

OZONE SEASON SUMMARY 2018

Sunil Kumar
Principal Environmental Engineer

MWAQC-TAC Meeting
November 13, 2018

Peak 8-Hour Average Ozone Levels (ppb)

March 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
25	26	27	28	01	02	03
				34	45	46
04	05	06	07	08	09	10
47	46	39	38	44	41	48
11	12	13	14	15	16	17
50	40	47	41	48	44	43
18	19	20	21	22	23	24
50	55	39	48	49	53	51
25	26	27	28	29	30	31
48	47	48	33	54	41	50
01	02	03	04	05	06	07

April 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01	02	03	04	05	06	07
48	45	40	48	51	61	51
08	09	10	11	12	13	14
52	50	54	56	59	70	57
15	16	17	18	19	20	21
44	36	44	52	50	56	56
22	23	24	25	26	27	28
61	59	53	48	57	53	61
29	30	01	02	03	04	05
46	60					

May 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	01	02	03	04	05
		70	73	64	68	53
06	07	08	09	10	11	12
46	63	62	70	56	65	63
13	14	15	16	17	18	19
35	46	56	34	25	37	23
20	21	22	23	24	25	26
50	58	41	52	71	61	52
27	28	29	30	31	01	02
51	28	46	27	34		
03	04	05	06	07	08	09

June 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01	02	03	04	05	06	07
65	50	26	43	56	44	55
08	09	10	11	12	13	14
65	64	46	35	52	44	55
15	16	17	18	19	20	21
61	67	67	85	51	54	56
22	23	24	25	26	27	28
36	40	47	49	57	37	57
29	30	01	02	03	04	05
69	80					
06	07	08	09	10	11	12

Peak 8-Hour Average Ozone Levels (ppb)

July 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01	02	03	04	05	06	07
69	67	76	59	37	47	60
08	09	10	11	12	13	14
60	92	84	68	65	62	60
15	16	17	18	19	20	21
59	73	62	50	68	70	37
22	23	24	25	26	27	28
41	39	31	41	59	61	55
29	30	31	01	02	03	04
59	44	37				

August 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	31	01	02	03	04
			42	26	27	50
05	06	07	08	09	10	11
56	67	59	62	56	73	55
12	13	14	15	16	17	18
51	55	48	60	64	55	49
19	20	21	22	23	24	25
42	38	39	51	39	54	55
26	27	28	29	30	31	01
55	63	65	62	60	56	

September 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
06	07	08	09	10	11	12
						40
02	03	04	05	06	07	08
56	47	62	65	69	68	24
09	10	11	12	13	14	15
31	25	16	27	20	22	28
16	17	18	19	20	21	22
29	28	33	50	50	32	37
23	24	25	26	27	28	29
34	32	31	44	29	42	52
30	01	02	03	04	05	06
46						

October 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	01	02	03	04	05	06
	47	49	45	40	21	30
07	08	09	10	11	12	13
36	39	36	35	24	36	37
14	15	16	17	18	19	20
27	31	31	38	36	40	36
21	22	23	24	25	26	27
30	31	43	28	31	33	26
28	29	30	31	01	02	03
33	30	35	42			
04	05	06	07	08	09	10

1 Code Red Day, 8 Code Orange Days, 77 Code Yellow Days, Rest Code Green Days

Analysis is based on draft data as of November 9, 2018. Data is subject to change

2018 Ozone Exceedances

Date	Monitors Exceeding	Highest Monitor	8-Hr Max (ppb)
5/2	1	Beltsville	73
5/24	1	Franconia	71
6/18	3	Beltsville	85
6/30	5	Beltsville	80
7/3	4	Takoma	76
7/9	6	HU-Beltsville	92
7/10	4	Calvert	84
7/16	3	HU-Beltsville/ Beltsville	73
8/10	1	PG Equestrian Center	73

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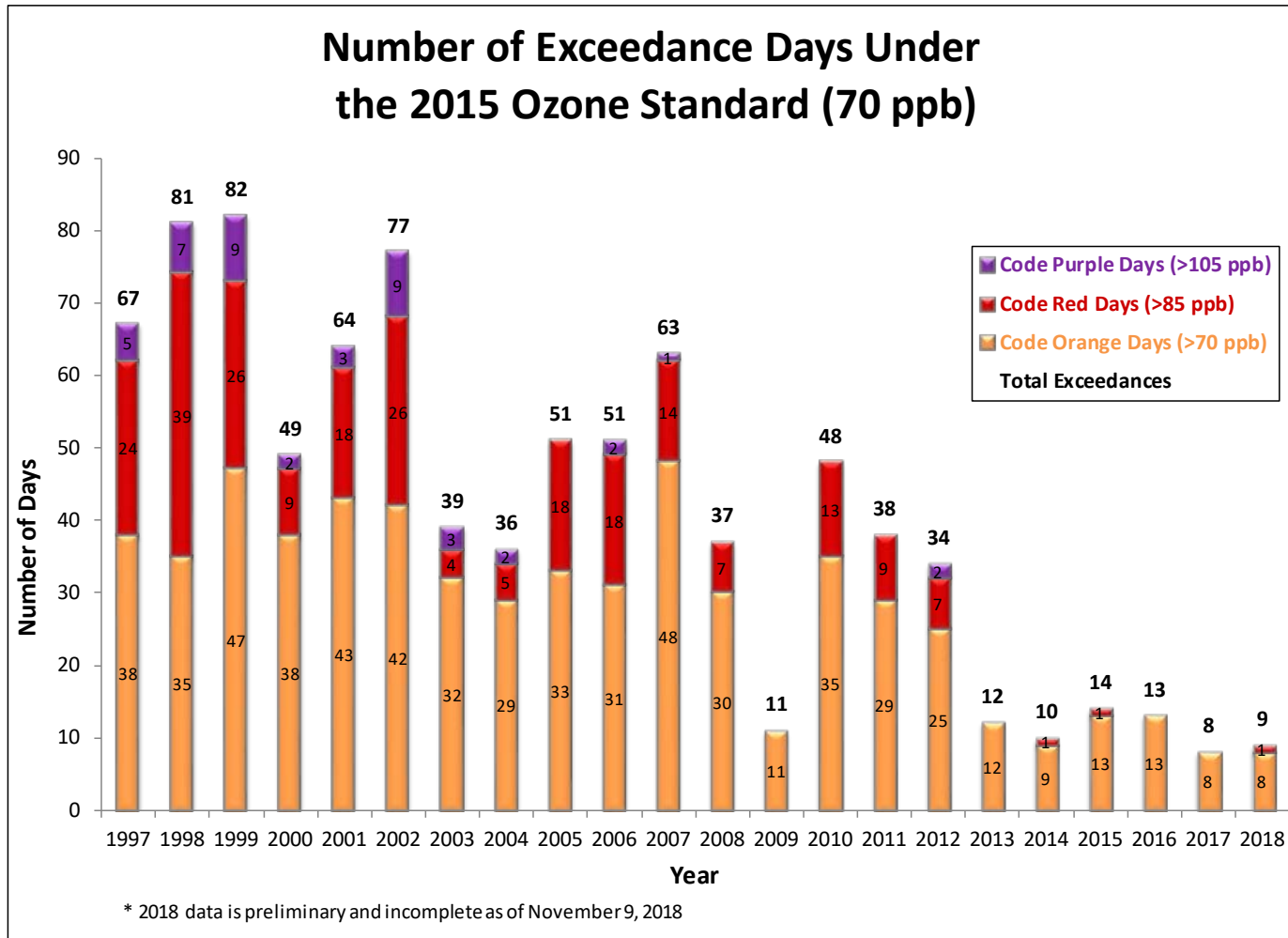
Meteorology on Exceedance Days

Exceedances seem influenced by both transported & local emissions

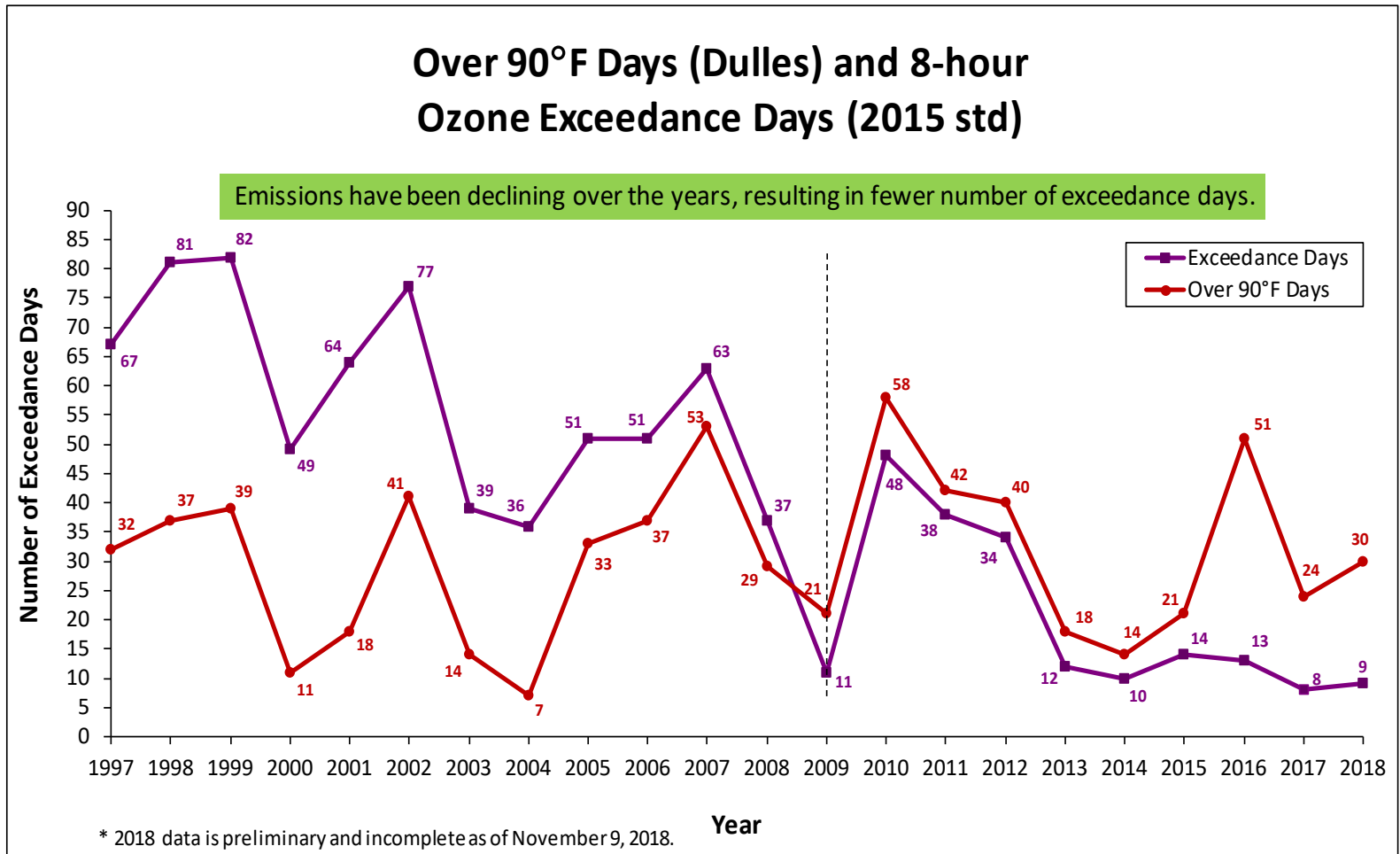
- High Temperatures: 83°F - 94°F
- Clear sky
- Light winds brought some ozone from upstream areas
- Recirculation of polluted air
- Ozone build up on previous days



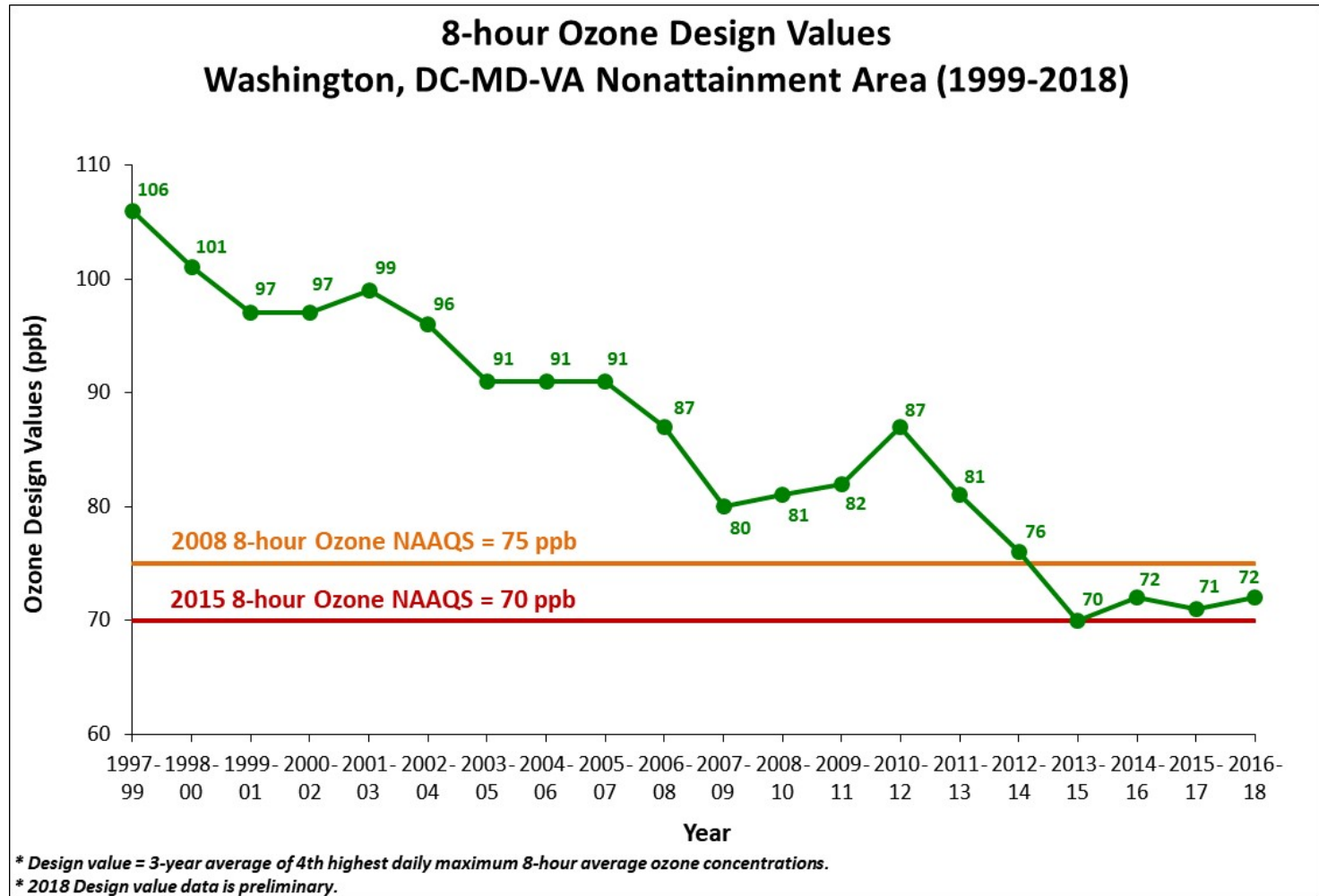
Ozone Exceedance Trend



Ozone & Temperature Trend



Ozone Design Value Trend



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



24-Hour Average PM2.5 Levels ($\mu\text{g}/\text{m}^3$)

March 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
25	26	27	28	01	02	03
				21.9	7.9	9.5
04	05	06	07	08	09	10
7.6	7.7	14.9	10.8	10.2	10.5	15.0
11	12	13	14	15	16	17
16.2	16.4	11.9	10.2	14.5	10.7	11.7
18	19	20	21	22	23	24
12.5	18.7	15.4	12.2	9.1	10.7	9.1
25	26	27	28	29	30	31
16.3	11.8	12.6	19.2	23.4	13.0	9.0
01	02	03	04	05	06	07

April 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01	02	03	04	05	06	07
9.9	12.2	20.3	10.1	8.1	11.6	8.1
08	09	10	11	12	13	14
10.3	13.3	17.1	16.0	20.3	23.1	23.5
15	16	17	18	19	20	21
12.7	6.1	7.4	10.1	11.1	8.1	9.8
22	23	24	25	26	27	28
10.1	10.1	9.1	5.8	8.8	9.6	15.9
29	30	01	02	03	04	05
8.0	9.6					

May 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	01	02	03	04	05
		17.5	23.9	30.1	33.9	11.8
06	07	08	09	10	11	12
14.5	11.2	10.2	11.7	12.5	13.6	19.7
13	14	15	16	17	18	19
12.1	14.6	12.6	9.6	6.6	5.2	7.7
20	21	22	23	24	25	26
9.7	10.0	10.7	9.7	11.7	15.7	12.9
27	28	29	30	31	01	02
9.5	10.8	19.1	6.6	9.6	8.6	10.3
03	04	05	06	07	08	09

June 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	31	01	02
					8.6	10.3
03	04	05	06	07	08	09
7.0	7.1	8.9	8.6	11.3	14.2	15.3
10	11	12	13	14	15	16
11.7	8.1	9.6	12.0	7.5	6.2	8.5
17	18	19	20	21	22	23
13.3	17.7	14.0	7.4	6.7	8.4	5.0
24	25	26	27	28	29	30
6.0	7.0	8.5	8.4	9.2	14.1	16.2
01	02	03	04	05	06	07



24-Hour Average PM2.5 Levels ($\mu\text{g}/\text{m}^3$)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01	02	03	04	05	06	07
17.0	17.7	20.0	25.5	7.7	9.2	4.5
08	09	10	11	12	13	14
6.9	9.5	10.0	12.2	10.6	10.6	8.2
15	16	17	18	19	20	21
12.7	18.9	13.5	6.9	8.6	10.4	4.6
22	23	24	25	26	27	28
4.2	8.9	5.5	6.7	11.3	12.8	8.0
29	30	31	01	02	03	04
9.1	10.7	6.2				

September 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	01
						8.2
02	03	04	05	06	07	08
7.0	11.2	14.5	16.2	12.5	10.1	6.6
09	10	11	12	13	14	15
2.3	6.2	6.3	15.6	4.7	5.1	5.2
16	17	18	19	20	21	22
7.5	7.5	5.3	12.3	10.8	8.2	9.9
23	24	25	26	27	28	29
7.5	6.2	9.8	7.9	7.5	7.5	11.8
30	01	02	03	04	05	06
12.2						

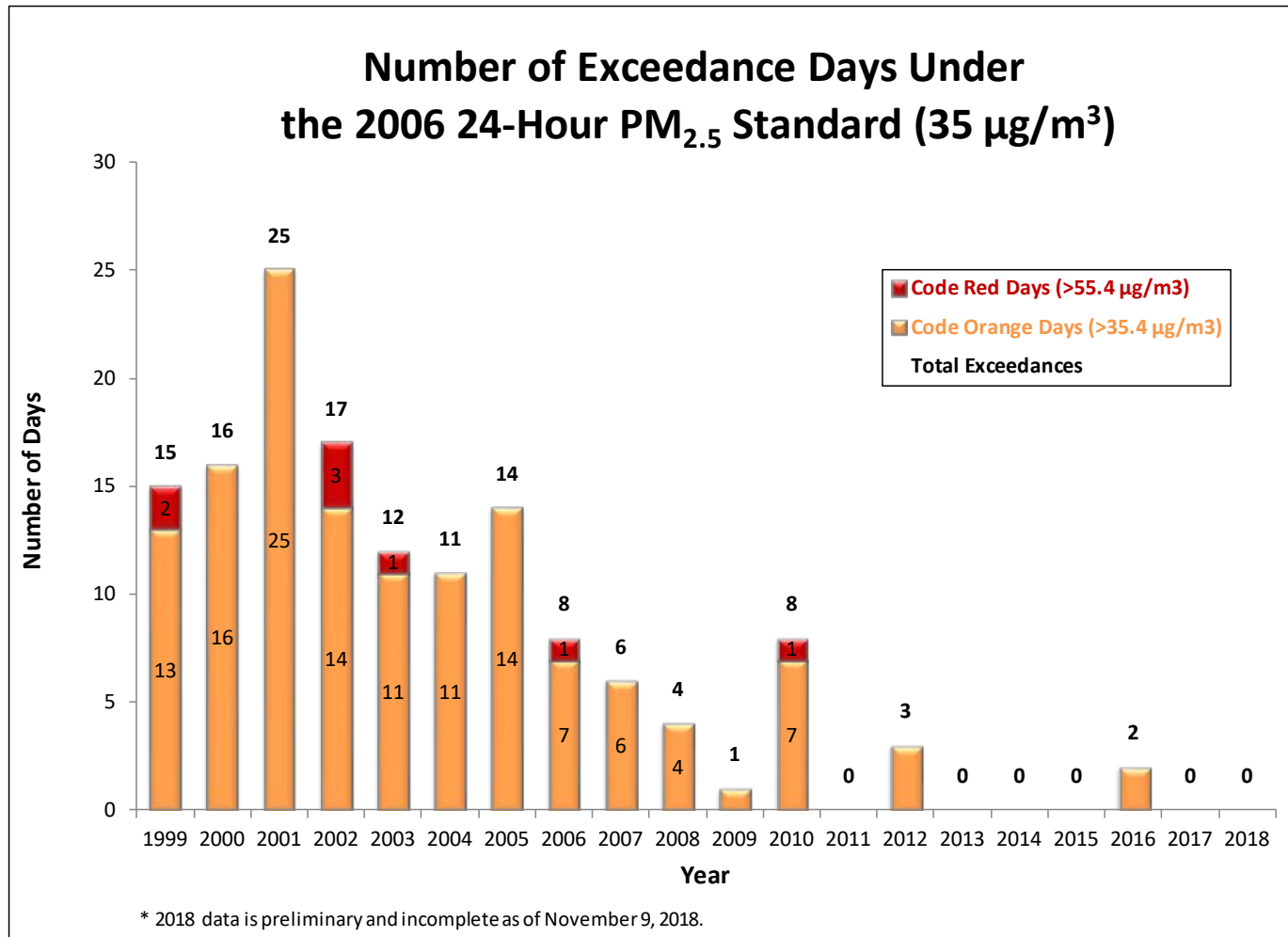
August 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	31	01	02	03	04
			6.5	6.3	6.1	7.7
05	06	07	08	09	10	11
12.5	15.4	14.8	10.7	9.0	13.6	16.9
12	13	14	15	16	17	18
13.5	9.4	8.0	13.4	16.7	19.3	8.6
19	20	21	22	23	24	25
6.8	7.2	5.8	11.5	9.0	10.7	10.1
26	27	28	29	30	31	01
11.4	24.1	22.1	17.5	9.2	9.3	
02	03	04	05	06	07	08

October 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	01	02	03	04	05	06
	12.1	13.5	13.5	14.6	11.0	19.8
07	08	09	10	11	12	13
20.4	16.4	12.8	11.2	8.2	9.3	9.0
14	15	16	17	18	19	20
11.8	13.2	8.5	11.5	9.4	11.4	11.1
21	22	23	24	25	26	27
8.7	9.5	11.4	8.7	10.3	11.8	6.6
28	29	30	31	01	02	03
7.8	8.4	11.0	13.8			

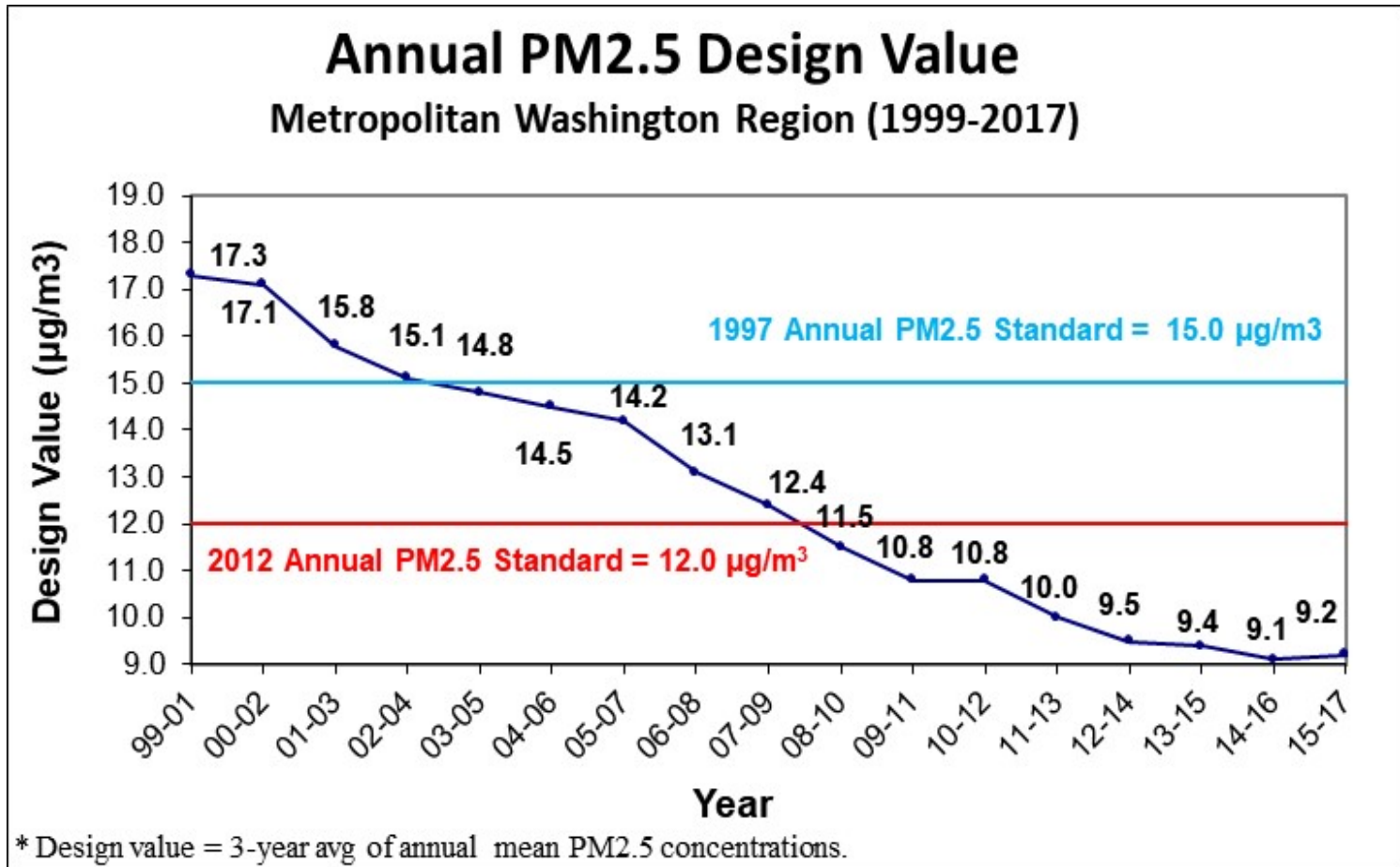
No Code Orange Day, only Code Yellow or Green Days

Analysis is based on draft data as of November 9, 2018. Data is subject to change

PM2.5 Exceedance Trend



Annual PM2.5 Design Value Trend



24-Hour PM2.5 Design Value Trend

