2015 Ozone Season Summary & New Ozone Standard

Steve Walz

ACPAC Meeting

October 19, 2015

2015 Ozone Season Summary

Peak 8-Hour Ozone Concentrations (ppb)

APRIL 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
		1	2	3	4	5
		51	62	46	46	53
6	7	8	9	10	11	12
57	45	39	37	42	58	60
13	14	15	16	17	18	19
60	43	53	58	51	65	58
20	21	22	23	24	25	26
48	52	54	50	55	48	52
27	28	29	30			
47	50	61	60			

MAY 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
				1	2	3
				43	52	68
4	5	6	7	8	9	10
67	71	67	70	72	45	41
11	12	13	14	15	16	17
48	59	46	59	60	61	40
18	19	20	21	22	23	24
52	52	47	38	59	60	68
25	26	27	28	29	30	31
60	65	48	69	66	52	43

JUNE 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1	2	3	4	5	6	7
51	32	28	32	33	54	49
8	9	10	11	12	13	14
56	60	67	88	60	59	57
15	16	17	18	19	20	21
45	42	55	46	47	52	46
22	23	24	25	26	27	28
68	52	63	64	60	43	42
29	30					
53	58					

JULY 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
		1	2	3	4	5
		60	46	62	54	54
6	7	8	9	10	11	12
39	62	41	39	60	57	71
13	14	15	16	17	18	19
50	54	56	60	48	48	62
20	21	22	23	24	25	26
68	54	56	67	68	63	62
27	28	29	30	31		
58	70	49	51	67		

AUGUST 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
					1	2
					57	54
3	4	5	6	7	8	9
62	64	73	55	53	55	55
10	11	12	13	14	15	16
37	52	48	55	75	71	67
17	18	19	20	21	22	23
68	59	44	39	63	60	69
24	25	26	27	28	29	30
62	64	57	53	62	63	61
31						
62						

SEPTEMBER 2015

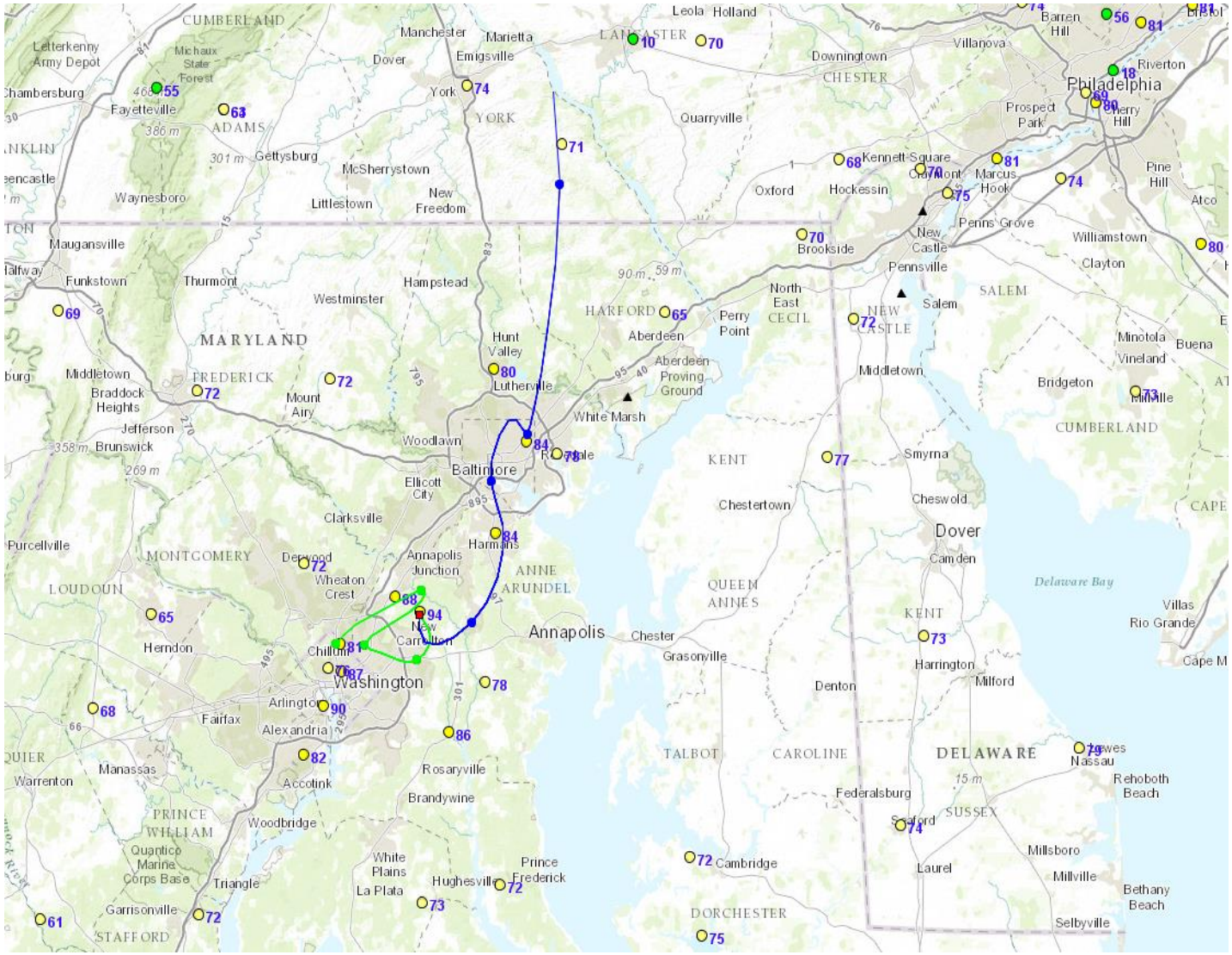
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
	1	2	3	4	5	6
	72	77	68	72	45	57
7	8	9	10	11	12	13
58	57	54	39	58	33	35
14	15	16	17	18	19	20
51	73	81	82	78	57	40
21	22	23	24	25	26	27
32	35	54	57	40	36	37
28	29	30				
37	27	37				

**** Since April 1, 2015, there have been 5 Code Orange Days, 61 Code Yellow Days, and 117 Code Green Days***

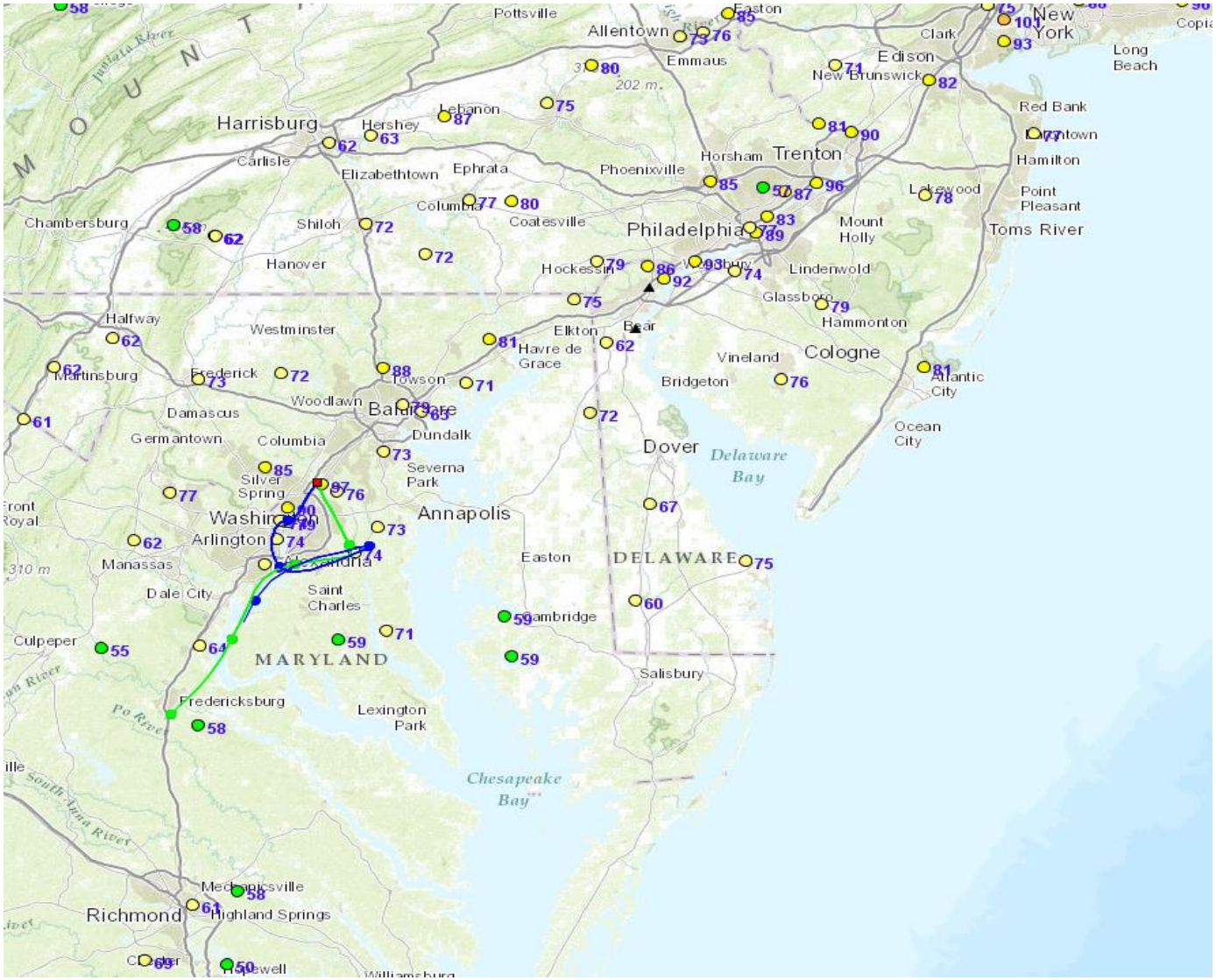
Meteorology Factors on Exceedance Days

- June 11 & September 2 (Local & Transported Emissions)
  - High Temperatures: 92°F/93°F, Clear skies
  - Light westerly winds brought ozone from Ohio River Valley
  - Ozone build up on previous days
  - Recirculation (September 2) & Canadian wildfire smoke (June 11)
- September 16-18 (Mostly Recirculation of Local Emissions)
  - High Temperatures: Mid-80°F, Clear skies
  - Extremely light winds & Recirculation
  - Ozone build up on previous days

Wind Trajectories (September 16)



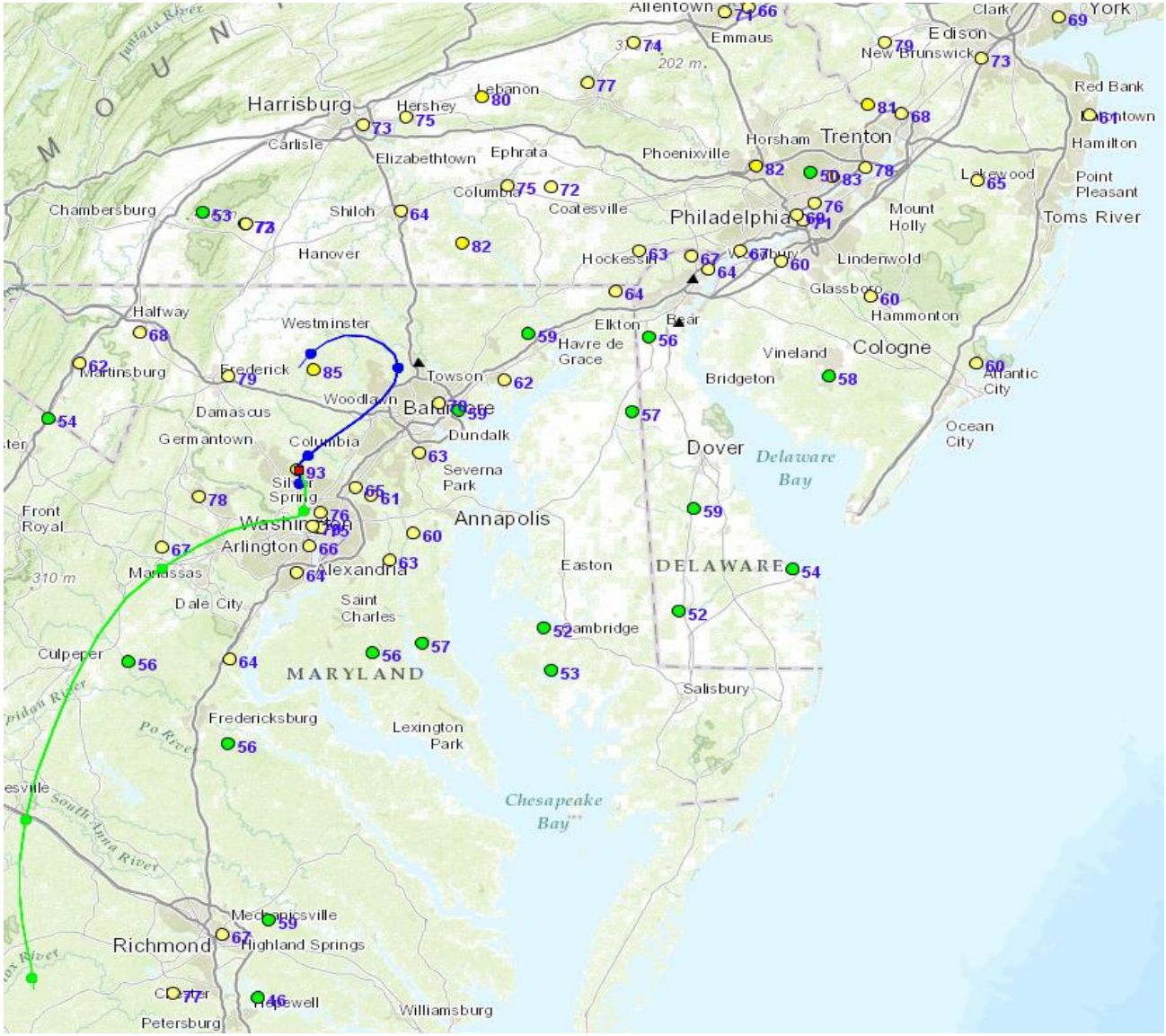
Wind Trajectories (September 17)



500 m

1500 m

Wind Trajectories (September 18)



500 m

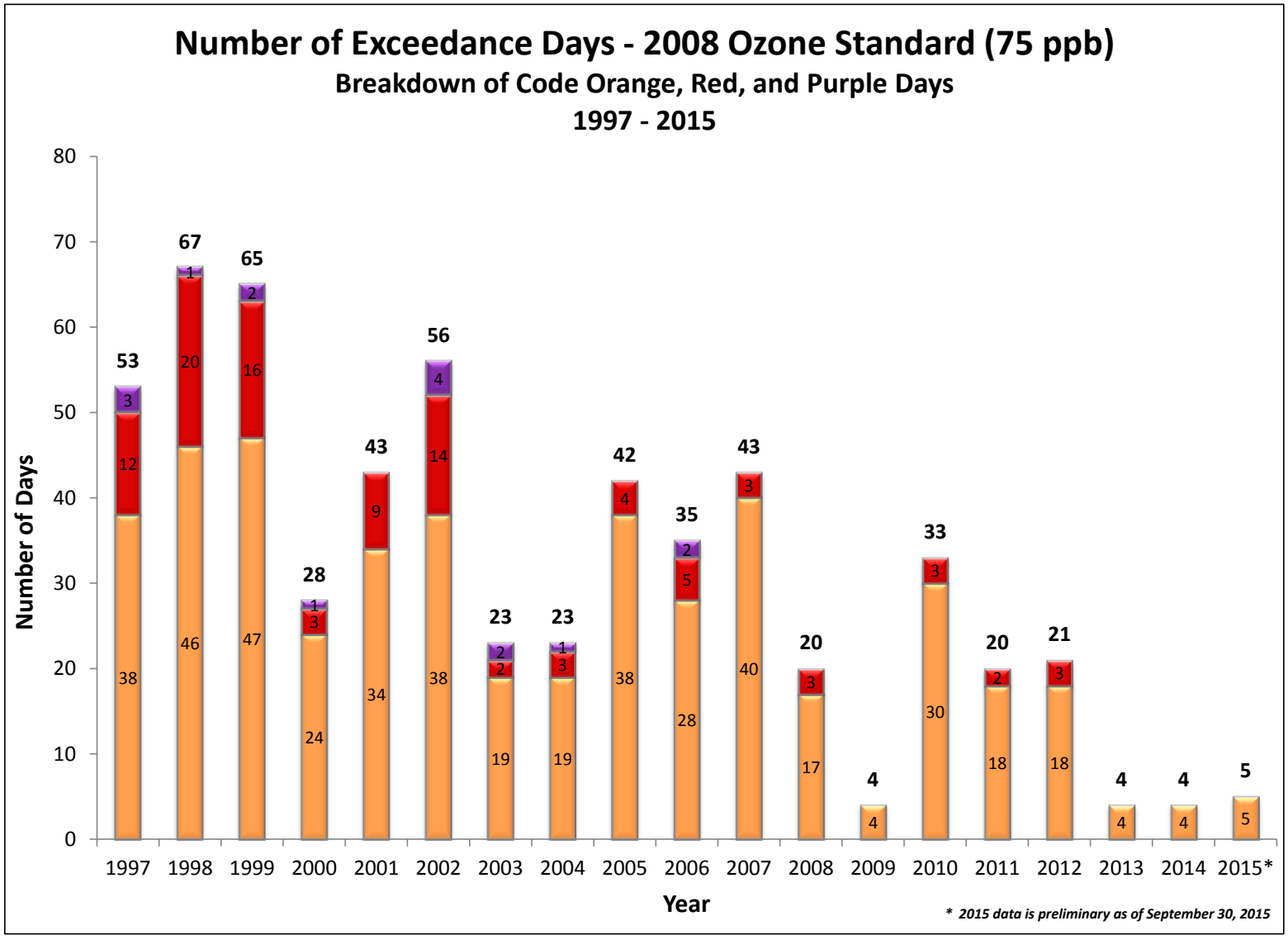
1500 m

2015 Ozone Exceedances

Date	Monitors Exceeding	Highest Monitor	8-Hr Max (ppb)
6/11	6	HU-Beltsville	88
9/2	1	Southern Maryland	77
9/16	7	Beltsville	81
9/17	4	Beltsville	82
9/18	2	Rockville	78

***Analysis is based on draft data as of October 13, 2015 and is subject to change.**

Exceedance Trend (2008 Ozone NAAQS)

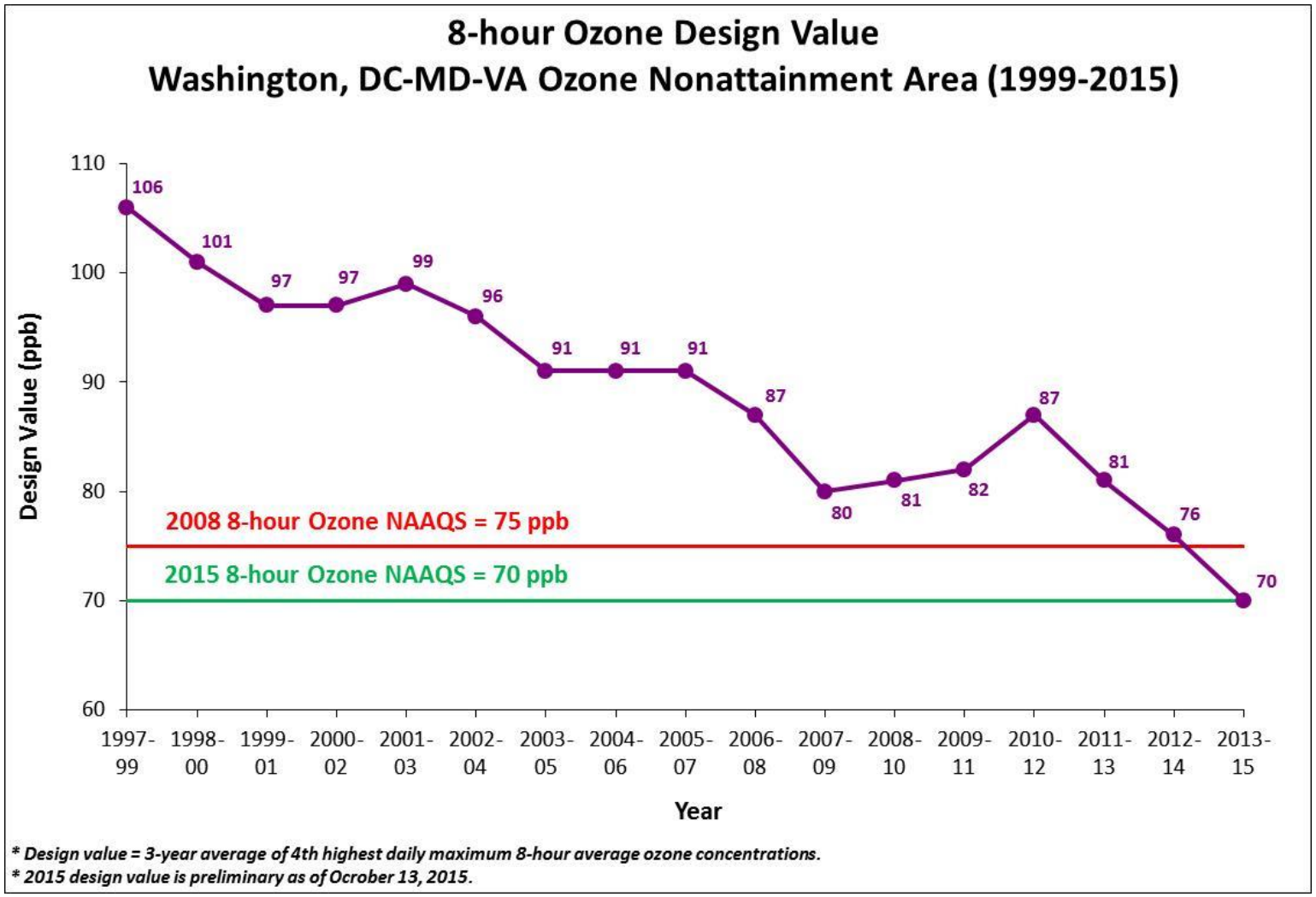


Why Fewer Exceedance Days Now ?

Emission Control Programs

Federal	State	Local
Acid Rain Program (1996/2000)	Vehicle Inspection and Maintenance Programs	Renewable Energy Programs Regional Wind Power Purchase Program Clean Energy Rewards Program Renewable Portfolio Standards
Tier 2 (LD Vehicle) Rule (2004)	MD Healthy Air Act (2009/2012)	Energy Efficiency Programs LED Traffic Signal Retrofit Program Building Energy Efficiency Programs
HD Diesel Vehicle Rule (2004/2007)	VA CSAPR Rule	VRE Idling Reduction
NOx SIP Call (2004)		Low VOC Paint
Clean Air Interstate Rule/CSAPR (2009/2015)	Ozone Transport Commission Rules	Gas Can Replacement

Ozone Design Value Trend



Fine Particle Summary

24-hour $PM_{2.5}$ Concentrations (µg/m³)

APRIL 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
		1	2	3	4	5
		10.5	11.4	16.6	7.5	6.8
6	7	8	9	10	11	12
10.1	16.7	9.6	12.1	12.7	8.2	9.1
13	14	15	16	17	18	19
11.6	13.4	8.9	10.0	13.5	17.2	13.9
20	21	22	23	24	25	26
12.7	11.3	12.5	9.0	7.6	11.0	10.9
27	28	29	30			
10.9	11.0	13.2	16.3			

MAY 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
				1	2	3
				13.1	14.3	19.2
4	5	6	7	8	9	10
21.2	24.4	21.5	16.7	18.7	12.7	17.4
11	12	13	14	15	16	17
20.5	9.7	6.6	5.7	8.5	14.8	11.3
18	19	20	21	22	23	24
12.2	10.6	8.4	8.5	8.4	6.6	11.5
25	26	27	28	29	30	31
14.1	13.5	11.2	12.7	13.5	8.7	12.2

JUNE 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1	2	3	4	5	6	7
9.7	4.9	6.8	7.7	6.5	9.9	9.6
8	9	10	11	12	13	14
10.0	11.5	24.6	32.5	17.2	14.2	13.9
15	16	17	18	19	20	21
10.5	8.8	10.5	8.8	12.4	11.7	8.1
22	23	24	25	26	27	28
10.3	15.0	6.0	11.4	13.6	5.7	5.1
29	30					
8.2	10.9					

JULY 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
		1	2	3	4	5
		14.1	21.4	16.2	24.1	17.8
6	7	8	9	10	11	12
7.9	14.5	14.7	6.8	9.7	14.0	14.8
13	14	15	16	17	18	19
12.9	8.8	4.6	4.9	10.4	9.3	15.2
20	21	22	23	24	25	26
12.1	10.9	6.0	8.0	7.8	10.7	15.0
27	28	29	30	31		
10.9	9.3	10.8	9.7	8.6		

AUGUST 2015

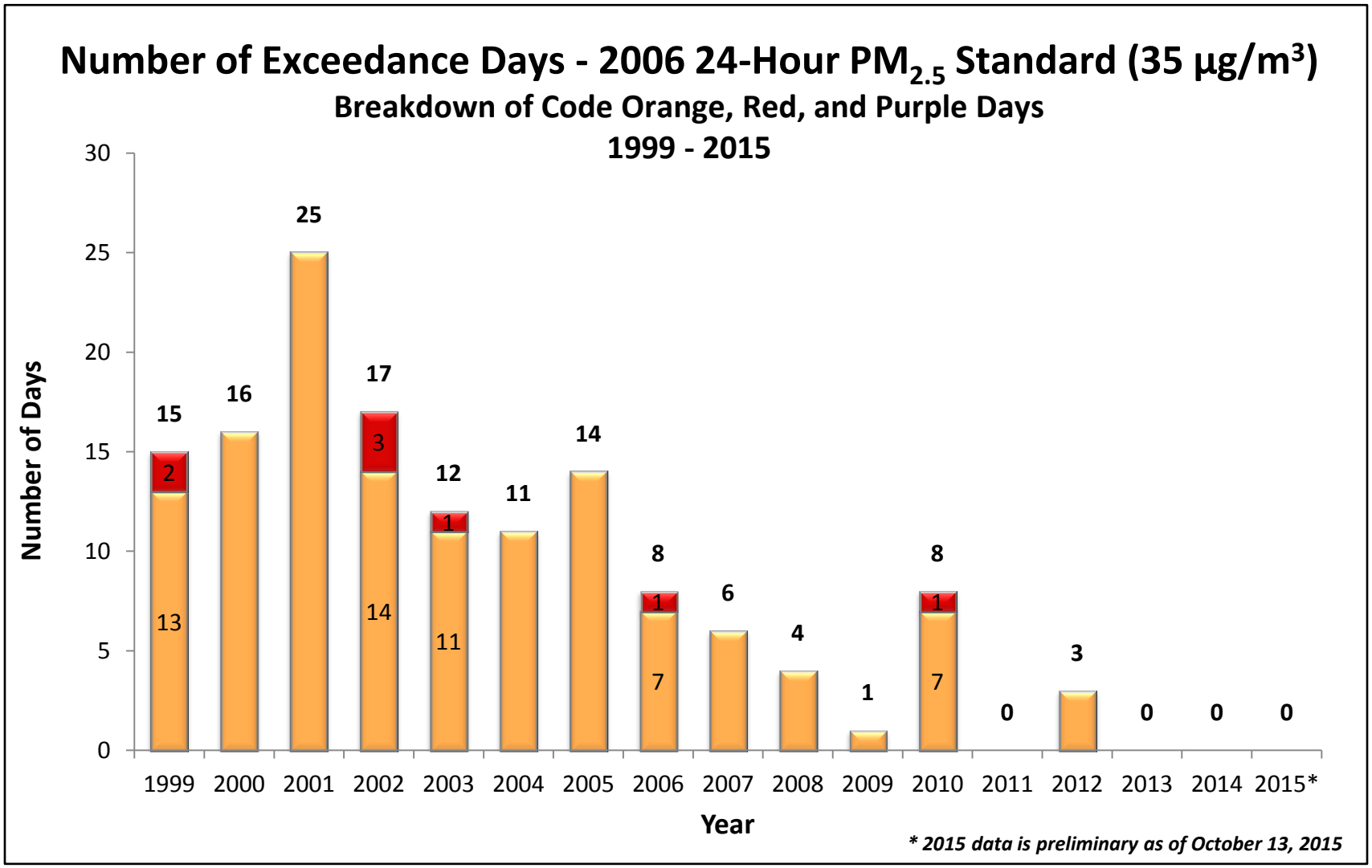
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
					1	2
					11.4	12.4
3	4	5	6	7	8	9
10.7	11.3	10.9	10.7	10.8	9.0	10.2
10	11	12	13	14	15	16
9.3	10.9	6.8	5.9	9.3	12.5	15.8
17	18	19	20	21	22	23
14.1	17.1	12.4	9.2	7.4	8.7	8.7
24	25	26	27	28	29	30
12.7	9.7	10.0	8.8	11.4	12.6	15.7
31						
17.2						

SEPTEMBER 2015

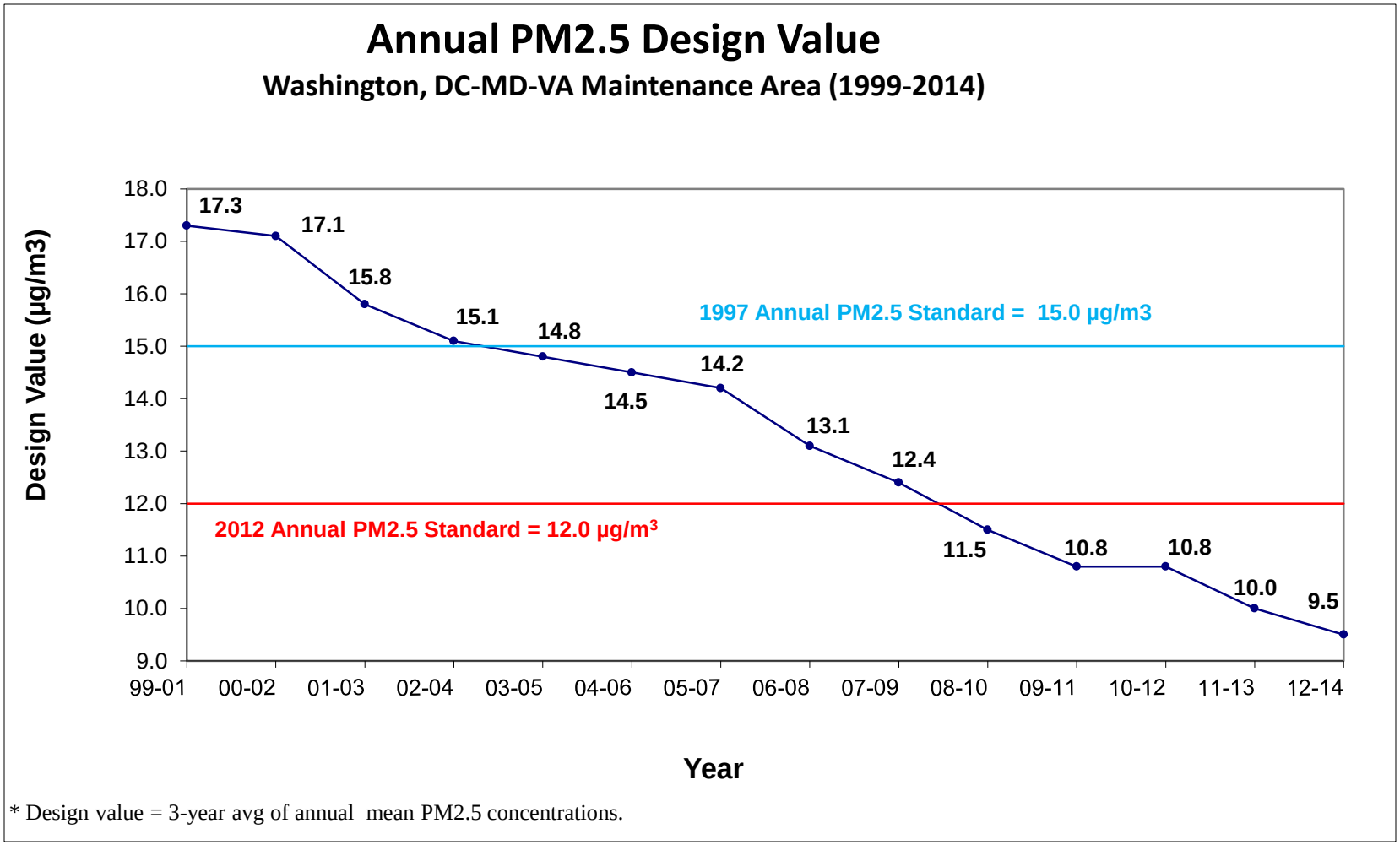
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
	1	2	3	4	5	6
	18.1	26.7	21.7	27.7	15.8	8.2
7	8	9	10	11	12	13
9.7	9.7	8.8	8.2	7.0	9.5	5.7
14	15	16	17	18	19	20
7.2	8.9	12.7	14.6	12.6	11.4	5.9
21	22	23	24	25	26	27
6.8	7.2	7.6	7.8	8.1	7.0	5.2
28	29	30				
8.2	6.3	4.2				

**** Since April 1, 2015, there have been 69 Code Yellow Days and 114 Code Green Days***

$PM_{2.5}$ Exceedance Trend

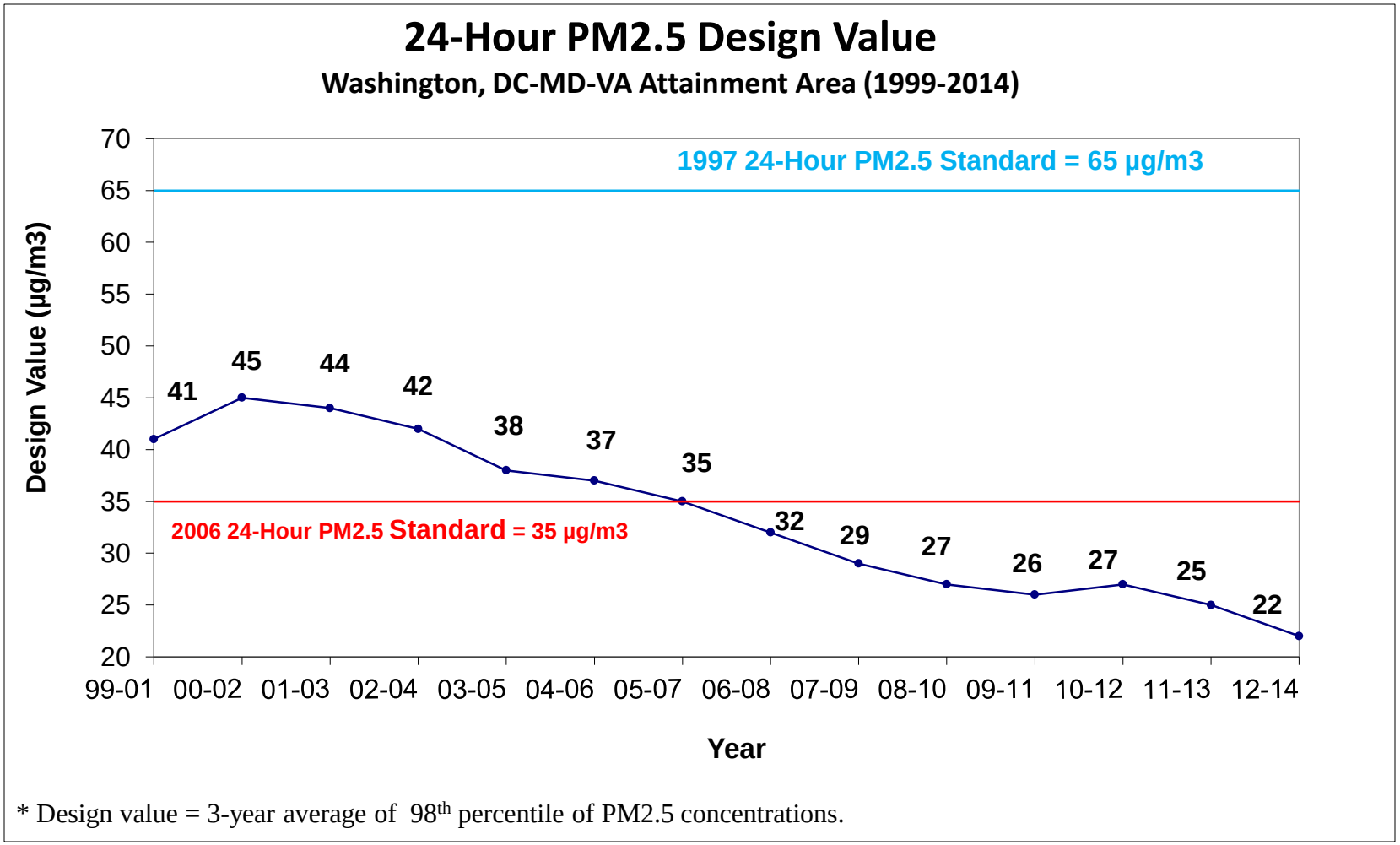


Annual $PM_{2.5}$ Design Value Trend



* Design value = 3-year avg of annual mean PM2.5 concentrations.

24-Hour $PM_{2.5}$ Design Value Trend



* Design value = 3-year average of 98th percentile of PM2.5 concentrations.

EPA's New Ozone Standard

- October 1, 2015 - EPA announced revisions to 2008 primary & secondary 8-hour ozone standards

  (75 parts per billion, ppb)
  - Primary standard: Public health; Sec. standard: Public welfare (Plants & trees)
- Revised Pr./Sec. 8-hour ozone standards = **70 ppb**
- EPA extended ozone monitoring season by 1 month
- EPA updated the Air Quality Index (AQI) for ozone

Reasons for Revision of Standards

EPA's revision of 2008 ozone standards is based on following key scientific evidence:

- Evidence from a large number of clinical and epidemiological studies – 2008 standard (75 ppb) not adequate to protect public health
- Ozone causes adverse respiratory effects in healthy adults
- Children, people with asthma and other respiratory diseases, and older adults likely to experience more serious effects than healthy people
- People with certain health conditions, such as obesity or diabetes, may be at increased risk of ozone-related health effects
- Recent studies consistently report associations between ozone exposures and mortality from respiratory and cardiovascular causes

Benefits & Costs

- **Benefits** (Nationwide, excluding California)
  - $2.9 to $5.9 billion annually in 2025
  - Benefits include the value of avoiding asthma attacks, heart attacks, missed school days and premature deaths, among other health effects
- **Costs** (Nationwide, excluding California)
  - $1.4 billion annually in 2025

Revised Air Quality Index (AQI)
2015 Ozone NAAQS

AQI Category	Index Values	2008 AQI Breakpoints (ppb, 8-hour average)	2015 AQI Breakpoints (ppb, 8-hour average)
Good	0 - 50	0 - 59	0 - 54
Moderate	51 - 100	60 - 75	55 - 70
Unhealthy for Sensitive Groups	101 – 150	76 - 95	71 - 85
Unhealthy	151 – 200	96 - 115	86 - 105
Very Unhealthy	201 – 300	116 - 374	106 - 200
Hazardous	301 –500	375 to the Significant Harm Level*	201 to the Significant Harm Level*

**The Significant Harm Level for ozone is 600 ppb, two-hour average*

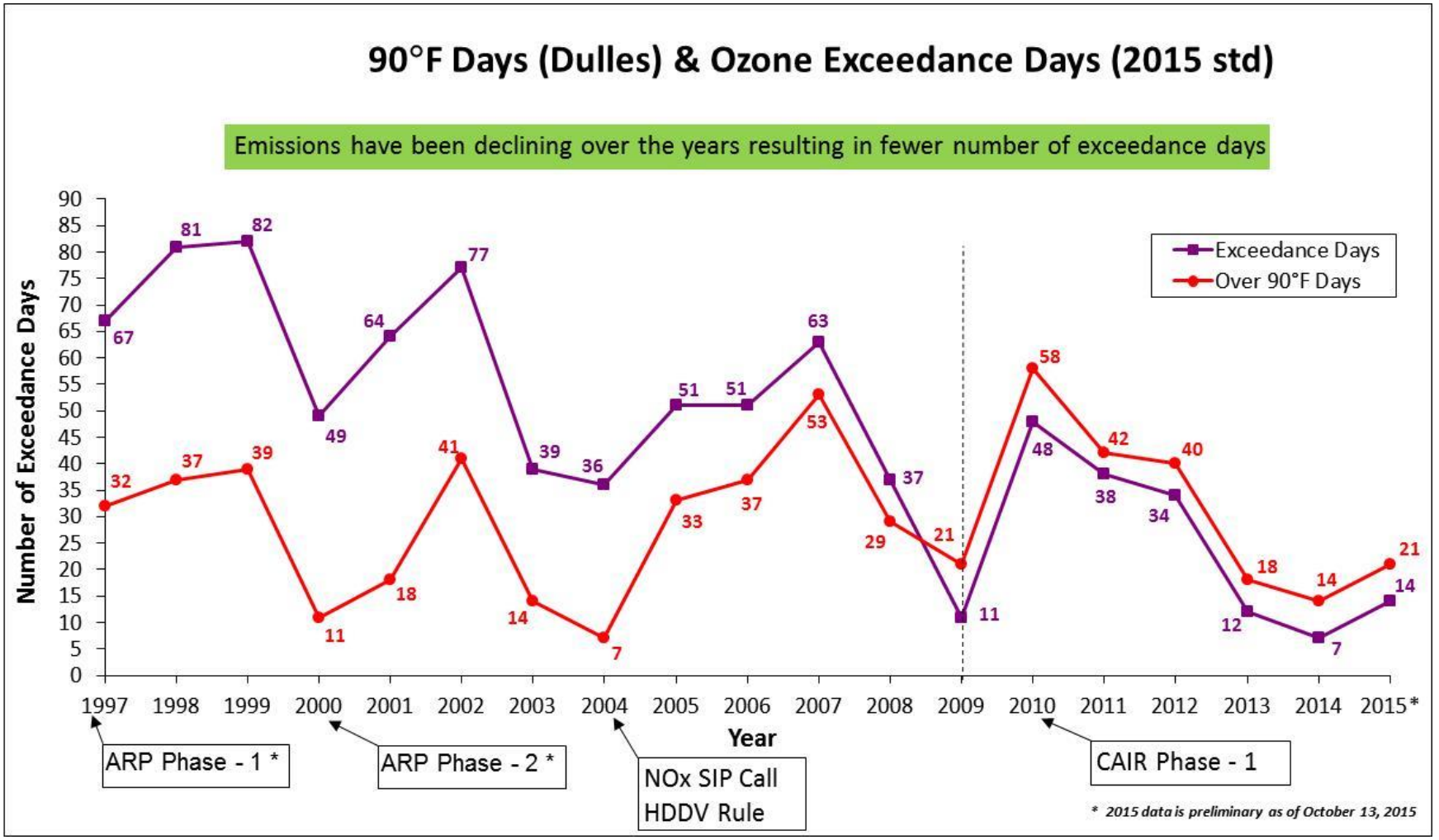
Changes – Ozone Monitoring

- **Extension in ozone monitoring season**
  - Lower threshold for code orange means ozone needs to be monitored in Spring and early Fall months to alert citizens
  - EPA extended the ozone monitoring season by one month
  - Ozone monitors located at the multi-pollutant NCore monitoring sites would be required to operate year round
  - The expanded monitoring season requirements would become effective January 1, 2017
  - A new monitoring method is being introduced

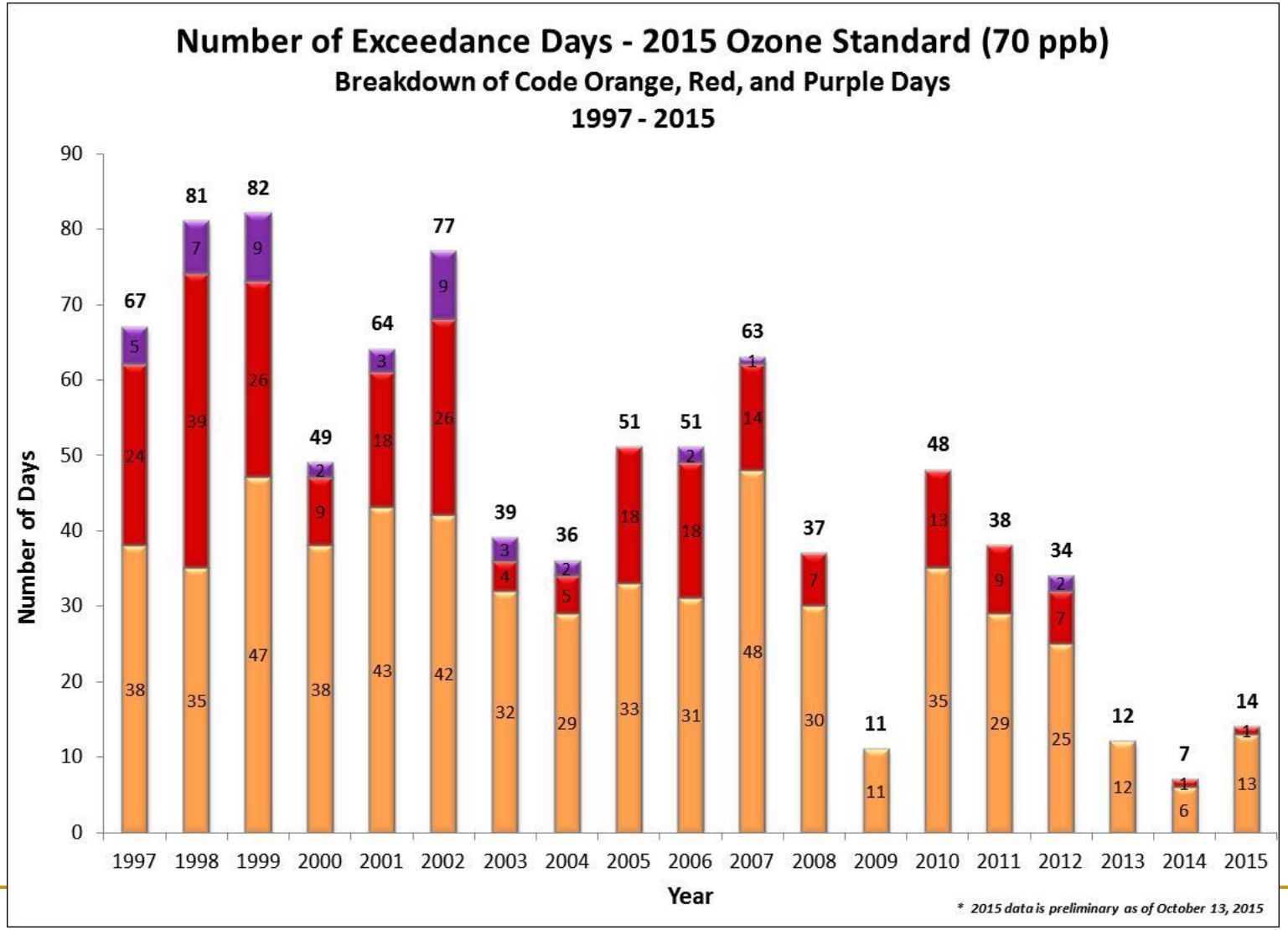
Implementation Schedule

Milestone	2015 Ozone Standard
Final Rule Announced	October 1, 2015
State Designation Recommendations to EPA	October 1, 2016
EPA Response to State Designation Recommendations	June 1, 2017
Final Designations	October 1, 2017 (Likely based on 2014-16 data)
Attainment Demonstration SIPs Due	2020/2021 (for Moderate and above NAA)
Attainment Dates	2020-2037 (depends on level of nonattainment designation) Marginal NAA – October 1, 2020

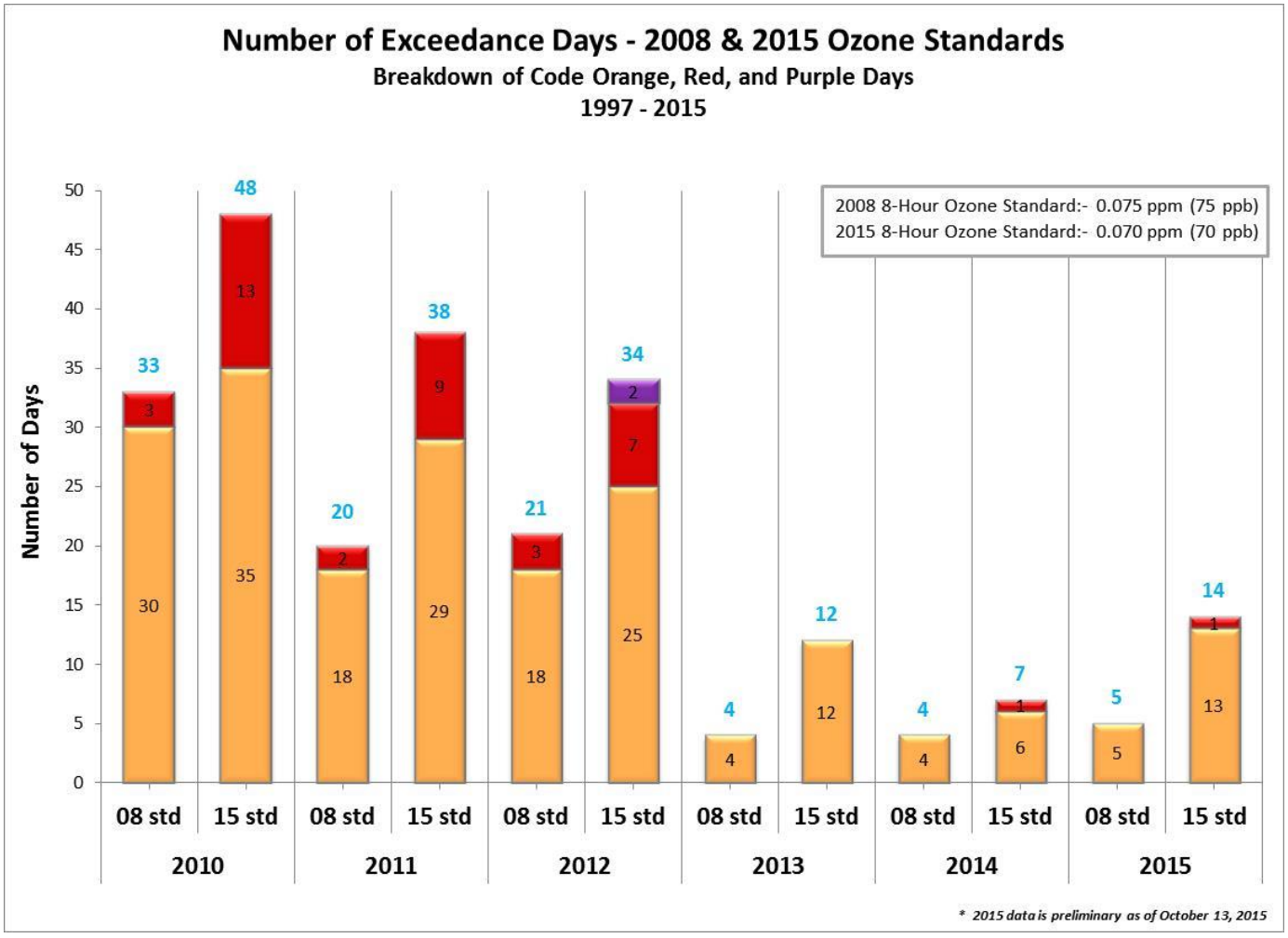
Trends of 90°F Days and Exceedance Days



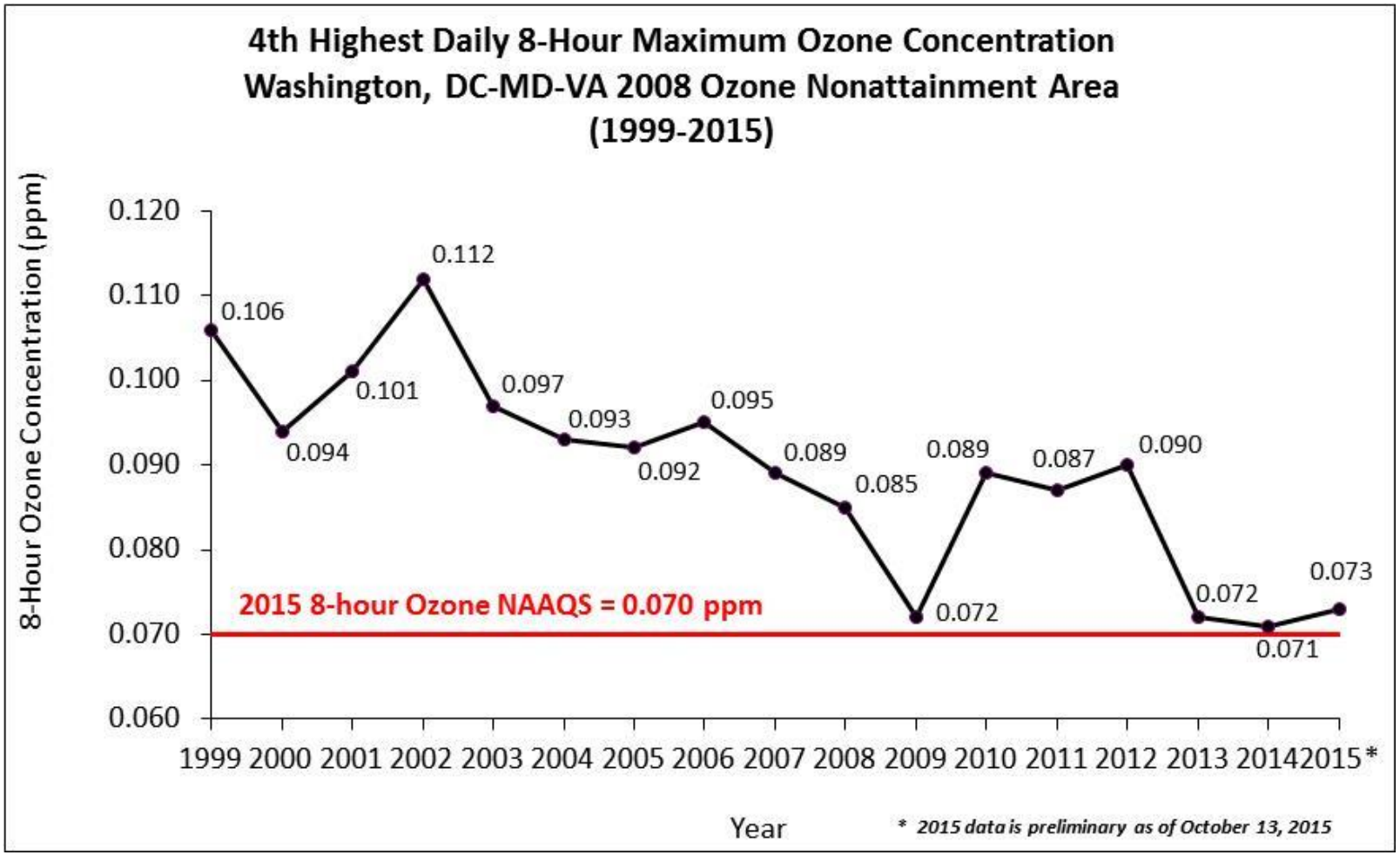
Exceedance Trend (2015 Ozone NAAQS)



Exceedances for 2008 & 2015 Ozone Standards



Trend in Fourth Highest Daily Maximum Ozone Levels
(Washington Region)



What Would It Take to Get Designated as Nonattainment for 2015 Ozone NAAQS

MONITOR	4th Highest Daily 8-Hour Max Ozone Concentration in 2016 (ppm)
Takoma	0.072
McMillian NCore	0.073
Calvert	0.076
S. Maryland	0.078
Frederick	0.080
Rockville	0.077
PG Equestrian	0.075
HU- Beltsville	0.076
Beltsville	0.077
Arlington	0.069
Franconia	0.076
Ashburn	0.079
Long Park	0.084

Ozone Levels - 2025

Current control measures to help in attaining standard

- Mercury and Air Toxics Standards
- Requirements to reduce the interstate transport of air pollution
- Regional Haze regulations
- Clean Power Plan
- Tier 3 Vehicle Emissions and Fuels Standards
- Light-Duty Vehicle Tier 2 Rule
- Mobile Source Air Toxics Rule
- Light-Duty & Heavy-Duty Greenhouse Gas/Corporate Average Fuel Efficiency Standards
- Reciprocating Internal Combustion Engines (RICE) Rule
- Industrial/Commercial/Institutional Boilers and Process Heaters Rules