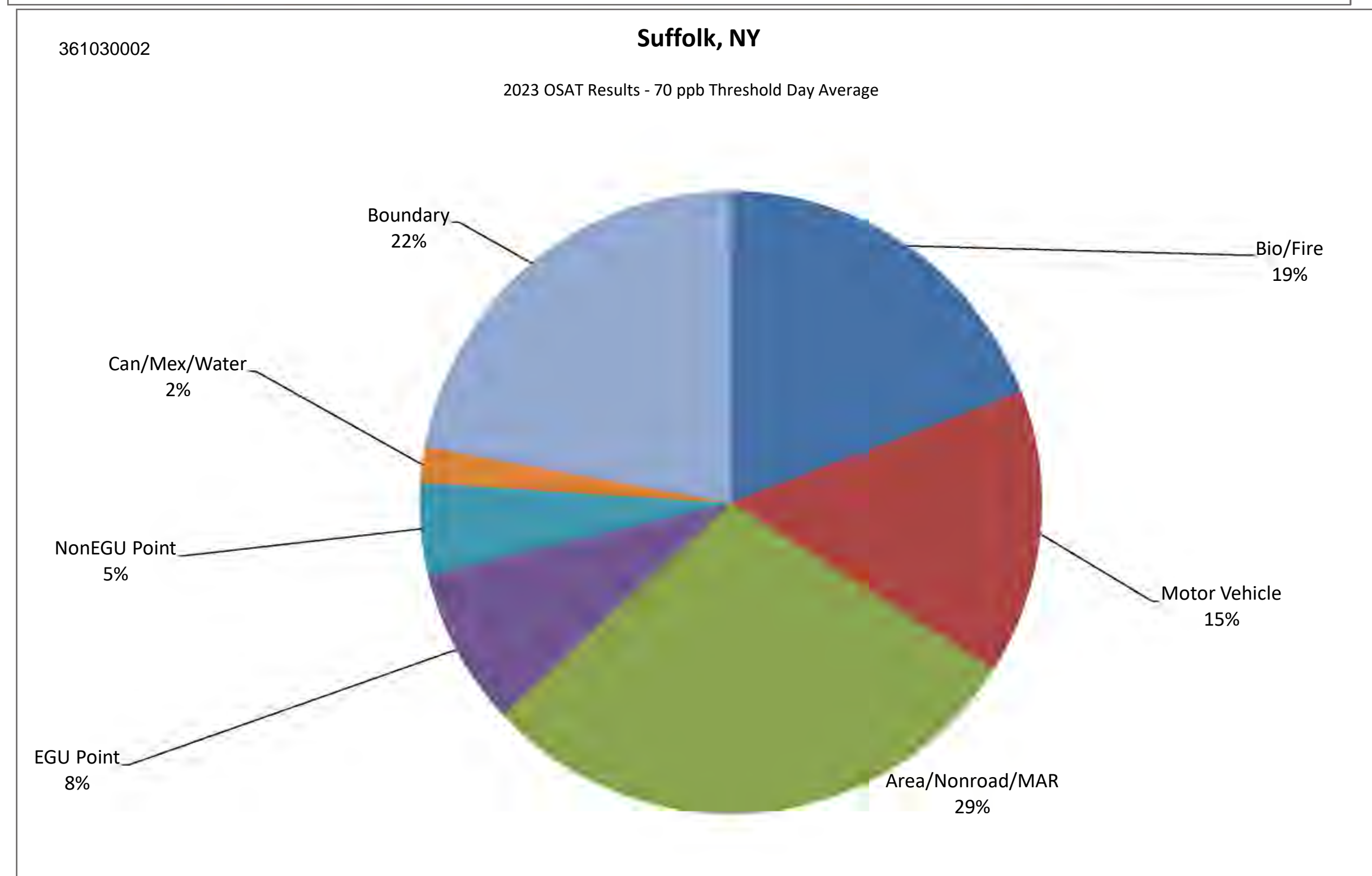
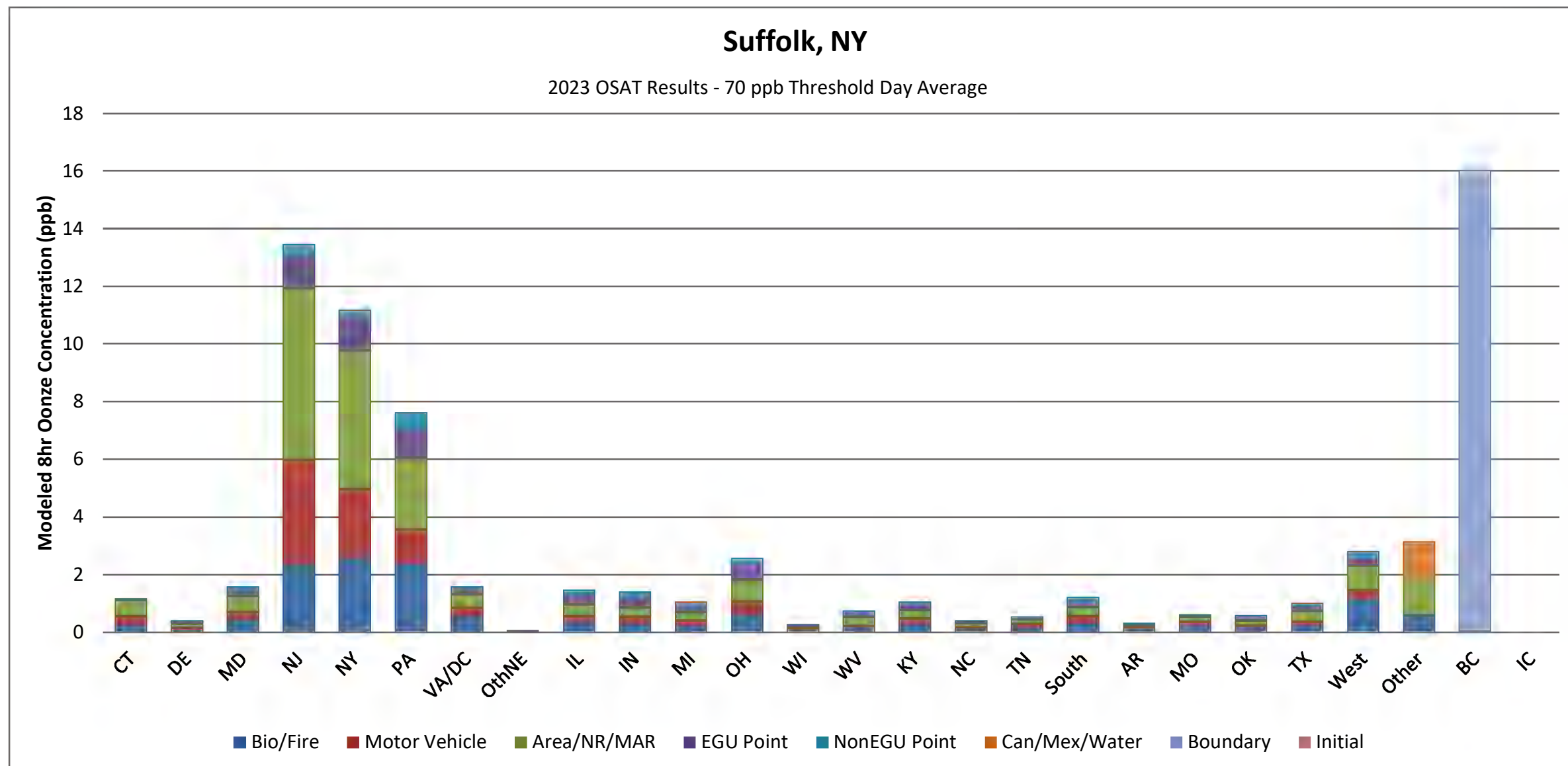
Monitor 360850067 Richmond, NY

2023 OSAT Results (Modeled ppb) -- 70 ppb Threshold												
Row Labels	Bio/Fire	Motor Vehicle	Area/NR/MAR	EGU Point	NonEGU Point	Can/Mex/Water	Boundary	Initial	Anthro	Total	% of Total	
CT	0.10	0.08	0.14	0.02	0.01	0.00	0.00	0.00	0.25	0.34	0%	
DE	0.15	0.22	0.33	0.38	0.13	0.00	0.00	0.00	1.06	1.22	2%	
MD	0.57	0.58	0.89	0.43	0.26	0.00	0.00	0.00	2.16	2.73	4%	
NJ	2.21	4.24	6.39	2.88	0.75	0.00	0.00	0.00	14.26	16.47	23%	
NY	0.75	0.52	1.55	0.24	0.14	0.01	0.00	0.00	2.45	3.21	4%	
PA	1.56	1.73	2.83	1.40	0.76	0.00	0.00	0.00	6.71	8.27	12%	
VA/DC	0.62	0.58	0.73	0.37	0.20	0.00	0.00	0.00	1.89	2.51	3%	
OthNE	0.02	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0%	
IL	0.38	0.24	0.47	0.30	0.26	0.00	0.00	0.00	1.26	1.65	2%	
IN	0.29	0.26	0.33	0.39	0.24	0.00	0.00	0.00	1.22	1.50	2%	
MI	0.26	0.28	0.36	0.20	0.12	0.06	0.00	0.00	0.97	1.28	2%	
OH	0.57	0.59	0.83	0.60	0.35	0.00	0.00	0.00	2.38	2.95	4%	
WI	0.11	0.08	0.11	0.05	0.04	0.00	0.00	0.00	0.27	0.38	1%	
WV	0.17	0.10	0.44	0.27	0.12	0.00	0.00	0.00	0.93	1.10	2%	
KY	0.27	0.24	0.38	0.18	0.14	0.00	0.00	0.00	0.95	1.22	2%	
NC	0.19	0.09	0.14	0.10	0.05	0.00	0.00	0.00	0.37	0.57	1%	
TN	0.11	0.14	0.13	0.06	0.05	0.00	0.00	0.00	0.38	0.50	1%	
South	0.30	0.32	0.41	0.19	0.27	0.00	0.00	0.00	1.19	1.48	2%	
AR	0.10	0.05	0.06	0.04	0.04	0.00	0.00	0.00	0.18	0.28	0%	
MO	0.28	0.12	0.18	0.06	0.01	0.00	0.00	0.00	0.37	0.65	1%	
OK	0.19	0.07	0.19	0.06	0.12	0.00	0.00	0.00	0.44	0.63	1%	
TX	0.29	0.11	0.41	0.12	0.13	0.03	0.00	0.00	0.78	1.09	2%	
West	1.23	0.34	0.88	0.28	0.21	0.02	0.00	0.00	1.71	2.96	4%	
Other	0.56	0.00	1.02	0.00	0.02	1.22	0.00	0.00	1.03	2.81	4%	
BC	0.00	0.00	0.00	0.00	0.00	0.00	16.04	0.00	0.00	16.04	22%	
IC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	
<b>Grand Total</b>	<b>11.26</b>	<b>10.98</b>	<b>19.23</b>	<b>8.62</b>	<b>4.43</b>	<b>1.33</b>	<b>16.04</b>	<b>0.00</b>	<b>41.95</b>	<b>71.90</b>	<b>100%</b>	



Monitor 361030002 Suffolk, NY

2023 OSAT Results (Modeled ppb) -- 70 ppb Threshold												
Row Labels	Bio/Fire	Motor Vehicle	Area/NR/MAR	EGU Point	NonEGU Point	Can/Mex/Water	Boundary	Initial	Anthro	Total	% of Total	
CT	0.25	0.31	0.57	0.03	0.01	0.00	0.00	0.00	0.92	1.16	2%	
DE	0.09	0.07	0.14	0.07	0.05	0.00	0.00	0.00	0.33	0.42	1%	
MD	0.45	0.28	0.54	0.18	0.14	0.00	0.00	0.00	1.14	1.59	2%	
NJ	2.34	3.64	5.97	1.05	0.46	0.00	0.00	0.00	11.11	13.45	19%	
NY	2.60	2.37	4.81	1.16	0.21	0.01	0.00	0.00	8.55	11.17	15%	
PA	2.39	1.19	2.48	0.95	0.60	0.00	0.00	0.00	5.23	7.62	11%	
VA/DC	0.55	0.30	0.48	0.15	0.12	0.00	0.00	0.00	1.05	1.60	2%	
OthNE	0.02	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.05	0.06	0%	
IL	0.39	0.18	0.41	0.27	0.23	0.00	0.00	0.00	1.09	1.48	2%	
IN	0.30	0.24	0.33	0.34	0.21	0.00	0.00	0.00	1.12	1.42	2%	
MI	0.21	0.21	0.30	0.17	0.12	0.06	0.00	0.00	0.81	1.07	1%	
OH	0.59	0.50	0.75	0.45	0.29	0.00	0.00	0.00	2.00	2.59	4%	
WI	0.08	0.06	0.07	0.04	0.04	0.00	0.00	0.00	0.21	0.29	0%	
WV	0.16	0.06	0.33	0.13	0.08	0.00	0.00	0.00	0.61	0.76	1%	
KY	0.28	0.20	0.31	0.15	0.12	0.00	0.00	0.00	0.78	1.06	1%	
NC	0.13	0.06	0.12	0.07	0.04	0.00	0.00	0.00	0.29	0.42	1%	
TN	0.16	0.15	0.15	0.06	0.05	0.00	0.00	0.00	0.39	0.55	1%	
South	0.31	0.25	0.32	0.15	0.20	0.00	0.00	0.00	0.92	1.23	2%	
AR	0.14	0.05	0.07	0.04	0.04	0.00	0.00	0.00	0.19	0.33	0%	
MO	0.28	0.11	0.17	0.06	0.01	0.00	0.00	0.00	0.34	0.61	1%	
OK	0.17	0.06	0.18	0.06	0.11	0.00	0.00	0.00	0.41	0.59	1%	
TX	0.28	0.10	0.39	0.12	0.13	0.02	0.00	0.00	0.73	1.03	1%	
West	1.16	0.32	0.84	0.26	0.21	0.02	0.00	0.00	1.63	2.81	4%	
Other	0.59	0.00	1.32	0.00	0.00	1.25	0.00	0.00	1.32	3.15	4%	
BC	0.00	0.00	0.00	0.00	0.00	0.00	16.03	0.00	0.00	16.03	22%	
IC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	
<b>Grand Total</b>	<b>13.91</b>	<b>10.74</b>	<b>21.09</b>	<b>5.94</b>	<b>3.45</b>	<b>1.35</b>	<b>16.03</b>	<b>0.00</b>	<b>39.97</b>	<b>72.50</b>	<b>100%</b>	





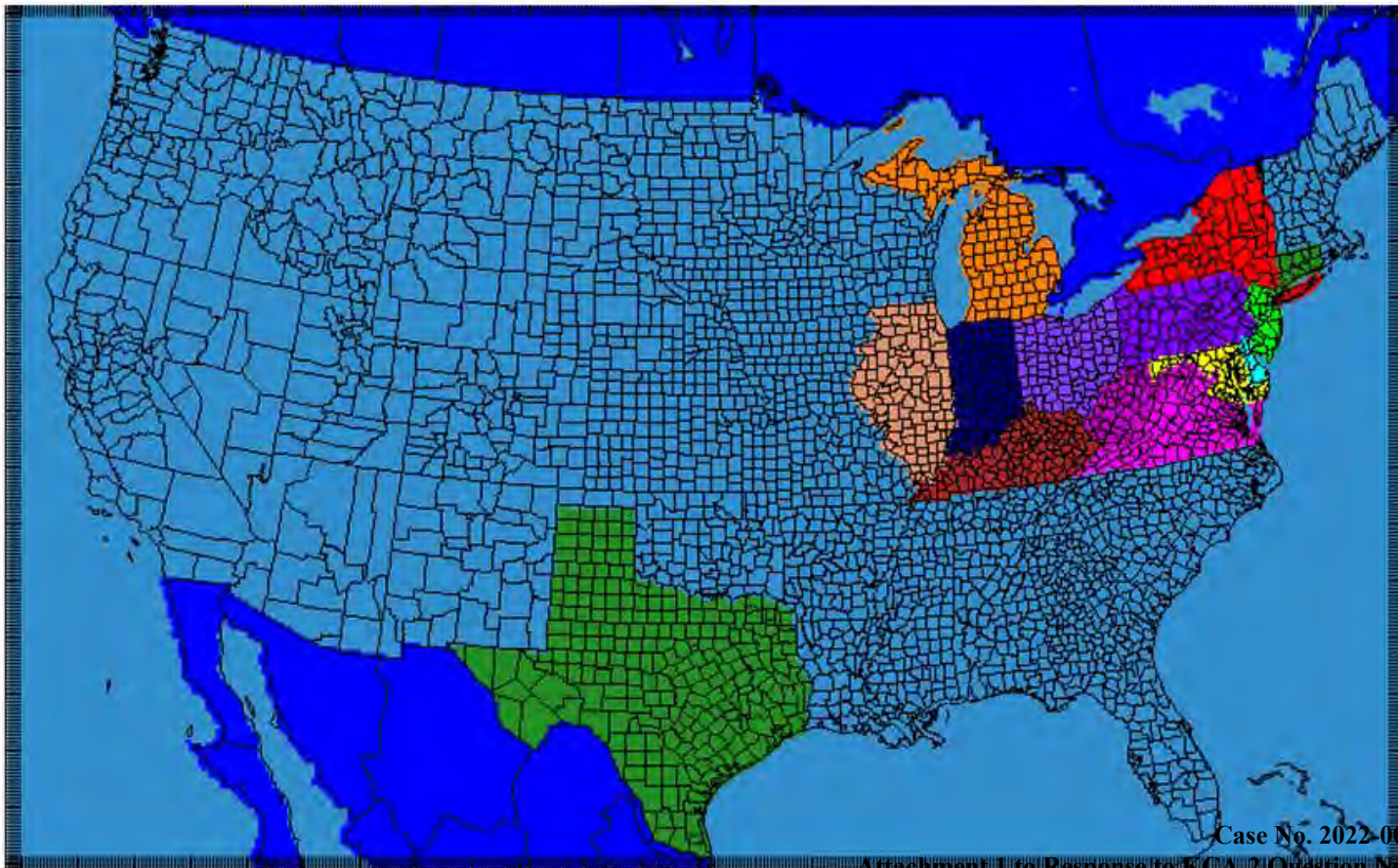
# 12km OSAT Results Used to Inform 4km Processing

- Using the significant contribution calculations from the 12km simulation, Alpine selected the states with “significant contribution” (based on the 1% of 70 pbb NAAQS) to define source regions in 4km OSAT simulation

Monitor	Name	PA	VA/DC	IL	IN	OH	MD	NJ	NY	WV	KY	MI	CT	DE	TX
90019003	Fairfield, CT	X	X	X	X	X	X	X	X						
361030002	Suffolk, NY	X	X	X	X	X	X	X			X	X	X		X
360850067	Richmond, NY	X	X	X	X	X	X	X		X	X	X		X	X
240251001	Harford, MD	X	X	X	X	X				X	X	X			X
90013007	Fairfield, CT	X	X	X	X	X	X	X	X						
90099002	New Haven, CT	X	X	X	X	X	X	X	X						

# 4km Modeling Domain

- OSAT will be run with noted source states (all other states will be grouped as “other” for contribution purposes) and anthropogenic source contribution calculations will be generated by source category for monitors in 4km domain
- Results expected mid to late April 2018



# *International Transport Authorities*

CAA section 179B(a) EPA must approve a SIP if it meets all “requirements applicable to it under the [CAA] other than a requirement that [it] demonstrate attainment and maintenance of the relevant [NAAQS] by the [applicable] attainment date ... and ... the submitting State establishes ... that [its] implementation plan ... would be adequate to attain and maintain the relevant [NAAQS] by the attainment date ... *but for emissions emanating from outside of the United States.*”

CAA section 110(a)(2)(D)(i)(I) – this section “gives EPA no authority to force an upwind state to share the burden of reducing other upwind states’ emissions.” *North Carolina v. EPA*, 531 F 2d at 921.

# “But For” Contribution Calculation No Monitor > 56.6 ppb

2023en Final  
CSAPR MDA8  
DVs (ppb)  
without APCA  
calculated  
“Boundary”  
Contributions

[BC/IC/Can/Mex]



- International contribution, wildfires, and natural background emissions play an ever increasing role in modeled ozone
- We need a better understanding and quantification of the impact of these sources on regional air quality and better tools and policies to account for their presence

# Residual 12km Nonattainment Monitors

Monitor	State	County	2023 Average MDA8 Ozone Design Value (ppb)					
			2009-2013 Base Period Average Design Value (ppb)	Average Base Case	Canada & Mexico Contribution	Initial & Boundary Contribution	w/o Can/Mex	w/o Can/Mex /IC/BC
90019003	Connecticut	Fairfield	83.7	72.7	1.34	16.71	71.4	54.7
361030002	New York	Suffolk	83.3	72.5	1.35	16.03	71.2	55.1
360850067	New York	Richmond	81.3	71.9	1.33	16.04	70.6	54.5
240251001	Maryland	Harford	90.0	71.4	0.72	15.15	70.7	55.5
90099002	Connecticut	New Haven	85.7	71.2	1.17	15.54	70.0	54.5
90013007	Connecticut	Fairfield	84.3	71.2	1.33	15.98	69.9	53.9

Only two monitors remain nonattainment after the subtraction of Canadian and Mexican emission contributions.

# APCA v OSAT

- Sometimes multiple, equally acceptable tools and tests are available – choosing the most appropriate one is important
- MOG findings indicate selection of appropriate model for contribution of anthropogenic source calculation can mean difference between significant or not
  - Selection of APCA v OSAT can significantly alter the modeled contribution of upwind anthropogenic emissions on downwind monitors
  - MOG is prepared to provide a complete monitor-level comparison of APCA v OSAT as soon as EPA releases its APCA results of the 2023en platform

# APCA v OSAT (2)

Monitor 90019003

Fairfield, Connecticut

## APCA Technique (EPA Method)

Category	Bio/Fire	Total Anthro	Motor Vehicle	Area/NR/MAR	EGU Point	NonEGU Point	Can/Mex /Water	Boundary	Total
2023en DVf Contribution (ppb)	4.35	50.19	13.50	25.02	7.93	3.74	1.40	16.76	72.7
% Contribution	6%	69%	19%	34%	11%	5%	2%	23%	

## OSAT Method (Alternate Method)

Category	Bio/Fire	Total Anthro	Motor Vehicle	Area/NR/MAR	EGU Point	NonEGU Point	Can/Mex /Water	Boundary	Total
2023en DVf Contribution (ppb)	12.15	42.50	11.10	21.39	6.70	3.31	1.34	16.71	72.7
% Contribution	17%	58%	15%	29%	9%	5%	2%	23%	

Almost 8 ppb of biogenic ozone attributed to anthropogenic sources using APCA technique compared to OSAT at this receptor. This amount would be allocated across upwind states potentially triggering significant contribution threshold.

# Step 3

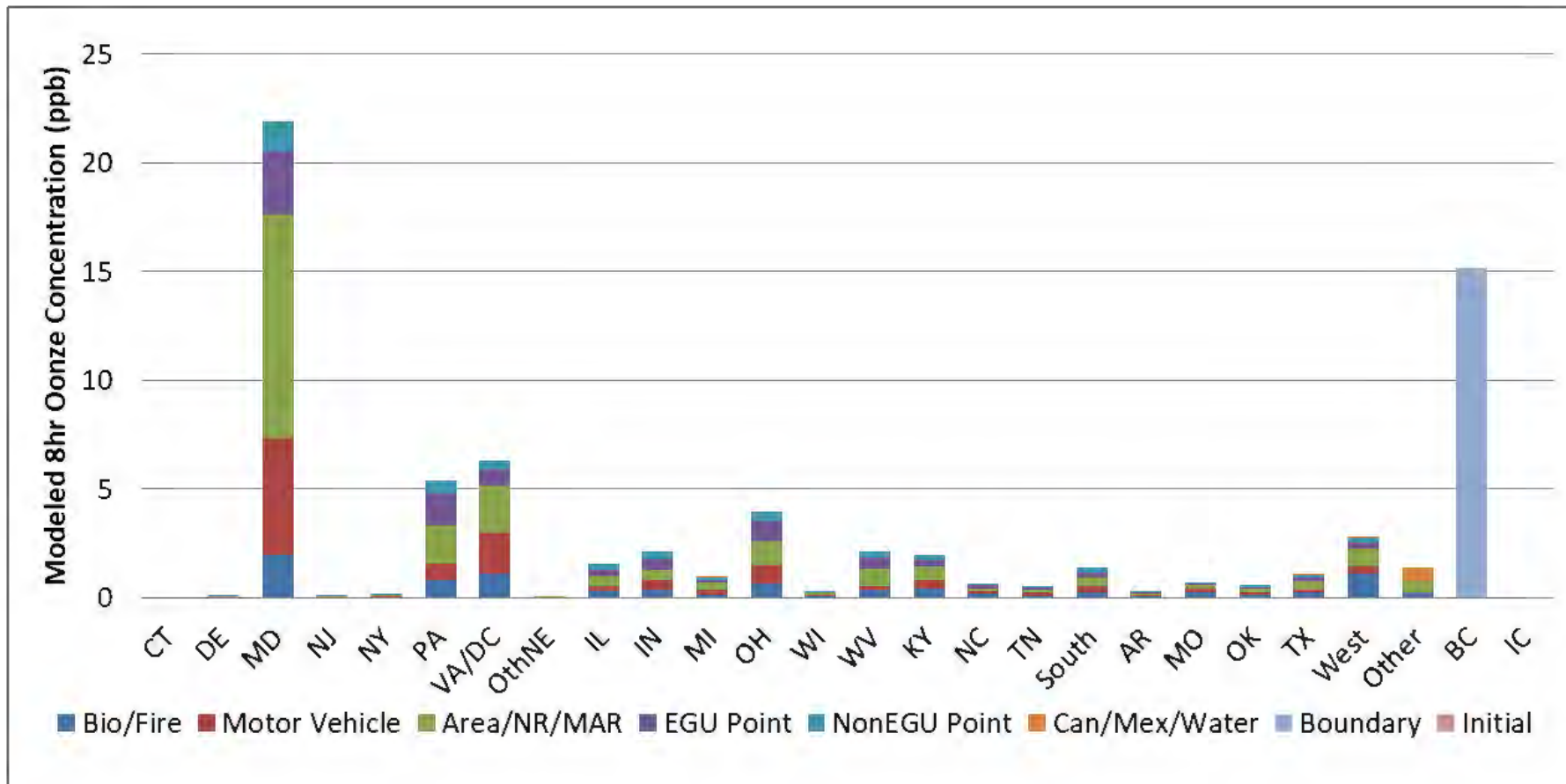
Identify cost effective emission reductions



# *Emission Reduction Alternative*

- CSAPR relied on \$1,400/ton of NO<sub>x</sub>
- U.S. Appeals Court offered an option for upwind states to address downwind contributions to monitor modeled nonattainment using redline calculations
  - *EME Homer City, etc. v. EPA* (Case No. 11-1302 et. al) – August 21, 2012
  - Upwind States are obligated to reduce emissions must be allocated “in proportion to the size of their contributions to downwind non-attainment”

# Redlines Calculation – 2023en Platform Contribution to Harford, MD Monitor



# Redlines Calculation for Harford, MD (2)

## Anthropogenic Contribution (ppb) from 2023 Base Case - 12km OSAT Modeling

CT	0.00	IL	1.23	TN	0.42	BC	15.15
DE	0.07	IN	1.76	South	1.17	IC	0.00
MD	19.90	MI	0.78	AR	0.20	Can/Mex	0.72
NJ	0.09	OH	3.29	MO	0.41	Bio/Fire	9.03
NY	0.13	WI	0.23	OK	0.41		
PA	4.52	WV	1.76	TX	0.80	<b>Total</b>	<b>71.40</b>
VA/DC	5.18	KY	1.54	West	1.66	<b>Reduction To Attain</b>	<b>0.50</b>
OthNE	0.01	NC	0.47	Other	0.48		

### Redlines Reduction Contribution Calculation

Upwind State must achieve less than 0.70 ppb significant contribution or monitor much achieve attainment (70.9 ppb)

Reduction Necessary for Attainment = 0.50 ppb from 71.40 ppb

Relative Contribution of Significant Upwind States (ppb and %)			Proportional Reduction Requirement (ppb)		Resulting Concentration After Reduction (ppb)	
VA/DC	5.18	25%		0.12		5.06
PA	4.52	22%		0.11		4.42
OH	3.29	16%		0.08		3.21
IN	1.76	8%		0.04		1.72
WV	1.76	8%		0.04		1.72
KY	1.54	7%		0.04		1.50
IL	1.23	6%		0.03		1.20
TX	0.80	4%		0.02		0.78
MI	0.78	4%		0.02		0.76
<b>Total</b>	<b>20.86</b>	<b>100%</b>		<b>0.50</b>		

Case No. 2022-00402

Attachment 1 to Response to KCA-2 Question No. 27

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Imber

# Maintenance Areas

- EPA's January 17, 2018 brief in the CSAPR Update litigation (Wisconsin et al. v EPA, Case No. 16-1406) states on pages 77 and 78:

"Ultimately, Petitioners' complaint that maintenance-linked states are unreasonably subject to the "same degree of emission reductions" as nonattainment linked states must fail. Indus. Br. 25. There is no legal or practical prohibition on the Rule's use of a single level of control stringency for both kinds of receptors, provided that the level of control is demonstrated to result in meaningful air quality improvements without triggering either facet of the Supreme Court's test for over-control. So while concerns at maintenance receptors can potentially be eliminated at a lesser level of control in some cases given the smaller problem being addressed, this is a practical possibility, not a legal requirement. See 81 Fed. Reg. at 74,520. Here, EPA's use of the same level of control for both maintenance-linked states and nonattainment-linked states is attributable to the fact that the Rule considered only emission reduction measures available in time for the 2017 ozone season. Id. at 74,520. Under this constraint, both sets of states reduced significant emissions, without over-control, at the same level of control. Id. at 74,551-52. Accordingly, EPA's selection of a uniform level of control for both types of receptors was reasonable." Emphasis added.

# *Alternative Maintenance Approaches*

- Section 175A of the Clean Air Act provides:

“(a) Plan revision

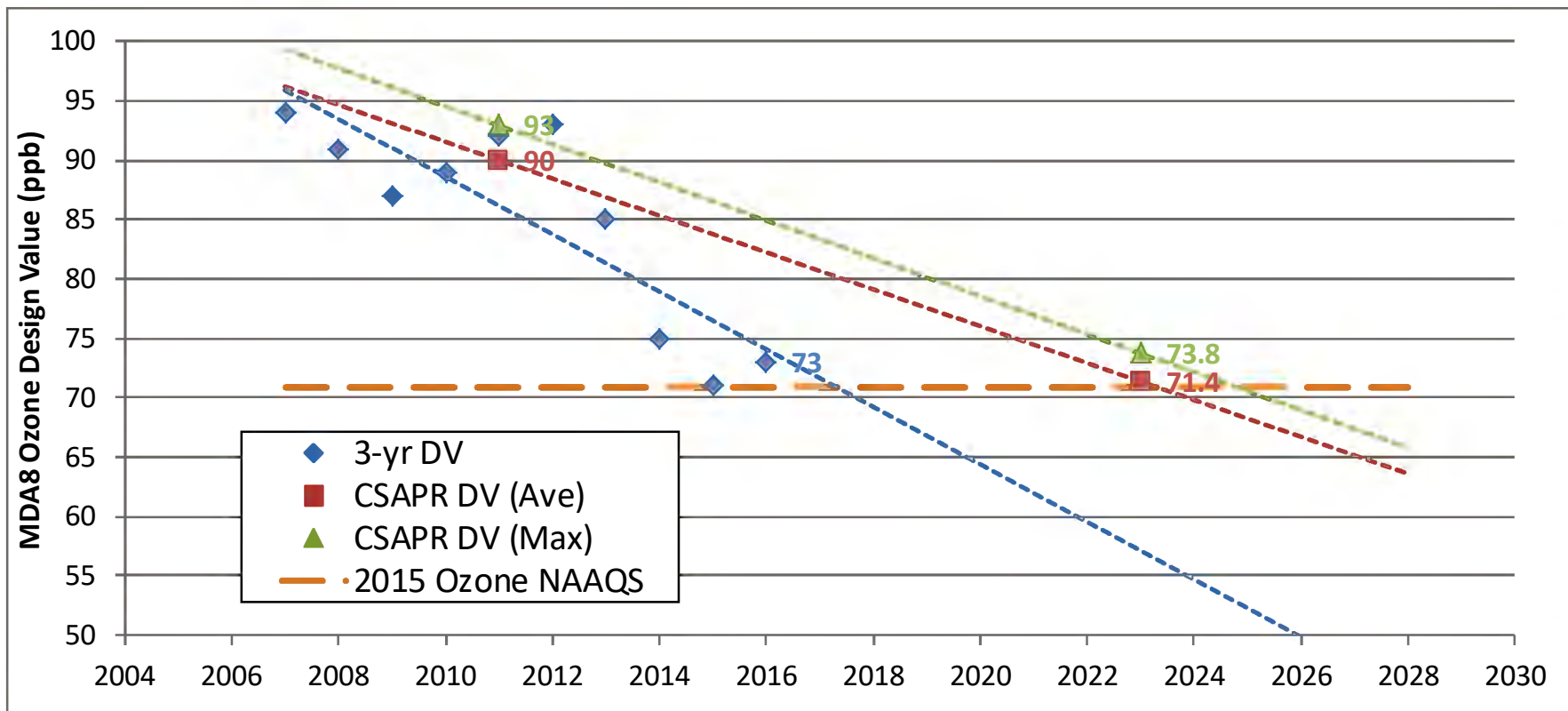
Each State which submits a request under section 7407 (d) of this title for redesignation of a nonattainment area for any air pollutant as an area which has attained the national primary ambient air quality standard for that air pollutant shall also submit a revision of the applicable State implementation plan to provide for the maintenance of the national primary ambient air quality standard for such air pollutant in the area concerned for at least 10 years after the redesignation. The plan shall contain such additional measures, if any, as may be necessary to ensure such maintenance.”

- “Procedures for Processing Requests to Redesignate Areas to Attainment”, John Calcagni memorandum, 4 September 1992, which contains the following statement on page 9:

“A State may generally demonstrate maintenance of the NAAQS by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory, or by modeling to show what the future mix of source and emission rates will not cause a violation of the NAAQS. Under the Clean Air Act, many areas are required to submit modeled attainment demonstrations to show that proposed reductions in emissions will be sufficient to attain the applicable NAAQS. For these areas, the maintenance demonstration should be based upon the same level of modeling. In areas where no such modeling was required, the State should be able to rely on the attainment inventory approach. In both instances, the demonstration should be for a period of 10 years following the redesignation.”

# Linear Trends of Maintenance Area Observations and Modeling

Monitor **240251001** Harford, MD



# Next Steps

- More analyses to come
  - 4km OSAT in progress
  - 4km performance evaluations underway
  - Additional “intensity factor” analysis being considered
    - Impact of ppb/ton by region/category combinations
- *Meetings / webinars:*
  - EPA
  - States
  - MOG Spring Meeting: May 10, 2018, Cincinnati

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