2022 OZONE SEASON UPDATE

Sunil Kumar Principal Environmental Engineer

Metropolitan Washington Air Quality Committee September 28, 2022



Peak 8-Hour Average Ozone Levels (ppb)

Ma	rch	2022					Ар	ril	2022					Ma	ау	2022)			
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	01	02	03	04	05	27	28	29	30	31	01	02	01	02	03	04	05	06	07
		47	47	46	44	48						42	49							45
06	07	08	09	10	11	12	03	04	05	06	07	08	09	08	09	10	11	12	13	14
43	38	46	43	43	47	46	47	48	39	41	39	49	39	49	62	63	53	39	24	29
13	14	15	16	17	18	19	10	11	12	13	14	15	16	15	16	17	18	19	20	21
44	52	57	58	43	52	44	42	46	51	57	46	59	57	43	48	60	47	54	63	62
20	21	22	23	24	25	26	17	18	19	20	21	22	23	22	23	24	25	26	27	28
42	53	55	43	26	47	42	44	32	39	48	50	61	60	55	45	36	40	30	34	41
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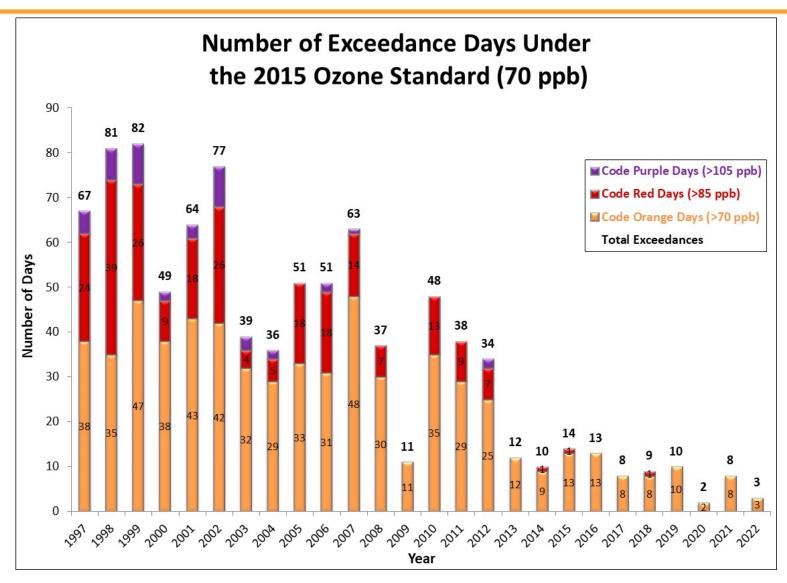
3 Code Orange days, 64 Code Yellow Days, rest all Code Green Days

Analysis is based on draft data as of September 16, 2022.



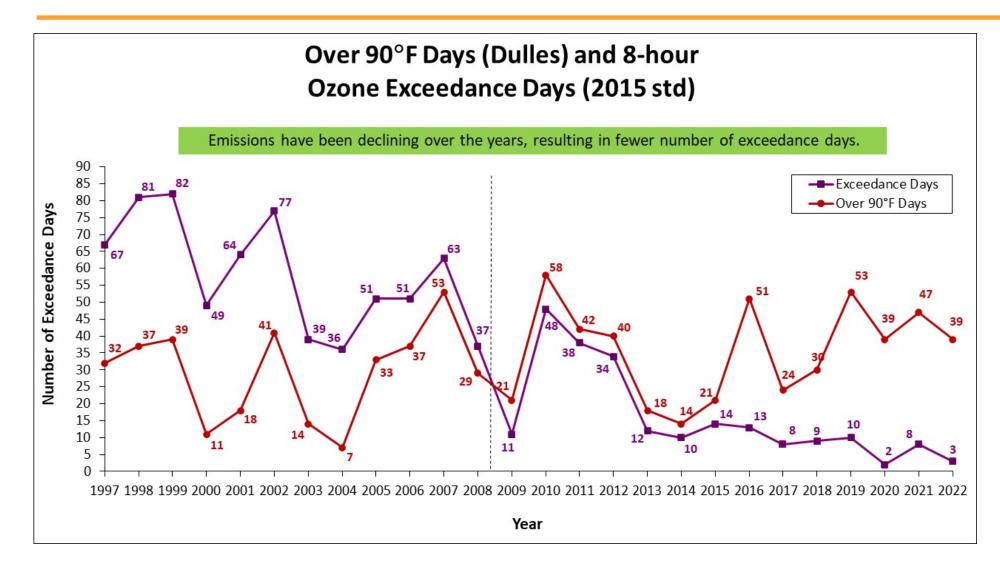
Sel	o te m b e r	2022				
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Ozone Exceedance Trend



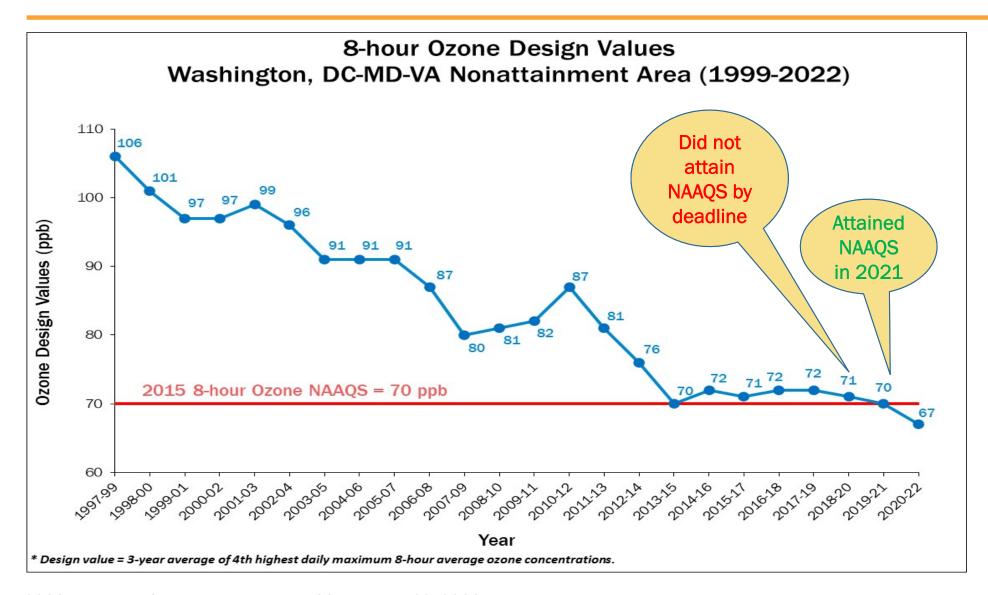


Ozone & Temperature Trend





Ozone Design Value Trend





24-Hour Average PM2.5 Levels (µg/m³)

Ma	rch	2022					Ар	ril	2022					Ma	ау	2022)			
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	01	02	03	04	05	27	28	29	30	31	01	02	01	02	03	04	05	06	07
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06	07	08	09	10	11	12	03	04	05	06	07	08	09	08	09	10	11	12	13	14
16.2	9.3	7.5	6.6	12.3	12.3	9.1	8.1	11.8	11.4	4.9	5.4	6.9	4.6	7.3	8.3	8.1	10.5	8.2	6.7	5.8
13	14	15	16	17	18	19	10	11	12	13	14	15	16	15	16	17	18	19	20	21
9.2	9.0	10.1	13.1	17.5	13.3	9.2	5.4	8.1	6.5	12.8	9.4	6.2	8.0	6.8	8.2	7.7	7.2	9.5	18.2	15.2
20	21	22	23	24	25	26	17	18	19	20	21	22	23	22	23	24	25	26	27	28
4.0	7.5	11.5	7.6	11.7	9.3	5.2	6.7	5.7	6.2	6.2	7.8	9.5	10.4	12.4	6.2	6.8	5.9	7.5	8.5	5.3
27	28	29	30	31			24	25	26	27	28	29	30	29	30	31				
5.8	7.1	8.8	11.3	10.8			11.4	12.3	12.0	8.2	5.6	7.5	9.1	8.6	11.7	15.5				
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Sunday 29 05	Monday 30 06	Tuesday 31	Wednesday 01 15.1 08	02 17.3 09	7.1	14.5	Sunday 26 03	Monday 27 04	Tuesday 28	Wednesday 29 06	30	14.5 08	02 8.9 09	Sunday 31	Monday 01 7.9	Tuesday 02 9.0 09	Wednesday 03 9.4	12.4 11	9.8 12	7.2
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Sunday 29 05	Monday 30 06 11.5 13 13.2	Tuesday 31 07 11.4 14 15.1	Wednesday 01 15.1 08 19.6 15 15.4	17.3 09 7.3 16 11.2	7.1 10 8.6 17 10.3	14.5 11 10.8 18 5.2	Sunday 26 03 14.9 10 9.5	Monday 27 04 46.3 11 10.0	28 05 17.5 12 9.0	29 06 9.1 13 10.0	9.0 14 9.9	01 14.5 08 8.6 15 12.0	02 8.9 09 8.0 16 11.1	Sunday 31	Monday 01 7.9 08 9.3	Tuesday 02 9.0 09 8.1	Wednesday 03 9.4 10 8.3	12.4 11 7.0	9.8 12 5.9	7.2 13 5.3
Sunday 29 05 10.9 12 9.8	Monday 30 06 11.5 13 13.2	Tuesday 31 07 11.4 14 15.1 21	Wednesday 01 15.1 08 19.6 15 15.4 22	17.3 09 7.3 16 11.2	7.1 10 8.6 17 10.3	14.5 11 10.8 18 5.2	Sunday 26 03 14.9 10 9.5	Monday 27 04 46.3 11 10.0 18	28 05 17.5 12 9.0	29 06 9.1 13 10.0 20	30 07 9.0 14 9.9 21	01 14.5 08 8.6 15 12.0	02 8.9 09 8.0 16 11.1	Sunday 31 07 6.1 14 6.7 21	Monday 01 7.9 08 9.3 15 8.0	9.0 99.0 99.0 7.2 7.2	Wednesday 03 9.4 10 8.3 17 9.2 24	12.4 11 7.0 18 7.9	9.8 12 5.9 19 10.7 26	7.2 13 5.3
Sunday 29 05 10.9	Monday 30 06 11.5 13 13.2	Tuesday 31 07 11.4 14 15.1 21 11.0	Wednesday 01 15.1 08 19.6 15 15.4 22 16.3	17.3 09 7.3 16 11.2 23 6.6	7.1 10 8.6 17 10.3	14.5 11 10.8 18 5.2	Sunday 26 03 14.9 10 9.5 17 11.1	Monday 27 04 46.3 11 10.0 18 10.6	7 Tuesday 28 05 17.5 12 9.0 19 9.4	29 06 9.1 13 10.0 20 11.9	9.0 14 9.9 21 13.4	01 14.5 08 8.6 15 12.0 22 13.2	8.9 09 8.0 16 11.1 23 14.1	Sunday 31 07 6.1 14 6.7	Monday 01 7.9 08 9.3 15 8.0	9.0 9.0 9.0 7.2	9.4 10 8.3 17 9.2	12.4 11 7.0 18 7.9	9.8 12 5.9 19	7.2 13 5.3 20 8.5
Sunday 29 05 10.9 12 9.8 19 5.2 26	Monday 30 06 11.5 13 13.2 20 7.6	7 11.4 14 15.1 21 11.0 28	Wednesday 01 15.1 08 19.6 15 15.4 22 16.3 29	17.3 09 7.3 16 11.2 23 6.6	7.1 10 8.6 17 10.3	14.5 11 10.8 18 5.2	Sunday 26 03 14.9 10 9.5 17 11.1 24	Monday 27 04 46.3 11 10.0 18 10.6 25	7 Tuesday 28 05 17.5 12 9.0 19 9.4 26	9.1 13 10.0 20 11.9 27	9.0 14 9.9 21 13.4 28	01 14.5 08 8.6 15 12.0 22 13.2	02 8.9 09 8.0 16 11.1 23 14.1 30	Sunday 31 07 6.1 14 6.7 21 5.4	Monday 01 7.9 08 9.3 15 8.0	9.0 99.0 99.0 7.2 7.2	Wednesday 03 9.4 10 8.3 17 9.2 24	12.4 11 7.0 18 7.9	9.8 12 5.9 19 10.7 26	7.2 13 5.3 20 8.5 27
Sunday 29 05 10.9 12 9.8	Monday 30 06 11.5 13 13.2	Tuesday 31 07 11.4 14 15.1 21 11.0	Wednesday 01 15.1 08 19.6 15 15.4 22 16.3	17.3 09 7.3 16 11.2 23 6.6	7.1 10 8.6 17 10.3	14.5 11 10.8 18 5.2	Sunday 26 03 14.9 10 9.5 17 11.1 24 11.6	Monday 27 04 46.3 11 10.0 18 10.6	7 Tuesday 28 05 17.5 12 9.0 19 9.4	29 06 9.1 13 10.0 20 11.9	9.0 14 9.9 21 13.4	01 14.5 08 8.6 15 12.0 22 13.2	8.9 09 8.0 16 11.1 23 14.1	Sunday 31 07 6.1 14 6.7 21 5.4	Monday 01 7.9 08 9.3 15 8.0 22 8.5	Tuesday 02 9.0 09 8.1 16 7.2 23 7.7	Wednesday 03 9.4 10 8.3 17 9.2 24 10.1	12.4 11 7.0 18 7.9	9.8 12 5.9 19 10.7 26	7.2 13 5.3 20 8.5 27
Sunday 29 05 10.9 12 9.8 19 5.2 26	Monday 30 06 11.5 13 13.2 20 7.6	7 11.4 14 15.1 21 11.0 28	Wednesday 01 15.1 08 19.6 15 15.4 22 16.3 29	17.3 09 7.3 16 11.2 23 6.6	7.1 10 8.6 17 10.3	14.5 11 10.8 18 5.2	Sunday 26 03 14.9 10 9.5 17 11.1 24	Monday 27 04 46.3 11 10.0 18 10.6 25	7 Tuesday 28 05 17.5 12 9.0 19 9.4 26	9.1 13 10.0 20 11.9 27	9.0 14 9.9 21 13.4 28	01 14.5 08 8.6 15 12.0 22 13.2	02 8.9 09 8.0 16 11.1 23 14.1 30	Sunday 31 07 6.1 14 6.7 21 5.4 28	Monday 01 7.9 08 9.3 15 8.0 22 8.5	Tuesday 02 9.0 09 8.1 16 7.2 23 7.7 30	Wednesday 03 9.4 10 8.3 17 9.2 24 10.1 31	12.4 11 7.0 18 7.9	9.8 12 5.9 19 10.7 26	7.2 13 5.3 20 8.5 27

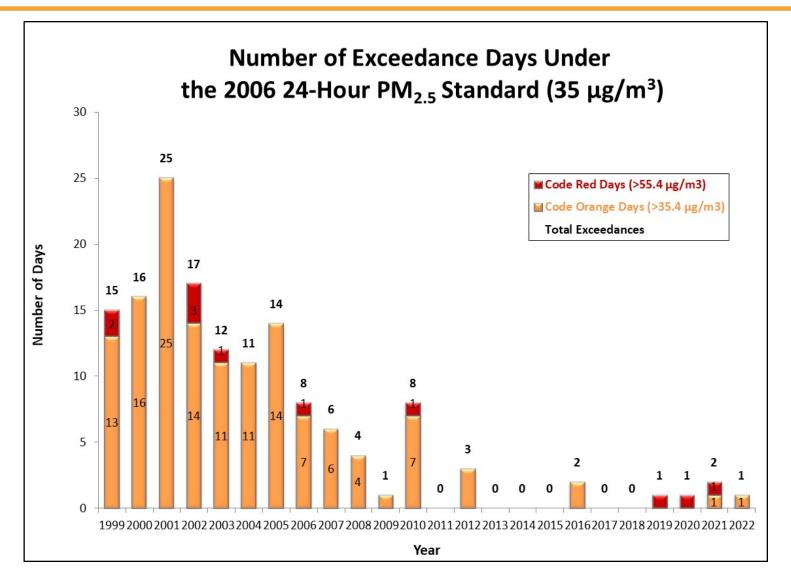
1 Code Orange Day, 36 Code Yellow Days, rest all Code Green Days

Analysis is based on draft data as of September 16, 2022.



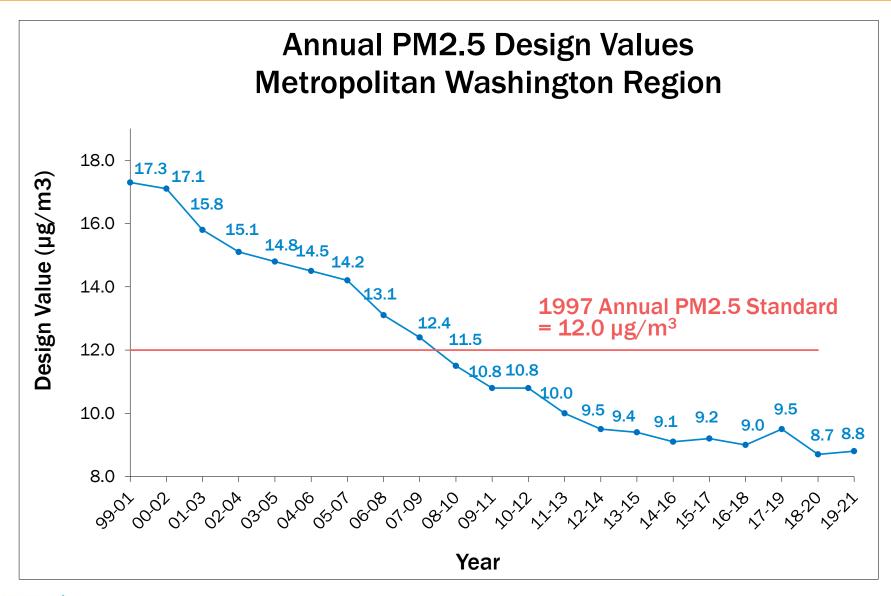
Septe	m b e r	2022				
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
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				7.7	9.2	7.6
04	05	06	07	08	09	10
9.3	8.1	5.7	5.5	8.9	9.5	9.4
11	12	13	14	15	16	17
6.7	7.3	6.1	6.4	9.1		
18	19	20	21	22	23	24

PM2.5 Exceedance Trend



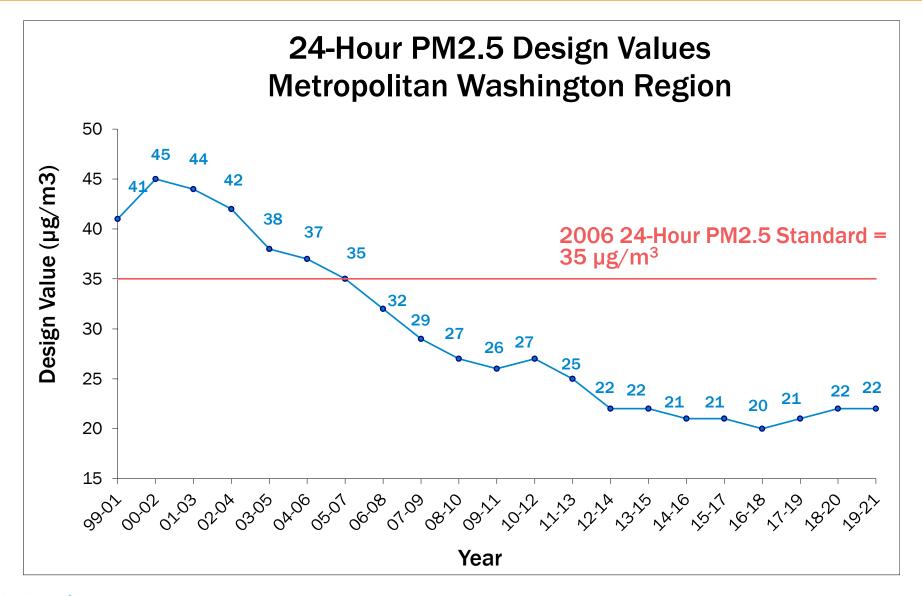


Annual PM2.5 Design Value Trend





24-Hour PM2.5 Design Value Trend





Geographical Extent of Exceedances - 2022

June 15 – 1 Monitor (McMillan, Washington, DC)

June 22 - 1 Monitor (McMillan, Washington, DC)

June 30 - 5 Monitors

McMillan, Washington, DC

Beltsville, MD

Fredrick, MD

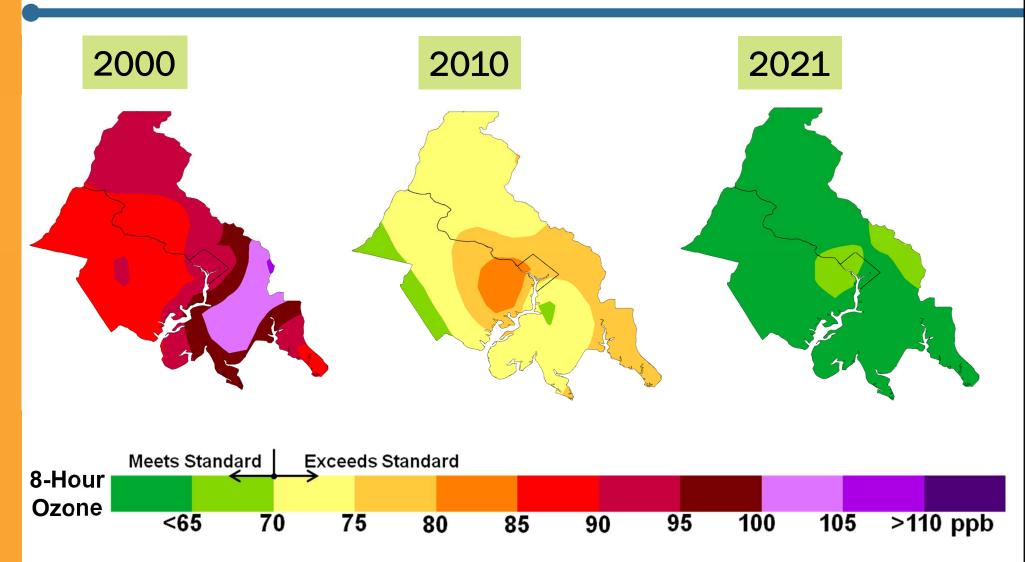
Rockville, MD

Loudoun, VA

* Draft data as of September 16, 2022.



Geographical Extent of 2015 Ozone NAAQS Violations Over Time



Credit - Maryland Department of the Environment



Ozone Level Needed in 2023 To Violate 2015 Ozone NAAQS

Monitor	Draft Design Value (2020-22) (Ppb)*	4 Th High Ozone Needed in 2023 (ppb)	Observed 4 th High Ozone (ppb) in 2022*	Highest 4 th High Ozone in Last 5 Years
Beltsville (MD)	67	75	61	75 (2019)
McMillan (DC)	67	74	66	73 (2018)

^{*} Observed draft data as of September 16, 2022.



Conclusions

- 2022 is 2nd lowest for ozone exceedances (2020 was lowest).
- Despite favorable weather (high temp, low wind) observed on many days, ozone exceedances were very limited in numbers (only 3).
- Exceedances in recent years indicate that most of the factors (high temp, low wind, recirculation, ozone transport, local emissions, and smoke) need to be present on any given day for an exceedance to occur.
- Lowest freight VMT observed in June/July 2022 since 2018. Could this indicate economic slowdown leading to low ozone levels this year?
- Violation of ozone NAAQS not impossible in 2023 after 2020 data is out of picture.
- Is relatively lower number of exceedances this year a temporary phenomenon or the start of a new trend of low ozone levels in the years to come?
- Is changing weather pattern due to climate change playing now a more important role?

