OZONE SEASON SUMMARY 2020

Sunil Kumar Principal Environmental Engineer

MWAQC-Technical Advisory Committee October 13, 2020



Peak 8-Hour Average Ozone Levels (ppb)

Ma	rch	2020)				Ар	ril	2020)				M	ay	2020)			
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	02	03	04	05	06	07	29	30	31	01	02	03	04	26	27	28	29	30	01	02
44	52	40	44	42	39	43				40	48	50	36	1	1"				39	49
	09	10	11	12	13	14	05	06	07	08	09	10	11	03	04	05	06	07	08	09
47	52	43	36	42	46	45	46	52	45	51	51	43	49	49	48	40	37	52	50	39
	16	17	18	19	20	21	12	13	14	15	16	17	18	10	11	12	13	14	15	16
40	48	40	42	39	41	39	50	45	47	48	49	51	47	49	39	46	56	47	57	52
	23	24	25	26	27	28	19	20	21	22	23	24	25	17	18	19	20	21	22	23
44	38	39	38	41	48	43	50	45	48	49	41	34	47	42	43	47	46	43	33	47
	30	31					26	27	28	29	30			24	25	26	27	28:	29	30
38	49	40					38	40	40	51	46			35	42	49	36	26	39	52
														31						
														43						
Jur	ne	2020)				Ju	ly	2020)				Aug	gust	2020)			
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	01	02	03	04	05	06	28	29	30	01	02	03	04	28	29	30	31	01	02	03
	49	48	65	66	43	57				56	52	52	49					55	38	52
	08			11	12	13	05	06	07	08	09	10	11	04	05	06	07	08	09	10
47	57	66	37	46	60	49	52	56	55	52	52	35	48	36	60	54	46	51	58	57
	15			18	19	20	12	13	14	15	16	17	18	11	12	13	14	15	16	17
50	53	50	30	39	38	41	50	51	53	66	53	56	70	53	61	47	51	37	32	47
42	~~	23	2-7	25	26 F.O.	27	19	20		22	23	24	25	18 F.3	19	20	21	22	23	24
43	48	49	55	55	59	51	58	56	73	59	60	46	60	52	49	59	48	42	46	53
44	44	53					55	60	51	72	64	45		54	44	43	42	39	40	29
	44						33	80	3 I	12	04	45		54	44	45	42	39	40	29

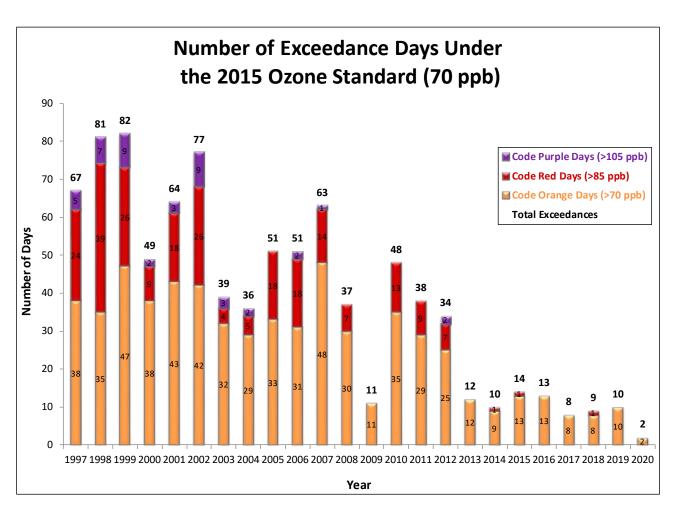
September 2020											
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday					
30	31	01	02	03	04	05					
40	29	31	37	42	45	46					
06	07	08	09	10	11	12					
50	52	49	32	23	40	31					
13	14	15	16	17	18	19					
38	35	30	36	26	34	36					
20	21	22	23	24	25	26					
38	39	47	57	35	32	28					
27	28	29	30								
33	32	29	33								

2 Code Orange, 32 Code Yellow Days, Rest All Code Green Days

Analysis is based on draft data as of September 30, 2020.

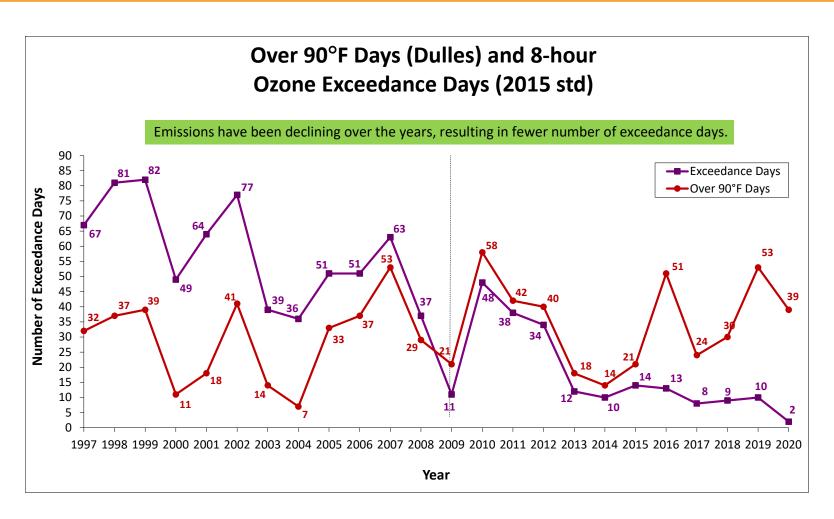


Ozone Exceedance Trend



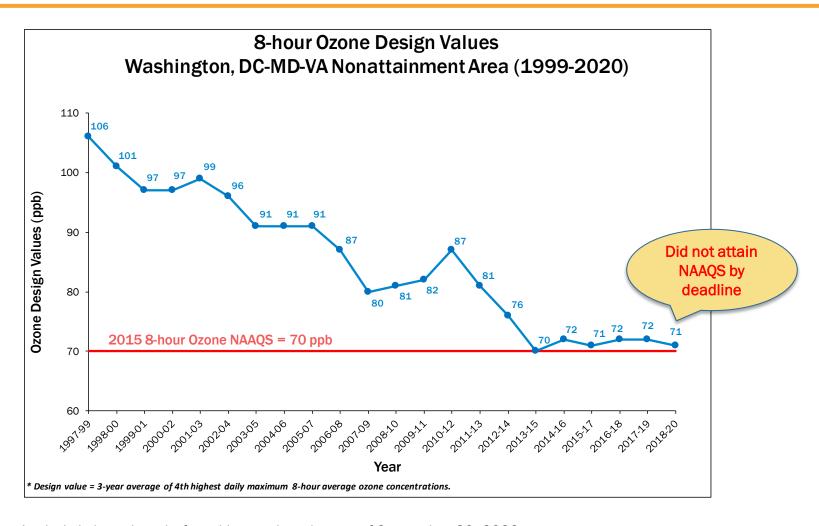


Ozone & Temperature Trend





Ozone Design Value Trend





Why Fewer Exceedance Days Now?

Emission Control Programs

Federal	State	Local
Acid Rain Program (1996/2000)	Vehicle Inspection & Maintenance Programs	Renewable Energy Programs Regional Wind Power Purchase Program Clean Energy Rewards Program Renewable Portfolio Standards
Tier 2 (LD Vehicle) Rule (2004)	Maryland Healthy Air Act (2009/2012)	Energy Efficiency Programs LED Traffic Signal Retrofit program Building Energy Efficiency Programs
HD Diesel vehicle Rule (2004/2007)	MD NOx regulation for coal- fired power plants	VRE Idling Reduction
NOX SIP Call (2004)	Virginia CSAPR Rule	LOW VOC Paint
CAIR/CSAPR/CSAPR Update (2009/2015/2017)	Ozone Transport Commission Rules	Gas Can Replacement



24-Hour Average PM2.5 Levels (µg/m³)

Ma	rch	2020)				Ар	ril	2020)				Ma	av	2020)			
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01	02	03	04	05	06	07	29	30	31	01	02	03	04	26.	27	28	29	30	01	02
6.2	10.9	9.4	3.4	7.7	9.3	4.0				6.6	4.2	3.1	3.1						3.5	5.6
08	09	10	11	12	13	14	05	06	07	08	09	10	11	03	04	05	06	07	08	09
7.6	8.0	7.9	7.7	10.3	6.9	4.7	6.2	6.9	10.9	6.5	7.4	4.2	7.8	8.9	4.4	5.2	4.6	5.3	6.6	4.3
15	16	17	18	19	20	21	12	13	14	15	16	17	18	10	11	12	13	14	15	16
8.1	6.7	7.7	8.4	13.1	10.6	5.2	10.0	3.9	5.3	6.8	7.9	9.5	8.5	5.1	11.7	9.3	11.1	10.3	10.4	8.5
22	23	24	25	26	27	28	19	20	21	22	23	24	25	-	18	19	20		22	23
6.8	5.0	6.7	6.0	10.9	6.9	8.8	8.6	10.2	6.9	5.1	7.1	3.9	7.0	9.8	6.6	7.0	6.7	9.1	6.5	10.1
29	30	31					26	27	28	29	30			24	25	26	27	28	29	30
9.4	6.5	4.3					4.0	3.1	6.0	8.3	5.1			8.0	7.4	8.6	6.7	6.8	10.7	5.1
														31						
														8.1		1				10
														8.1						
Ju	ne	2020)	I	I		Ju	ly	2020)				Aug	ust	2020				
JU	ne	2020	Wednesday	Thursday	Friday	Saturday	Ju	Monday	2020	Wednesday	Thursday	Friday	Saturday		UST Monday	2020	Wednesday	Thursday	Friday	Saturday
	Monday 01	Tuesday 02	Wednesday 03	04	05	06		,		Wednesday 01	02	03	04	Aug				Thursday 30	Friday 31	01
			1	Thursday 04 14.7	Friday 05 10.7	Saturday 06 15.5		,			Thursday 02 16.8	Friday 03 24.6	Saturday 04 83.7	Aug				Thursday 30	Friday 31	Saturday 01 9.7
Sunday 31 07	Monday 01 7.2	Tuesday 02 8.6 09	03 17.3	14.7	10.7	15.5	Sunday 28 05	Monday 29 06	Tuesday 30 07	Wednesday 01 14.8 08	16.8 09	24.6	83.7	Aug Sunday 26	Monday 27 03	Tuesday 28 04	Wednesday 29 05	30	31 07	9.7 08
	Monday 01	Tuesday 02	03 17.3	14.7 11 9.9	05	15.5 13 5.6		,		Wednesday 01 14.8 08 20.1	02	24.6 10 11.0	04	Aug			Wednesday 29 05 9.2	Thursday 30 06 12.0	Friday 31 07 6.0	01
Sunday 31 07 7.3	Monday 01 7.2 08 8.2	Tuesday 02 8.6 09 15.8	Wednesday 03 17.3 10 17.0 17	14.7 11 9.9	10.7 12 7.1	15.5 13 5.6	Sunday 28 05 32.3	Monday 29 06 26.2	Tuesday 30 07 23.4	Wednesday 01 14.8 08 20.1	16.8 09 15.1	24.6 10 11.0	83.7 11 12.5	Aug sunday 26 12.8 09	Monday 27 03 5.7	Tuesday 28 04 5.0	29 05 9.2	30 06 12.0	07 6.0	9.7 08 7.7
Sunday 31 07	Monday 01 7.2	Tuesday 02 8.6 09	Wednesday 03 17.3 10 17.0 17 6.3	14.7 11 9.9	10.7	15.5 13 5.6 20 9.2	Sunday 28 05	Monday 29 06	Tuesday 30 07	Wednesday 01 14.8 08 20.1 15 10.2	16.8 09 15.1 16	24.6 10 11.0	83.7	Aug Sunday 26	Monday 27 03	Tuesday 28 04	Wednesday 29 05 9.2	30	31 07	9.7 08 7.7 15
Sunday 31 07 7.3 14 6.4 21	Monday 01 7.2 08 8.2 15 10.0	Tuesday 02 8.6 09 15.8 16 7.2	Wednesday 03 17.3 10 17.0 17 6.3	14.7 11 9.9 18 7.1	10.7 12 7.1 19 9.7 26	15.5 13 5.6 20 9.2	Sunday 28 05 32.3 12 13.2	Monday 29 06 26.2 13 14.5 20	Tuesday 30 07 23.4 14 6.8 21	Wednesday 01 14.8 08 20.1 15 10.2	16.8 09 15.1 16 9.9	24.6 10 11.0 17 11.8	83.7 11 12.5 18 11.1	Aug sunday 26 02 12.8 09 12.2 16	Monday 27 03 5.7 10 14.4	Tuesday 28 04 5.0 11 18.4	Wednesday 29 05 9.2 12 12.6	30 06 12.0 13 9.0	31 07 6.0 14 11.8	9.7 08 7.7 15 14.5
Sunday 31 07 7.3	Monday 01 7.2 08 8.2	Tuesday 02 8.6 09 15.8	Wednesday 03 17.3 10 17.0 17 6.3	14.7 11 9.9	10.7 12 7.1	15.5 13 5.6 20 9.2	Sunday 28 05 32.3	Monday 29 06 26.2	Tuesday 30 07 23.4	Wednesday 01 14.8 08 20.1 15 10.2	16.8 09 15.1 16	24.6 10 11.0	83.7 11 12.5	Aug sunday 26 12.8 09	Monday 27 03 5.7	Tuesday 28 04 5.0	29 05 9.2	30 06 12.0	07 6.0	9.7 08 7.7 15 14.5 22 8.9
5unday 31 07 7.3 14 6.4 21 8.3 28	Monday 01 7.2 08 8.2 15 10.0 22 12.7	Tuesday 02 8.6 09 15.8 16 7.2 23 15.1 30	Wednesday 03 17.3 10 17.0 17 6.3	14.7 11 9.9 18 7.1	10.7 12 7.1 19 9.7 26	15.5 13 5.6 20 9.2	Sunday 28 05 32.3 12 13.2 19 13.6 26	Monday 29 06 26.2 13 14.5 20 11.1	Tuesday 30 07 23.4 14 6.8 21 9.7 28	Wednesday 01 14.8 08 20.1 15 10.2 22 11.1	16.8 09 15.1 16 9.9 23 8.6	24.6 11.0 11.8 24 7.1	83.7 11 12.5 18 11.1	Aug sunday 6 12.8 09 12.2 16 8.7	03 5.7 10 14.4 17 10.3	Tuesday 28 04 5.0 11 18.4 18 10.3 25	Wednesday 29 05 9.2 12 12.6 19 10.9 26	30 06 12.0 13 9.0 20 10.8	07 6.0 14 11.8 21 12.7 28	9.7 08 7.7 15 14.5 22 8.9
Sunday 31 07 7.3 14 6.4 21	Monday 01 7.2 08 8.2 15 10.0	Tuesday 02 8.6 09 15.8 16 7.2	Wednesday 03 17.3 10 17.0 17 6.3	14.7 11 9.9 18 7.1	10.7 12 7.1 19 9.7 26	15.5 13 5.6 20 9.2	Sunday 28 05 32.3 12 13.2	Monday 29 06 26.2 13 14.5 20	Tuesday 30 07 23.4 14 6.8 21	Wednesday 01 14.8 08 20.1 15 10.2	16.8 09 15.1 16 9.9	24.6 10 11.0 17 11.8	83.7 11 12.5 18 11.1	Aug sunday 26 02 12.8 09 12.2 16	Monday 27 03 5.7 10 14.4	Tuesday 28 04 5.0 11 18.4	Wednesday 29 05 9.2 12 12.6	30 06 12.0 13 9.0	31 07 6.0 14 11.8	9.7 08 7.7 15 14.5 22 8.9
5unday 31 07 7.3 14 6.4 21 8.3 28	Monday 01 7.2 08 8.2 15 10.0 22 12.7	Tuesday 02 8.6 09 15.8 16 7.2 23 15.1 30	Wednesday 03 17.3 10 17.0 17 6.3	14.7 11 9.9 18 7.1	10.7 12 7.1 19 9.7 26	15.5 13 5.6 20 9.2	Sunday 28 05 32.3 12 13.2 19 13.6 26	Monday 29 06 26.2 13 14.5 20 11.1	Tuesday 30 07 23.4 14 6.8 21 9.7 28	Wednesday 01 14.8 08 20.1 15 10.2 22 11.1	16.8 09 15.1 16 9.9 23 8.6	24.6 11.0 11.8 24 7.1	83.7 11 12.5 18 11.1	Aug Sunday 26 12.8 09 12.2 16 8.7 23 8.4	Monday 27 03 5.7 10 14.4 17 10.3 24 10.7 31	Tuesday 28 04 5.0 11 18.4 18 10.3 25	Wednesday 29 05 9.2 12 12.6 19 10.9 26	30 06 12.0 13 9.0 20 10.8	07 6.0 14 11.8 21 12.7 28	9.7 08 7.7 15 14.5 22 8.9
Sunday 31 07 7.3 14 6.4 21 8.3	Monday 01 7.2 08 8.2 15 10.0 22 12.7	Tuesday 02 8.6 09 15.8 16 7.2 23 15.1 30	Wednesday 03 17.3 10 17.0 17 6.3	14.7 11 9.9 18 7.1	10.7 12 7.1 19 9.7 26	15.5 13 5.6 20 9.2	Sunday 28 05 32.3 12 13.2 19 13.6 26	Monday 29 06 26.2 13 14.5 20 11.1	Tuesday 30 07 23.4 14 6.8 21 9.7 28	Wednesday 01 14.8 08 20.1 15 10.2 22 11.1	16.8 09 15.1 16 9.9 23 8.6	24.6 11.0 11.8 24 7.1	83.7 11 12.5 18 11.1	Aug sunday 6 12.8 09 12.2 16 8.7	03 5.7 10 14.4 17 10.3	Tuesday 28 04 5.0 11 18.4 18 10.3 25	Wednesday 29 05 9.2 12 12.6 19 10.9 26	30 06 12.0 13 9.0 20 10.8	07 6.0 14 11.8 21 12.7 28	9.7 08 7.7 15 14.5 22 8.9

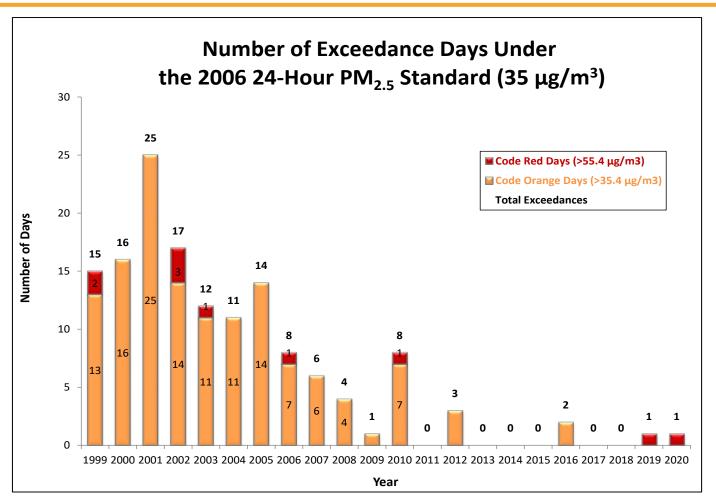
September 2020											
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday					
30	31	01	02	03	04	05					
		7.2	9.3	10.4	10.3	5.7					
06	07	08	09	10	11	12					
8.0	6.5	7.8	8.0	4.0	8.5	6.5					
13	14	15	16	17	18	19					
6.9	5.6	5.0	7.7	10.3	10.1	6.7					
20	21	22	23	24	25	26					
8.1	7.3	8.7	8.1	11.7	11.0	5.6					
27	28	29	30								
5.8	8.5	6.0	4.5								

1 Code Red Day, 36 Code Yellow Day, Rest All Code Green Days

Analysis is based on draft data as of September 30, 2020.



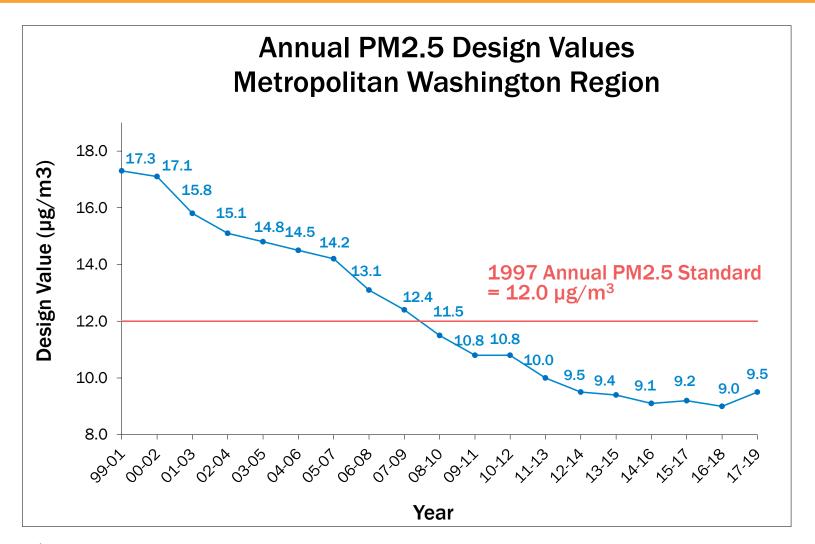
PM2.5 Exceedance Trend



Analysis is based on draft and incomplete data as of September 30, 2020. 2019 & 2020 code red days recorded on July 4th.

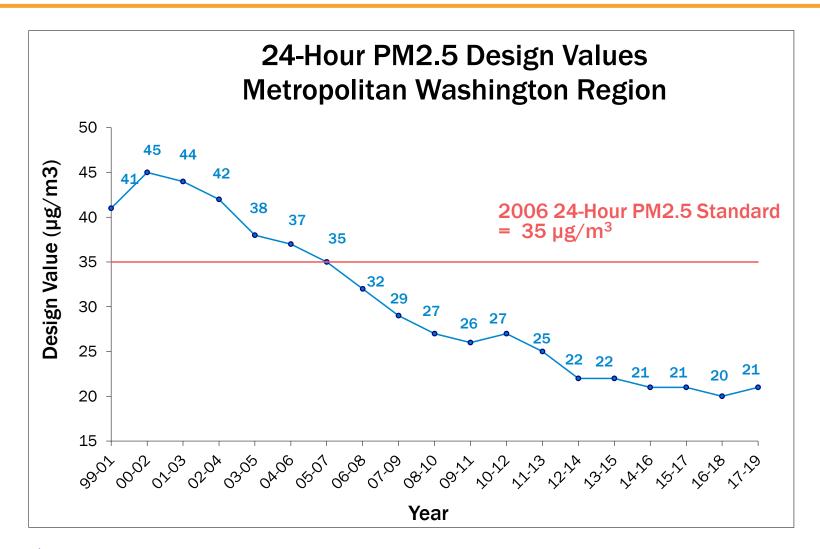


Annual PM2.5 Design Value Trend



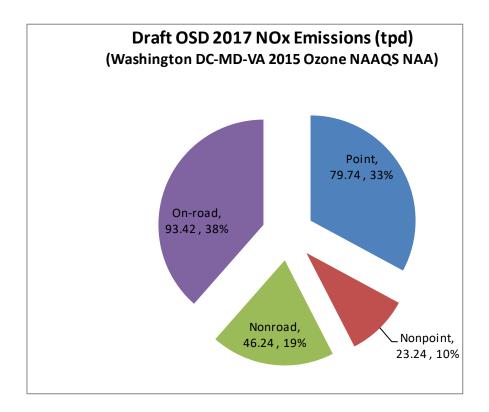


24-Hour PM2.5 Design Value Trend





Emission by Source



 Since COVID-19 has affected operation of all sources, emissions have been affected accordingly.



Increase in Vehicle Speed in Washington, DC

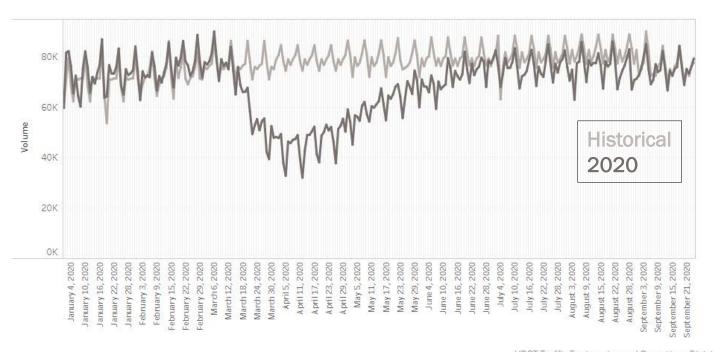
(Compared to Pre-COVID Level in February 2020)

	March	April	May	June	July
8 AM	22%	19%	18%	20%	20%
5 PM	30%	29%	26%	18%	17%

Source: INRIX Report - https://inrix.com/blog/2020/08/us-speeds/



I-95 N - Dumfries Road

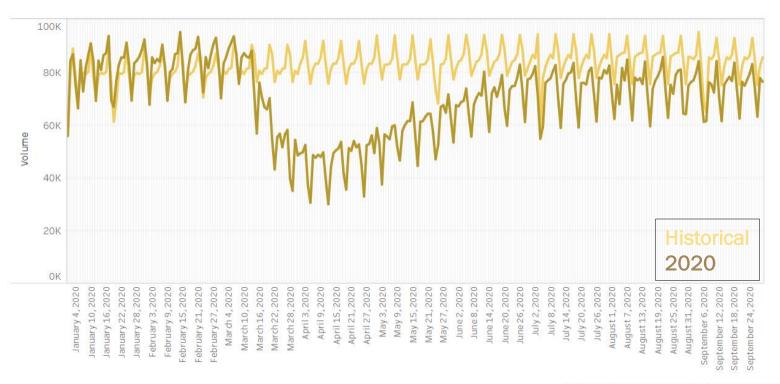


VDOT Traffic Engineering and Operations Divisions

Vehicle traffic continues to increase after a decrease during mid-March to mid April.
 Source: VDOT



I-395 N - Turkeycock

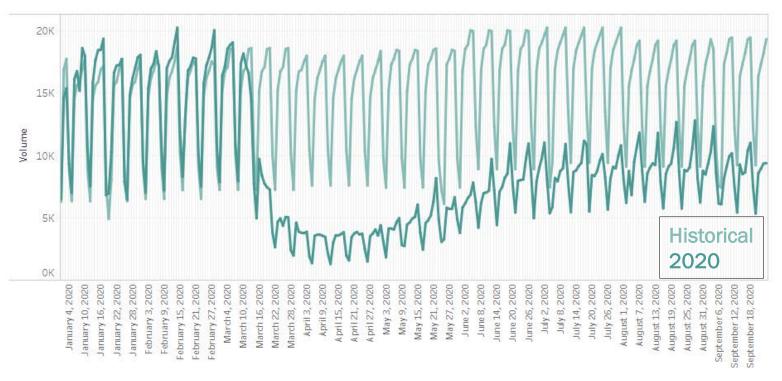


VDOT Traffic Engineering and Operations Divisions

Vehicle traffic continues to increase after a decrease during the mid-March to mid-April.
 Source: VDOT



I-495 S - Braddock Road



VDOT Traffic Engineering and Operations Divisions

Vehicle traffic continues to increase after a decrease during mid-March to mid-April.
 Source: VDOT



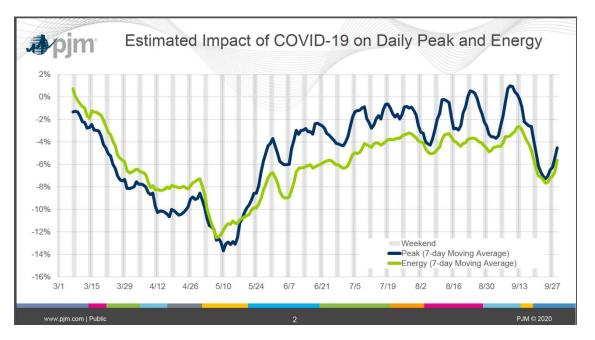
IMPACT ON NONPOINT & NONROAD SECTORS

• Emissions are still expected to be a little bit lower as activities related to nonroad sources and nonpoint sources have still not resumed to pre-COVID-19 levels.



IMPACT ON POINT SECTOR

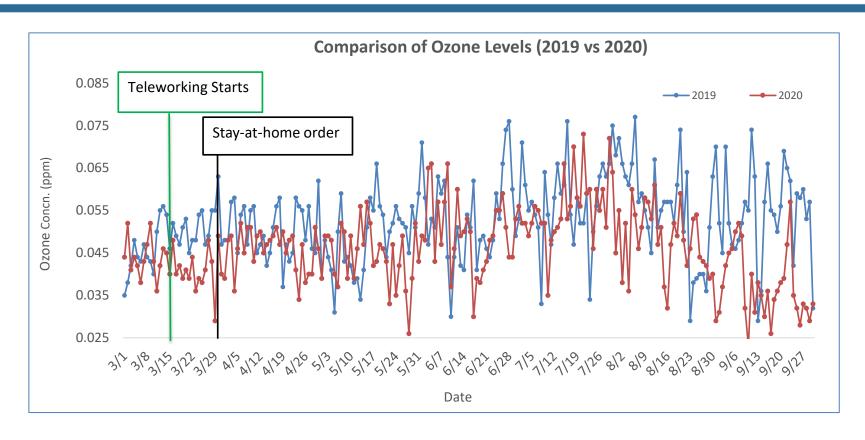
- Electricity consumption in the region is about 4% below the pre-COVID-19 level as many offices, businesses, schools, etc. remain closed & people are still teleworking/staying at home.
- Note recent PJM-wide data may differ from metropolitan Washington due to differing rates of reopening across the PJM territory.



https://www.pjm.com/~/media/committees-groups/pandemic/postings/estimated-impact-covid-19-daily-peak-and-energy.ashx



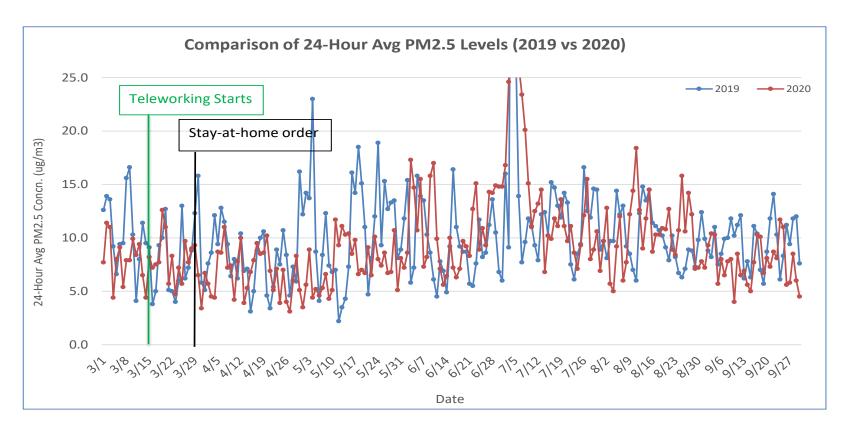
Comparison of Ozone Levels – 2019 vs 2020



Note: Draft data valid as of September 30, 2020.



Comparison of PM2.5 Levels – 2019 vs 2020



Note: Draft data valid as of September 30, 2020.



AQI Value Trends



Source: U.S. EPA AirData https://www.epa.gov/air-data
Generated: October 6, 2020

Jan 2020

Note: Data shown above is for the Washington-Arlington-Alexandria CBSA.



Highs & Lows

2021

5-year Average

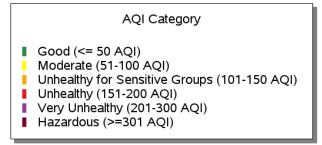
This year

AQI Value Trends

Daily AQI Values, 2011 to 2020

Washington-Arlington-Alexandria, DC-VA-MD-WV





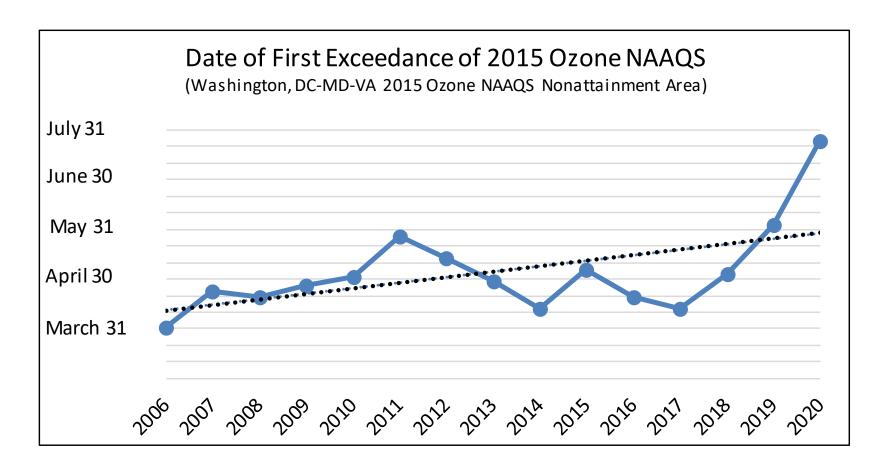
Source: U.S. EPA AirData https://www.epa.gov/air-data

Generated: October 2, 2020

Note: Data shown above is for combined AQI values for ozone, PM2.5, PM10, CO, NO2, and SO2 for the Washington-Arlington-Alexandria CBSA.



Trend - Day of First Code Orange





WEATHER & AIR QUALITY

- Weather plays an important role in determining air quality besides emission.
- April 2020 Colder and much wetter than normal.
- May 2020 Much Colder and drier than normal.
- June 2020 Warmer and drier than normal.
- July/August 2020 Warmer and wetter than normal.
- September 2020 Colder than drier than normal

Source: https://w2.weather.gov/climate/index.php?wfo=lwx



CONCLUSIONS

- Ozone and PM2.5 levels were overall lower in 2020 compared to 2019 as COVID-19 related restrictions were implemented in the Washington region.
- Reduction in emissions due to lower traffic and fuel/ electricity consumption coupled with weather contributed towards lower pollutant levels.
- The Washington region did not attain the 2015 ozone NAAQS based on draft 2018-2020 data (71 ppb). The attainment deadline is August 3, 2021 and the attainment is based on 2018-2020 data.

Ozone Planning - Probable Next Steps

Monitor	County, State		Ozone C	Concentration (p	entration (ppb)			
		Draft 2018-20 Design Value	4 th Highest Daily Max 8-Hr Avg Ozone (2019)	4 th Highest Daily Max 8-Hr Avg Ozone (2020)	Lowest 4 th Highest Daily Max 8-Hr Avg Ozone needed for continued nonattainment (71 ppb) in 2021			
Beltsville	Prince George's, MD	71	75	65	73			
McMillian Ncore	District of Columbia	69	71	63	79			
HU- Beltsville	Prince George's, MD	68	71	64	78			
Takoma	District of Columbia	67	67	63	83			
Arlington	Arlington, VA	66	68	62	83			
PG Equestrian	Prince George's, MD	65	65	60	88			
Franconia	Fairfax, VA	64	70	57	86			
Frederick	Fredrick, MD	65	65	63	85			
Rockville	Montgomery, MD	63	62	59	92			
S. Maryland	Charles, MD	60	61	52	100			
Ashburn	Loudoun, VA	61	60	60	93			
Long Park	Prince William, VA	60	60	57	96			
Calvert	Calvert, MD	59	58	54	101			
River Terrace	District of Columbia	55	62	54	97			



Ozone Planning - Probable Next Steps

- The Washington region did not attain the standard by the deadline but is eligible to apply for an extension of the attainment date by one year as 4th highest daily max 8-hour avg ozone concentration in 2020 is 65 ppb (≤ 70 ppb).
- Extension will push the attainment date to August 3, 2022 (attainment DV based on 2019-2021 data).
- This will give the region more time for attainment, avoid getting bumped up to Moderate nonattainment Area immediately, and the opportunity to develop a 15% RFP and an attainment demonstration plan.
- This will ensure that these plans will be ready for submittal when needed.



Ozone Planning - Probable Next Steps

- The region seems likely be able to request a second one-year extension to August 2023 (attainment DV based on 2020-22 data).
- Depending on EPA's timeline of action, the region may get bumped up to Moderate or even Serious NAA if the region fails to attain after second extension and would need to submit RFP and attainment plans within a short period of time after that.
- Considering above scenarios, it seems appropriate that the region requests for the first extension and then start working on a 15% RFP and attainment demonstration plan to ensure timely availability of these plans when needed.
- After attainment, the region needs to keep working to maintain that status in future. This will be especially important after 2022 when the abnormally low ozone values from 2020 will be excluded from design value calculations.

