Exceptional Event Demonstration Analysis
For Ozone from March 16 through December 31, 2020

September 27, 2021

DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

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Table of Contents

1.0 Background 1
1.1 Washington, DC-MD-VA Ozone Nonattainment Area 1
1.2 Clean Air Act Requirements 2
1.3 Document Overview 4
2.0 Definition of an Exceptional Event 5
2.1 Affects Air Quality 5
2.1.1 Conceptual Model 13
2.1.2 Causal Relationship 14
2.1.3 Comparison to Past Years 20
2.2 Not Reasonably Controllable nor Preventable 21
2.2.1 Reasonable Measures to Prevent the Event 23
2.2.2 Reasonable Measures to Control Air Quality 23
2.2.3 Reasonable Availability of Controls 23
2.2.4 Implementation Plan Revisions 23
2.2.5 Interstate Impacts 24
2.2.6 Additional Provisions 24
2.2.6.1 Identification of Natural and Anthropogenic Sources 24
2.2.6.2 Identification of Enforceable Controls in Relevant State Implementation Plans 24
2.3 Human-caused Event Unlikely to Recur or a Natural Event 24
2.4 Requirements in the Federal Regulations 25
2.5 Exclusions 26
3.0 Principles of Exceptional Events 27
3.1 Protection of the Public Health is the Highest Priority 27
3.2 Timely Dissemination of Information to Protect the Public Health 27
3.3 Submission of Air Quality Data to Federal Air Quality Databases 27
3.4 Necessary Measures to Safeguard Public Health 28
3.5 Air Quality Data Screening 28
4.0 Requirements of Exceptional Events 28
4.1 Prompt Demonstration 28
4.2 Clear Causal Relationship between Event and Monitored Air Quality 29
4.3 Public Process 29
5.0 Summary 29

List of Tables

Table 1: Average contribution by sector to McMillan, DC (110010043) monitor ordered by exceedance average 14
Table 2: MOVES monthVMTFraction for light-duty vehicles 17
Table 3: Major federal NOX reduction control programs implemented in recent years 20
Table 4: 2013-2020 ozone season summary 21

List of Figures

Figure 1: Metropolitan Washington 8-hour Ozone Nonattainment Region (Washington, DC-MD-VA) 2
Figure 2: Reduction in satellite monitored NO_2 from 2018 and 2019 to 2020 in March/April/May (left) and June/July/August (right) 5
Figure 3: Ozone season mean daily and mean daily max NO2 and NOX at McMillian Reservoir Monitor (110010043) 6
Figure 4: Maximum daily NO_2 ozone season concentration (ppb) as monitored at McMillan Reservoir (110010043) from 2013 to 2020 (2020 highlighted in black) 7
Figure 5: Maximum daily NO_X ozone season concentration (ppb) as monitored at McMillan Reservoir (110010043) from 2013 to 2020 (2020 highlighted in black) 7
Figure 6: June through August mean daily and mean daily max VOC (ppbC) at McMillian Reservoir Monitor (110010043) 8
Figure 7: Maximum daily VOC June through August concentration (ppbC) as monitored at McMillan Reservoir (110010043) from 2013 to 2020 (2020 highlighted in black) 9
Figure 8: Maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (McMillan Reservoir: 110010043) 10
Figure 9: Mean daily maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (McMillan Reservoir: 110010043) 10
Figure 10: Maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (River Terrace: 110010041) 11
Figure 11: Mean daily maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (River Terrace: 110010041) 11
Figure 12: Maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (Takoma Rec Center: 110010050) 12
Figure 13: Mean daily maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (Takoma Rec Center: 110010050) 12
Figure 14: Typical ozone isopleths 13
Figure 15: Monthly VMT from 2013-2020 15
Figure 16: Percentage change in VMT from 2019 to 2020 by month 16
Figure 17: MDE traffic count from I-95 near road site (Feb 4, 2020 - June 20, 2021) (courtesy of MDE) 16
Figure 18: Total NO_X and VOCs (tons) from 2019 and 2020 VMT adjusted MOVES run. 17

Figure 19: Percent monthly reduction in NO_X and VOCs from 2020 VMT adjusted MOVES run. 18
Figure 20: Correlation between ozone season temperature (upper left), GHI (right), humidity (lower left), and pressure (lower right) from 2013 to 2020 as matched based on 8-hour daily maximum rank and time of day 19
Figure 21: United States light-duty vehicle sales from April 2016 to April 2021 20
Figure 22: 2013-2020 ozone season summary. 21

1.0 Background

In 2015, EPA promulgated a resolution strengthening the National Ambient Air Quality Standard (NAAQS) for Ozone to 0.070 parts per million (ppm) (80 FR 65292, October 26, 2015). On June 4, 2018, the District of Columbia (District), along with surrounding counties in Maryland and Virginia, was designated as marginal nonattainment for the 2015 Ozone NAAQS (83 FR 25776, June 4, 2018). Due to the deadlines and requirements in the Clean Air Act, as well as what was required in the 2015 Ozone NAAQS Implementation Rule (83 FR 62998, December 6, 2018), which was issued to clarify these deadlines and requirements specifically for the 2015 Ozone NAAQS, the Washington DC-MD-VA nonattainment area is required to demonstrate attainment based on the ambient ozone levels recorded in 2018 through 2020.

Starting on March 11, 2020, the District instituted a state of emergency in response to the Covid-19 health crisis.[1] On March 16, 2020, the District of Columbia Government, as did the Federal Government and many other employers in the District, began modifying their operations to require telework among many of their employees. This state of emergency led to drastic changes in behavior, in particular in the use of transportation due to the sudden move towards telework. This in turn led to substantial reductions in emissions associated with commuting. This affected the air quality positively, but the changes in emissions are not quantifiable, enforceable, nor permanent, and use of the abnormal ambient data from the health emergency could result in a decreased ability for the District to maintain healthy air over the long-term.

The Covid-19 emergency and subsequent unique traffic disruption was an exceptional event under the Clean Air Act, both in general and specifically in terms of its impact on air quality. In this document, we will demonstrate that the Covid-19 emergency and related unique traffic disruption had a positive effect on air quality. Further, the reduction in emissions was also due to changes in human activity, namely a unique traffic disruption, which is unlikely to recur. We will also show that the request for this exceptional event clearly follows the law as outlined in Clean Air Act § 319 (b)(3)(A). While we understand that a massive pandemic was not anticipated when the exceptional events rule was promulgated, we believe that the exceptional event rule unnecessarily limits the broader Clean Air Act definition of exceptional event to only include exceedances, and that this exceptional event should also be accepted, even though it might not meet some specific requirements since the Exceptional Events Rule was tailored only to address events that resulted in exceedances. We will also show how granting this exceptional event is important to the long-term ability for the District to attain the 2015 Ozone NAAQS.

1.1 Washington, DC-MD-VA Ozone Nonattainment Area

The Washington, DC-MD-VA ozone nonattainment area is made up of the District, five counties in Maryland, four counties in Virginia, and five independent cities in Virginia as shown in Figure 1. This figure also shows the location of the 14 air quality monitors used in determining compliance with the ozone NAAQS.

[1] Mayor's Order 2020-045: Declaration of Public Health Emergency - Coronavirus (COVID-19)

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Figure 1: Metropolitan Washington 8-hour Ozone Nonattainment Region (Washington, DC-MD-VA)

1.2 Clean Air Act Requirements

The Clean Air Act, as amended by the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFTE-LU) (Public Law No: 109-59), states the following in regards to exceptional events:

> *319 (b) AIR QUALITY MONITORING DATA INFLUENCED BY EXCEPTIONAL EVENTS*
>
> *(1) DEFINITION OF EXCEPTIONAL EVENT In this section:*
>
> *(A) In general the term "exceptional event" means an event that—*
>
> *(i) affects air quality;*
>
> *(ii) is not reasonably controllable or preventable;*
>
> *(iii) is an event caused by human activity that is unlikely to recur at a particular location or a natural event; and*
>
> *(iv) is determined by the Administrator through the process established in the regulations promulgated under paragraph (2) to be an exceptional event.*
>
> *(B) Exclusions In this subsection, the term "exceptional event" does not include—*
>
> *(i) stagnation of air masses or meteorological inversions;*
>
> *(ii) a meteorological event involving high temperatures or lack of precipitation; or*
>
> *(iii) air pollution relating to source noncompliance.*

(2) REGULATIONS

(A) Proposed regulations Not later than March 1, 2006, after consultation with Federal land managers and State air pollution control agencies, the Administrator shall publish in the Federal Register proposed regulations governing the review and handling of air quality monitoring data influenced by exceptional events.

(B) Final regulations Not later than 1 year after the date on which the Administrator publishes proposed regulations under subparagraph (A), and after providing an opportunity for interested persons to make oral presentations of views, data, and arguments regarding the proposed regulations, the Administrator shall promulgate final regulations governing the review and handling or air quality monitoring data influenced by an exceptional event that are consistent with paragraph (3).

(3) PRINCIPLES AND REQUIREMENTS

(A) Principles In promulgating regulations under this section, the Administrator shall follow—

(i) the principle that protection of public health is the highest priority;

(ii) the principle that timely information should be provided to the public in any case in which the air quality is unhealthy;

(iii) the principle that all ambient air quality data should be included in a timely manner, an appropriate Federal air quality database that is accessible to the public;

(iv) the principle that each State must take necessary measures to safeguard public health regardless of the source of the air pollution; and

(v) the principle that air quality data should be carefully screened to ensure that events not likely to recur are represented accurately in all monitoring data and analyses.

(B) Requirements Regulations promulgated under this section shall, at a minimum, provide that—

(i) the occurrence of an exceptional event must be demonstrated by reliable, accurate data that is promptly produced and provided by Federal, State, or local government agencies;

(ii) a clear causal relationship must exist between the measured exceedances of a national ambient air quality standard and the exceptional event to demonstrate that the exceptional event caused a specific air pollution concentration at a particular air quality monitoring location;

(iii) there is a public process for determining whether an event is exceptional; and

(iv) there are criteria and procedures for the Governor of a State to petition the Administrator to exclude air quality monitoring data that is directly due to exceptional events from use in determinations by the Administrator with respect to exceedances or violations of the national ambient air quality standards.

(4) INTERIM PROVISION Until the effective date of a regulation promulgated under paragraph (2), the following guidance issued by the Administrator shall continue to apply:

(A) Guidance on the identification and use of air quality data affected by exceptional events (July 1986).

(B) Areas affected by PM–10 natural events, May 30, 1996.

(C) Appendices I, K, and N to part 50 of title 40, Code of Federal Regulations.

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The legislative summary of this section provides the following legislative intent for recognizing exceptional events :

> *SUMMARY*
> *Section 1618 requires EPA to promulgate regulations governing the handling of air quality monitoring data influenced by exceptional events. These regulations would allow governors to petition EPA to exclude air quality data directly due to exceptional events. Events such as forest fires or volcanic eruptions, should not influence whether a region is meeting its Federal air quality goals. The section includes requirements for demonstrating the occurrence of such a natural event by reliable and accurate data, a clear causal relationship between the exceptional event and a national air quality standard exceedance, and a public process for the determination.*
>
> *DISCUSSION*
> *This section includes a definition of exceptional events and excludes certain events from the definition. Natural climatological occurrences such as stagnant air masses, high temperatures, or lack of precipitation influence pollutant behavior but do not themselves create pollutants. Thus, they are not considered exceptional events. Likewise, air pollution related to source noncompliance may not be considered an exceptional event. In contrast, events which are part of natural ecological processes, which generate pollutants themselves that cannot be controlled, qualify as exceptional events.*
>
> *...*
>
> *EPA is directed to follow principles in promulgating regulations under this section. These principles reflect the requirements of the current Clean Air Act and do not establish new requirements for States or EPA to meet. Instead, these are principles that EPA must follow when promulgating regulations under this section.*[2]

1.3 Document Overview

Section 2 will outline how our request meets the Clean Air Act definition of an exceptional event. Section 3 will outline how our request follows the principles found in the Clean Air At. Section 4 will outline how our request follows the requirements in the Clean Air Act. Clean Air Act § 319(b)(2) solely places requirements for EPA to promulgate regulations and Clean Air Act § 319(b)(4) solely describes

[2] https://www.congress.gov/congressional-report/109th-congress/senate-report/53/1?overview=closed

how to approach exceptional events prior to the promulgation of new regulations, so neither will be evaluated.

2.0 Definition of an Exceptional Event

In this section, we will demonstrate how the Covid-19 health emergency met the definition of an exceptional event with each section of text following the outline of the statute as written in full in Section 1.2

2.1 Affects Air Quality

40 CFR § 50.14(c)(3)(iv)(A)–(C) addresses what a state must demonstrate to justify exclusion of data: :

> *(A) A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s);*
> *(B) A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation;*
> *(C) Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section. The Administrator shall not require a State to prove a specific percentile point in the distribution of data;*

Effect on NO_X Emissions

As one can see in Figure 2, in both the spring (March, April, May) and summer (June, July, August) months of 2020, there were substantial reductions in satellite observed NO_2, 39.5% and 17.1%, respectively. This is clear evidence that the Covid-19 health emergency had a substantial impact on NO_X pollution in the Washington, DC-MD-VA nonattainment area.

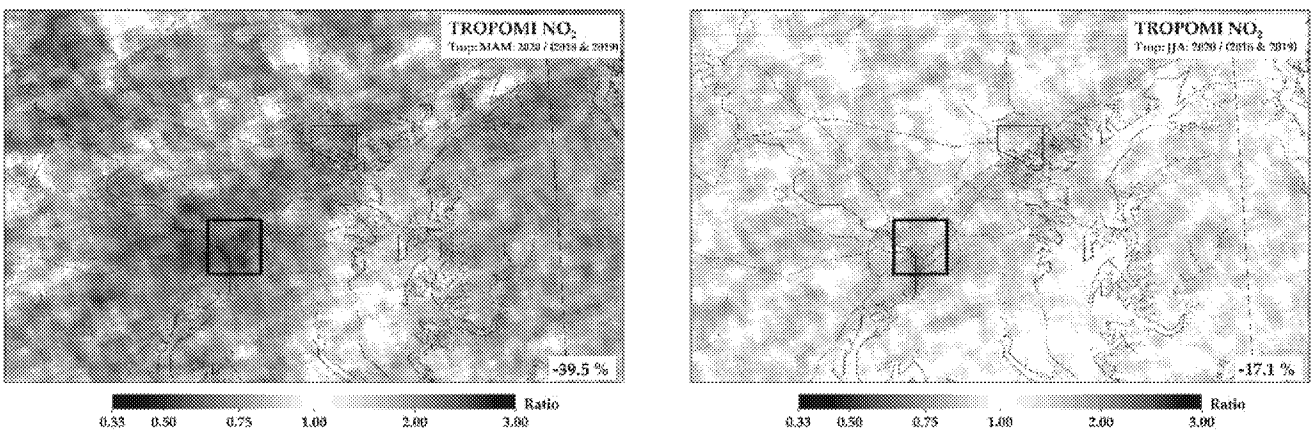

Figure 2: Reduction in satellite monitored NO_2 from 2018 and 2019 to 2020 in March/April/May (left) and June/July/August (right)[3]

[3] Email communication with Daniel Goldberg, PhD.

This evidence is further supported by ground-level NO_X readings in the District. As shown in Figure 3, ozone season NO_2 and NO_X were measured at steady levels in 2017 through 2019, but in 2020 the levels drop. This drop was particularly pronounced for the average daily ozone season maximum recorded NO_2 and NO_X, which is a more important metric than mean daily ozone season values to look at given a higher level of NO_X's impact on ozone formation (discussed in more detail in Section 2.1.1). Additionally, looking at the maximum daily monitored NO_2 (Figure 4) and NO_X (Figure 5), with the exception of two spikes during shoulder months, levels of NO_2 and NO_X remained considerably lower throughout the 2020 ozone season.

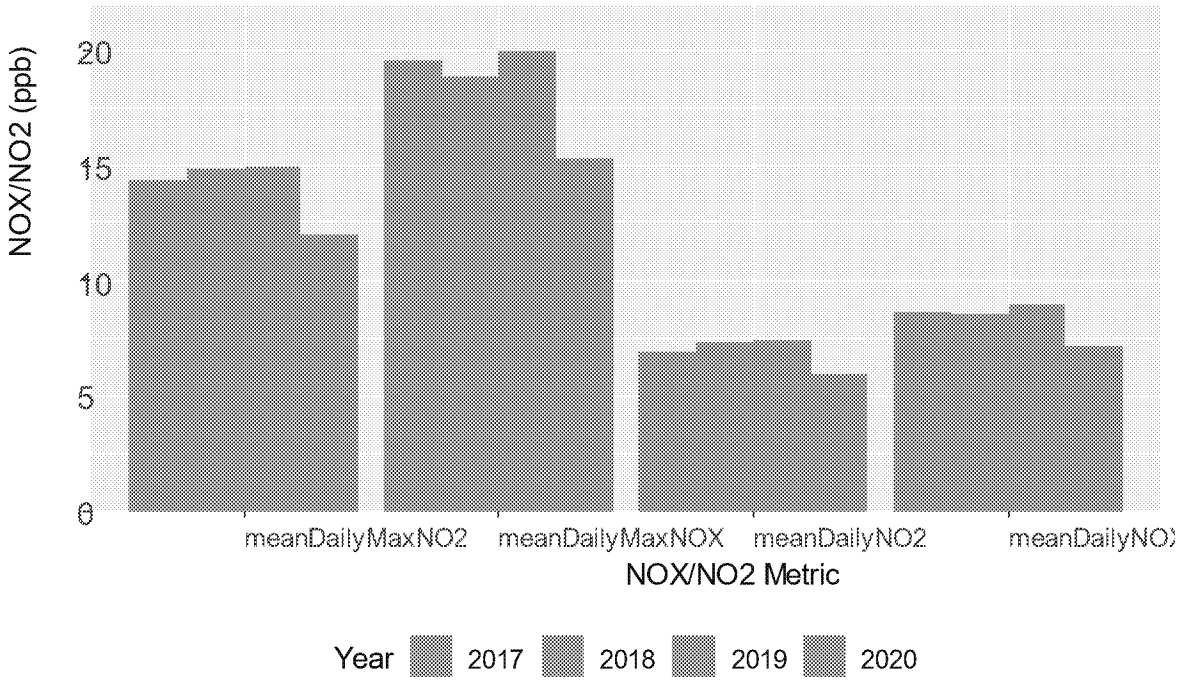

Figure 3: Ozone season mean daily and mean daily max NO2 and NOX at McMillian Reservoir Monitor (110010043)

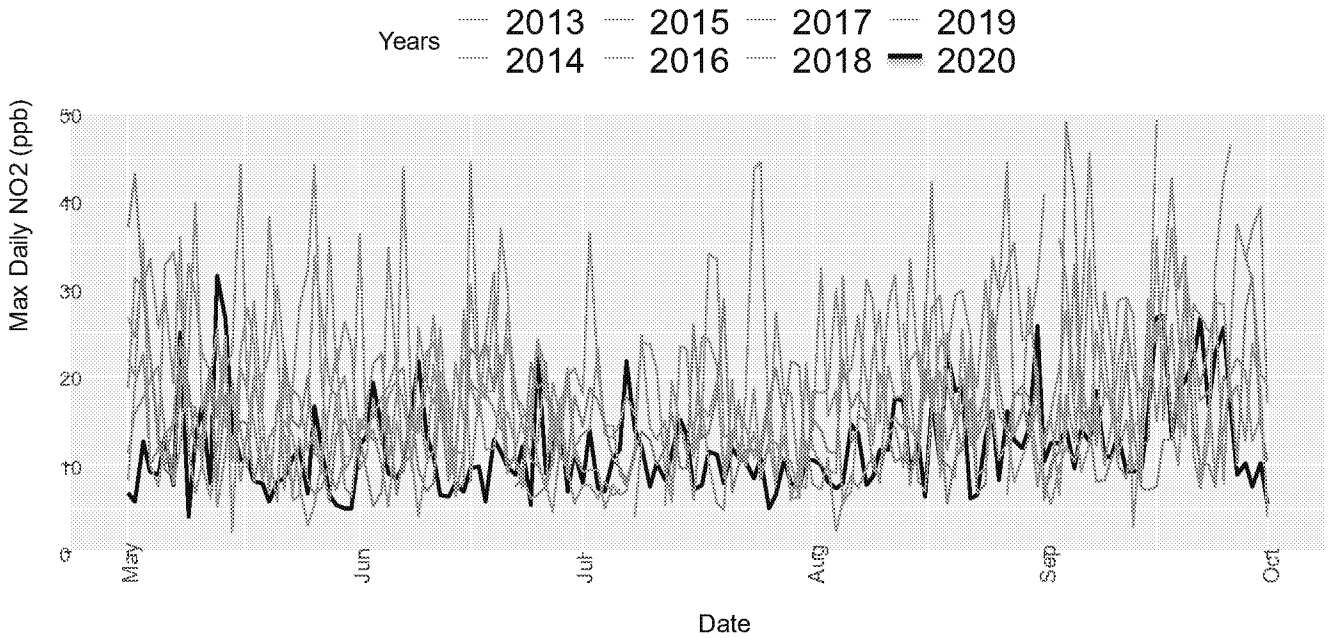

Figure 4: Maximum daily NO_2 ozone season concentration (ppb) as monitored at McMillan Reservoir (110010043) from 2013 to 2020 (2020 highlighted in black)

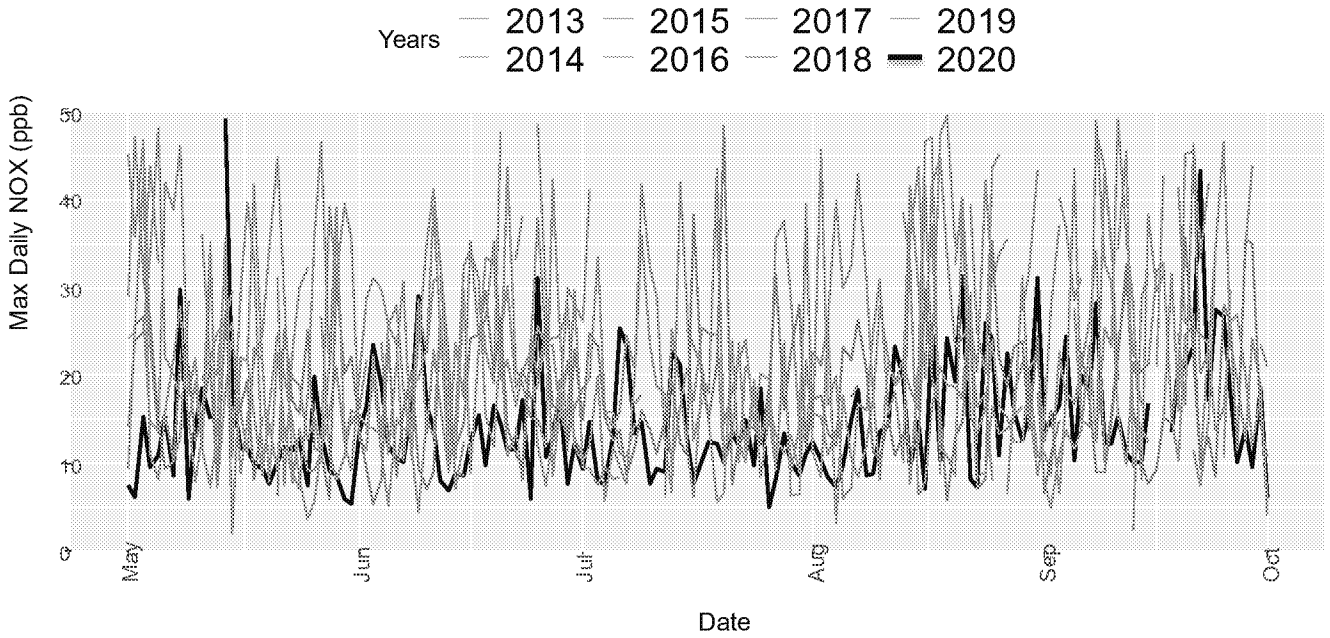

Figure 5: Maximum daily NO_X ozone season concentration (ppb) as monitored at McMillan Reservoir (110010043) from 2013 to 2020 (2020 highlighted in black)

Effect on VOC Emissions

While reductions are expected in VOC emissions from the reduction in Vehicle Miles Traveled (VMT) associated with the unique traffic congestion experienced in 2020, evidence does not appear in monitored data for a change in the overall magnitude of VOC levels in parts per billion Carbon (ppbC). Figure 6 shows the mean daily max and mean VOC concentrations at the McMillan Reservoir

Photochemical Assessment Monitoring Station (PAMS) for the recent four years and there is no discernible decrease in monitored levels in 2020. The maximum daily monitored VOCs Figure 7 also does not appear to have noticeably dropped in monitored VOCs levels in 2020. Thus, while there may have been a decrease in VOC emissions associated with vehicle travel, its effect was not powerful enough to impact overall monitored levels.

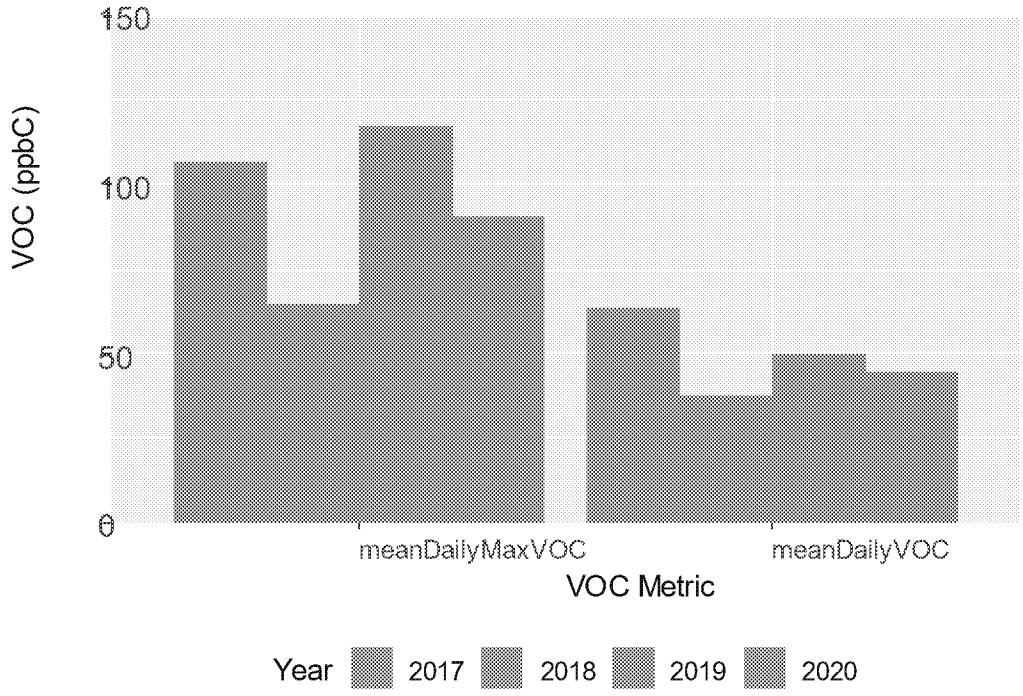

Figure 6: June through August mean daily and mean daily max VOC (ppbC) at McMillian Reservoir Monitor (110010043)

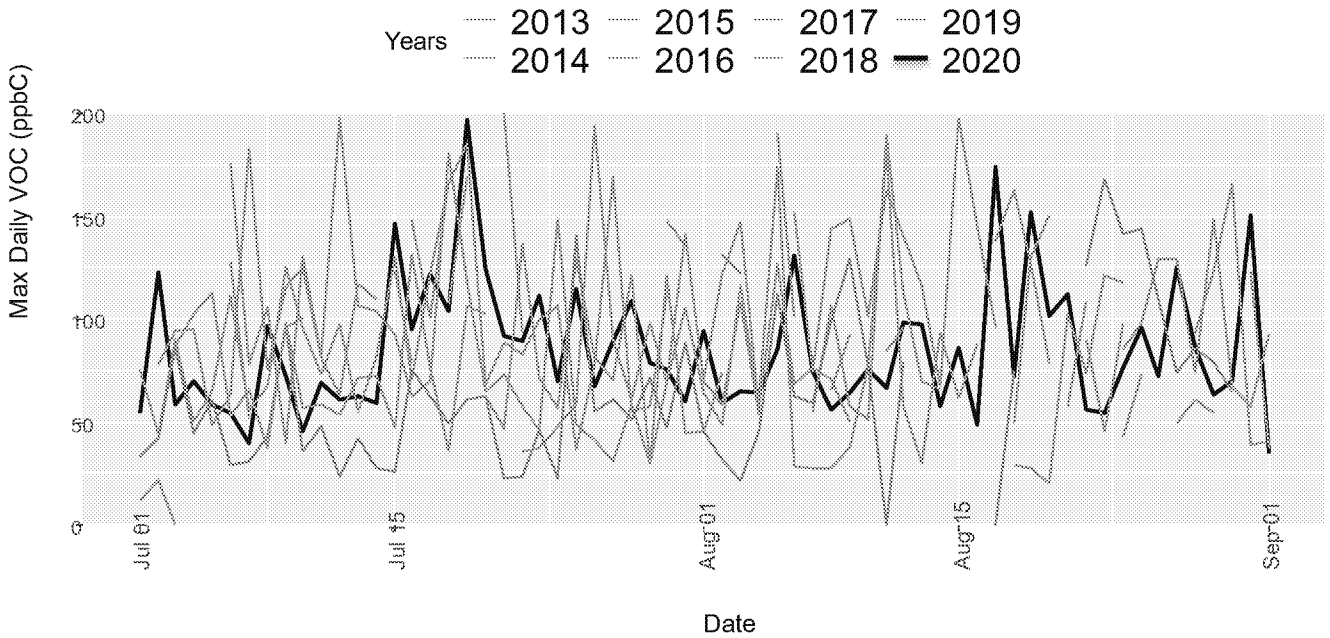

Figure 7: Maximum daily VOC June through August concentration (ppbC) as monitored at McMillan Reservoir (110010043) from 2013 to 2020 (2020 highlighted in black)

Effect on Ozone Levels

The analysis presented in Attachment A clearly demonstrates that events resulting from the COVID emergency of 2020 had an impact on air quality levels. The analysis used both ordinary least squares and quantile regression models developed using solely meteorological and temporal variables to predict ozone. In typical years (2013-2019 for this analysis), these tools, which did not directly consider emissions, under-predicted peak the 4th highest daily maximum, 8-hour ozone by about 3.86 (QR) and 10.1 (OLS) ppb on average. Contrast that to 2020 for which, using solely meteorological and temporal variables, the QR tool over-predicted the 4th highest ozone season daily maximum, 8-hour ozone by 5 ppb and the OLS tool under-predicted ozone by only 1 ppb, swings of 8.86 and 9.1 ppb from the 2013-2019 predictions respectively. It should be noted that regressions tools that ignore emission variables were fairly accurate in predicting peak 2020 ozone levels, which supports the contention that the lack of emissions played a crucial role in the exceptionally low ozone levels observed in 2020.

This result was expected from a straight observance of data from 2013 to 2019 and then 2020. Figure 8 through Figure 13 show the maximum daily ozone from 2013-2019 and the mean maximum daily ozone from 2013-2019, both compared to the 2020 daily maximum ozone, for each monitor in the District. It is discernable from looking at the 4th highest daily maximum, 8-hour ozone that ozone levels were depressed in 2020. And the mean daily maximum ozone shows that the summer of 2020 experienced far less ozone than typical.

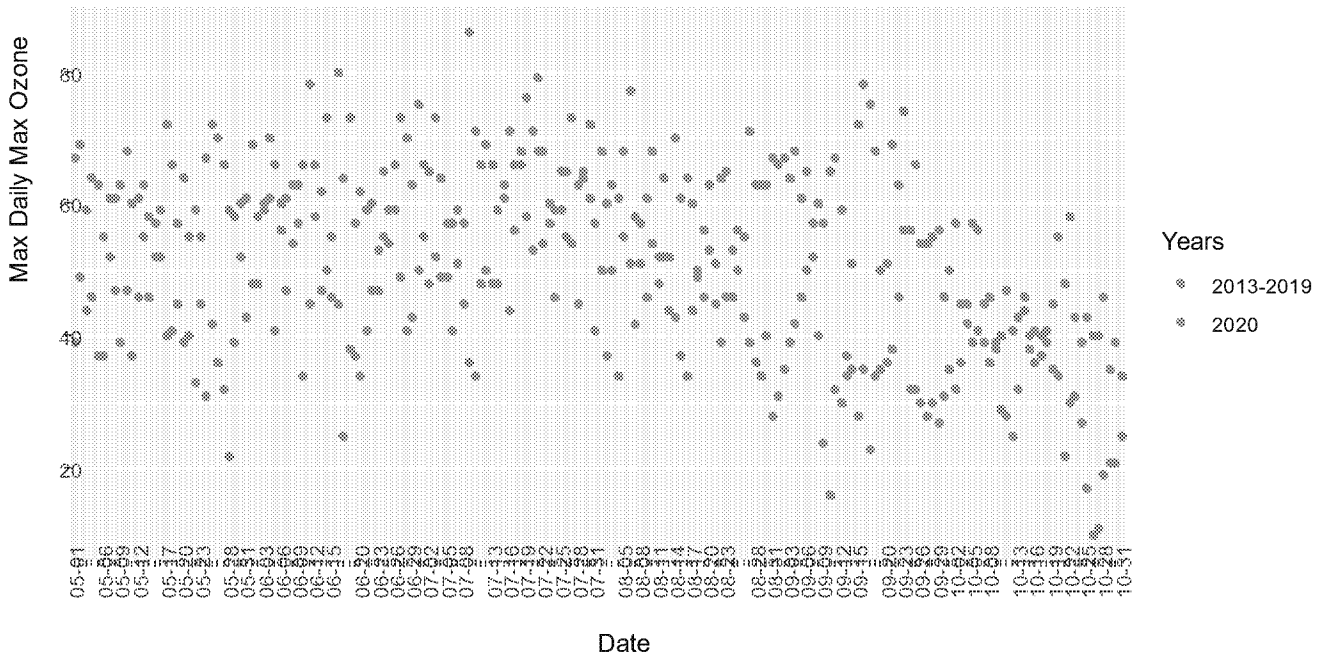

Figure 8: Maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (McMillan Reservoir: 110010043)

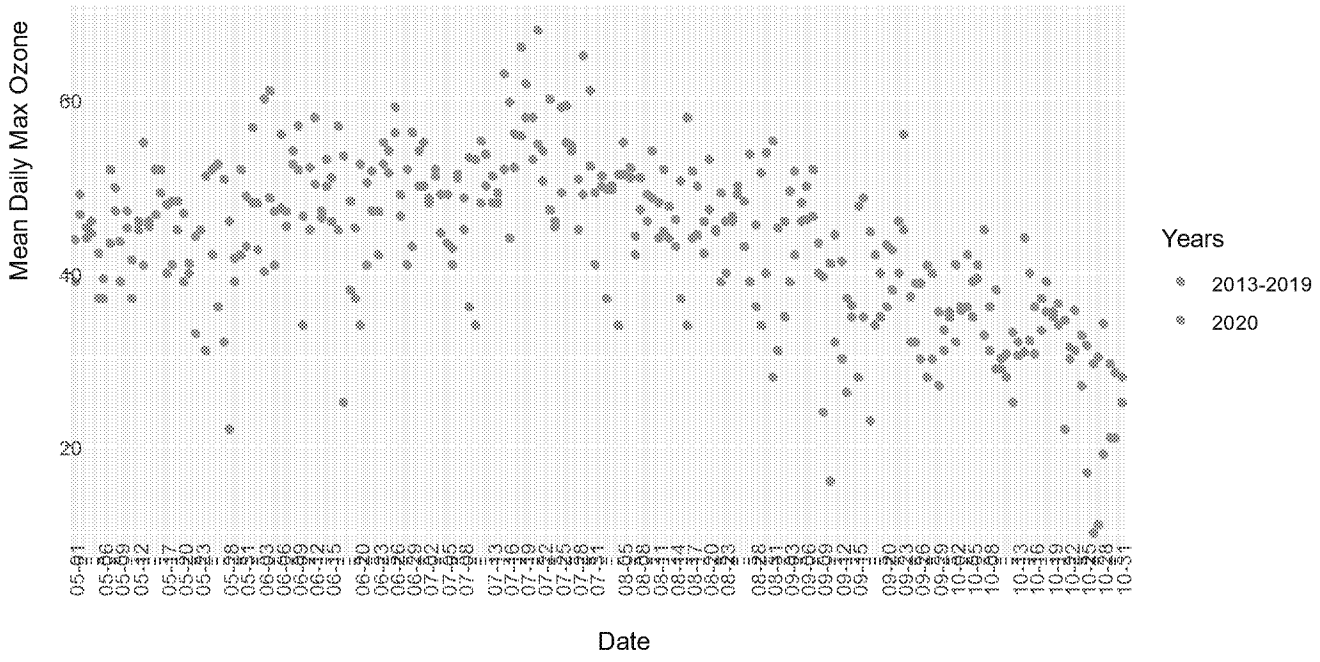

Figure 9: Mean daily maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (McMillan Reservoir: 110010043)

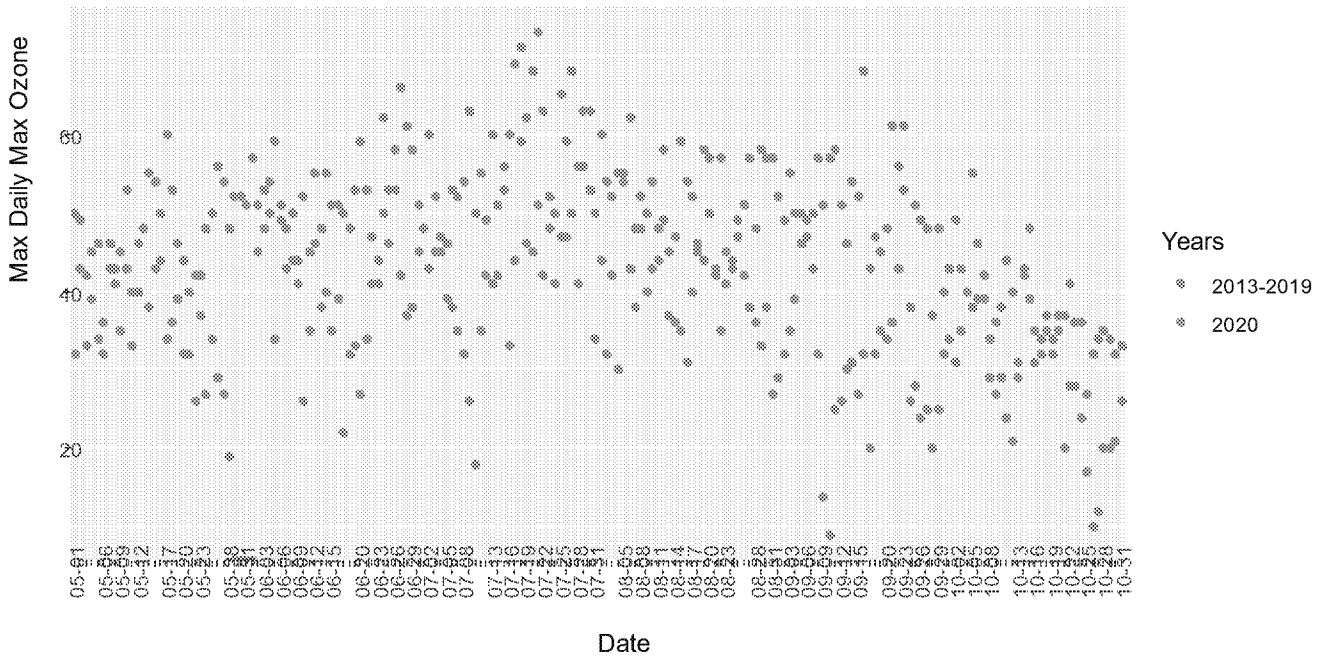

Figure 10: Maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (River Terrace: 110010041)

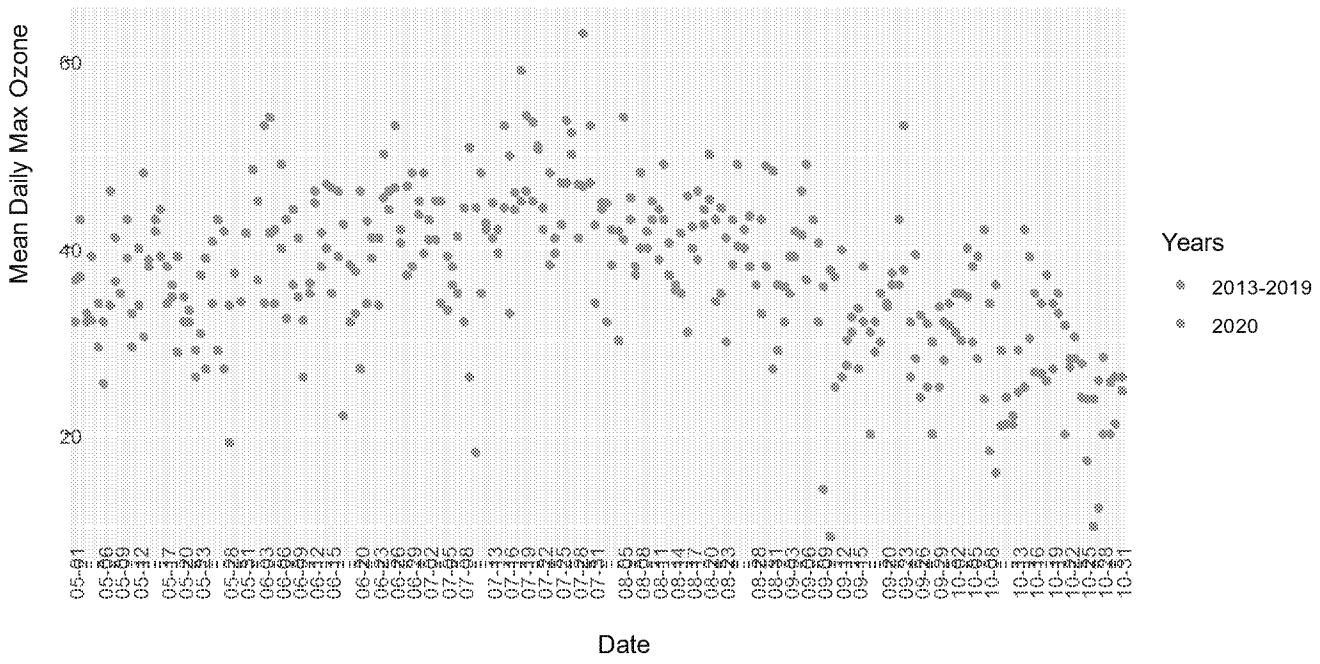

Figure 11: Mean daily maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (River Terrace: 110010041)

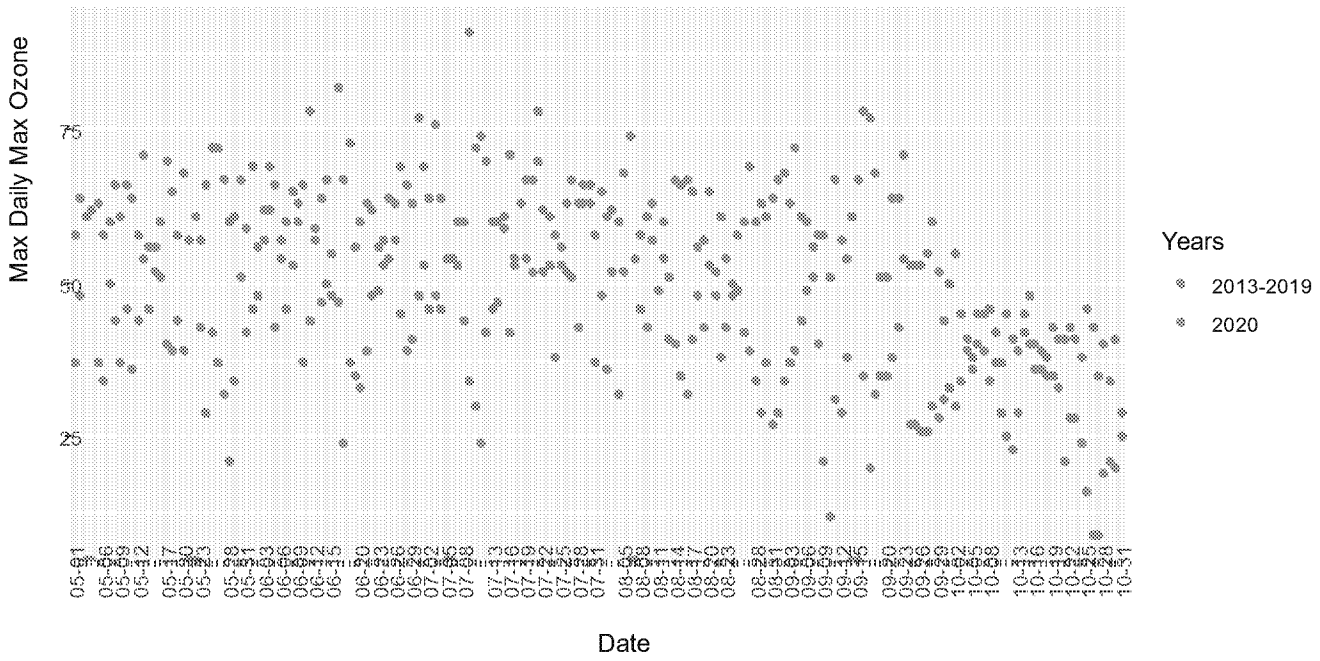

Figure 12: Maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (Takoma Rec Center: 110010050)

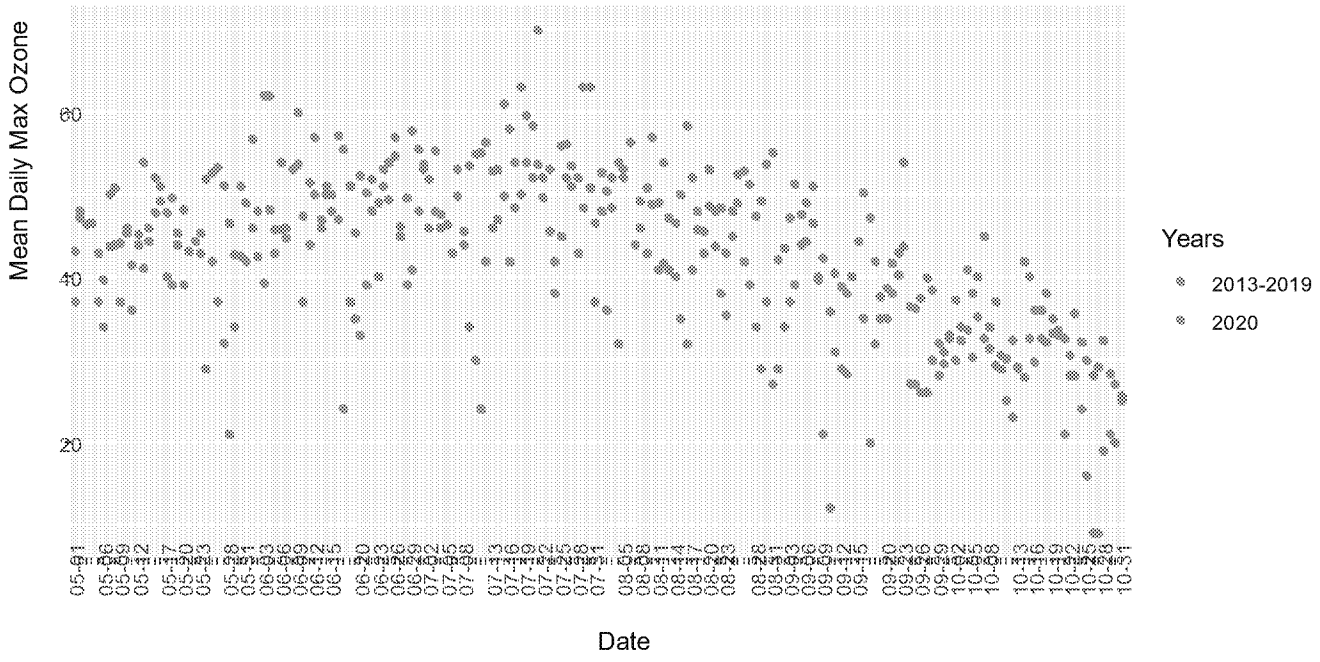

Figure 13: Mean daily maximum ozone (ppb) by day of the ozone season for 2013-19 and 2020 (Takoma Rec Center: 110010050)

2.1.1 Conceptual Model

Ozone is a secondary gas that is created by the photochemical reaction between precursor pollutants, in this case volatile organic compounds (VOCs) and nitrogen oxides (NO_X), in the presence of sunlight. Equations 1-4 explain the formation and depletion of ground-level ozone.

$$2NO + O_2 \rightarrow 2NO_2 \quad (1)$$

$$NO_2 + sunlight \rightarrow NO + O \quad (2)$$

$$O + O_2 \rightarrow O_3 \quad (3)$$

$$O_3 + NO \rightarrow NO_2 + O_2 \quad (4)$$

Nitric oxide (NO) reacts with oxygen (O_2) to produce nitrogen dioxide (NO_2). In the presence of sunlight, NO_2 breaks apart to form NO and a free oxygen atom. The free oxygen atom collides with molecules of oxygen to form ozone.

Generally, the highest levels of ozone occur during the hottest part of the year. In the District, the highest ozone levels are generally seen from May 1st to September 30th. During the day, ozone typically peaks in the mid to late afternoon. The relationship between NO_X and VOC levels and ozone, however, is not linear with ozone creation in certain areas or times of day being caused more by VOCs or NO_X depending on the chemistry, as shown in the example in Figure 14. In the District, all current evidence points towards the region being NO_X limited most days.

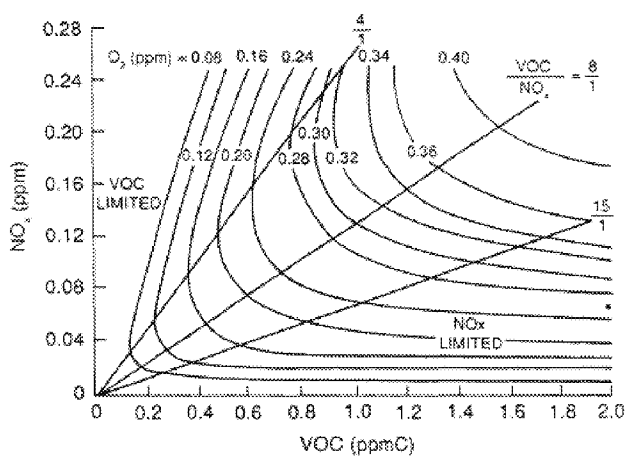

Figure 14: Typical ozone isopleths[4]

Determining which types of sources impact ozone formation is also important to understanding the conceptual model behind the event. The Ozone Transport Commission (OTC) conducted source

[4] Environment and Resources S Committee on Geosciences and National Research Council Staff, *Rethinking the Ozone Problem in Urban and Regional Air Pollution* (Washington: National Academies Press, 1991).

apportionment modeling using a 2011-based emissions platform.[5] Table 1 shows the modeled contribution to ozone exceedances and the 4th highest ozone value from the modeling. Excluding boundary conditions, which are not controllable, onroad mobile sources contribute nearly 20% to ozone levels on these days of concern. A major change to the transportation system would have a disproportionate effect on ozone levels.

Table 1: Average contribution by sector to McMillan, DC (110010043) monitor ordered by exceedance average

Source Group	Exceedance Avg	Exceedance Avg %	4th High Avg	4th High Avg %
Boundary Conditions	19.9	32.1%	22.7	26.3%
Onroad Mobile	11.3	18.3%	17.1	19.8%
Diesel Vehicles	*6.0*	*9.7%*	*9.2*	*10.6%*
Gasoline Vehicles	*5.4*	*8.7%*	*7.9*	*9.2%*
Nonroad Mobile	8.5	13.8%	12.6	14.6%
Non-EGU Point Source	6.3	10.3%	9.5	11.0%
ERTAC EGU Point Source	4.5	7.3%	7.8	9.0%
Nonpoint Sources	3.5	5.7%	5.4	6.3%
Biogenic	3.0	4.8%	3.6	4.1%
Oil & Gas	2.0	3.2%	3.5	4.0%
Marine/Rail	1.8	2.9%	2.3	2.7%
Other	1.0	1.6%	1.8	2.0%

2.1.2 Causal Relationship

As can be inferred from the conceptual model presented in Section 2.1.1, the relationship between the event and the ozone level is:

1. The Covid-19 health emergency caused unique levels of traffic congestion due to stay at home orders, mandatory telework, etc. in the Washington, DC area.
2. The marked decreases in traffic led to beyond normal reductions in NO_X pollution.
3. The reduction in NO_X pollution from onroad vehicles, combined with the location the Washington, DC area is on the ozone production curve, lead to exceptional decreases in ozone pollution.
4. The reductions in ozone were also not attributable to unique meteorological conditions or the implementation of control measures.

2.1.2.1 Link between Covid-19 and Traffic Congestion

One can see in Figure 15 that, starting in April 2020, Vehicle Miles Traveled (VMT) was consistently depressed throughout the remainder of the year. Figure 16 further shows the year-on-year VMT percentage decreases from 2019 to 2020, with May having the most pronounced decrease of 36.5

[5] Ozone Transport Commission, *Technical Support Document for the 2011 Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union Modeling Platform - 2nd Revision*, Washington, DC (Washington, DC: OTC, October 2018).

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percent. July was the month with the smallest percentage decrease, although there was still a decrease of 15.9 percent in the District.

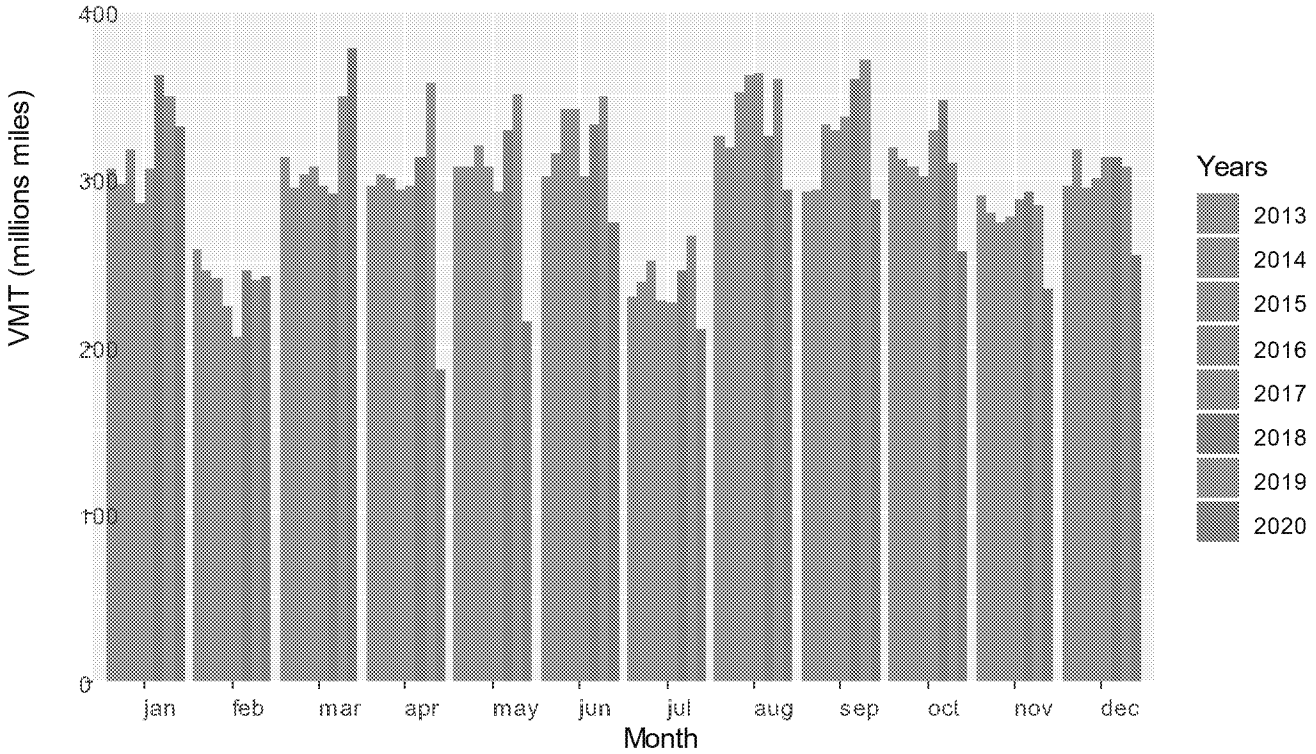

Figure 15: Monthly VMT from 2013-2020[6]

[6] Office of Highway Policy Information. "Traffic Monitoring Trends" https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm

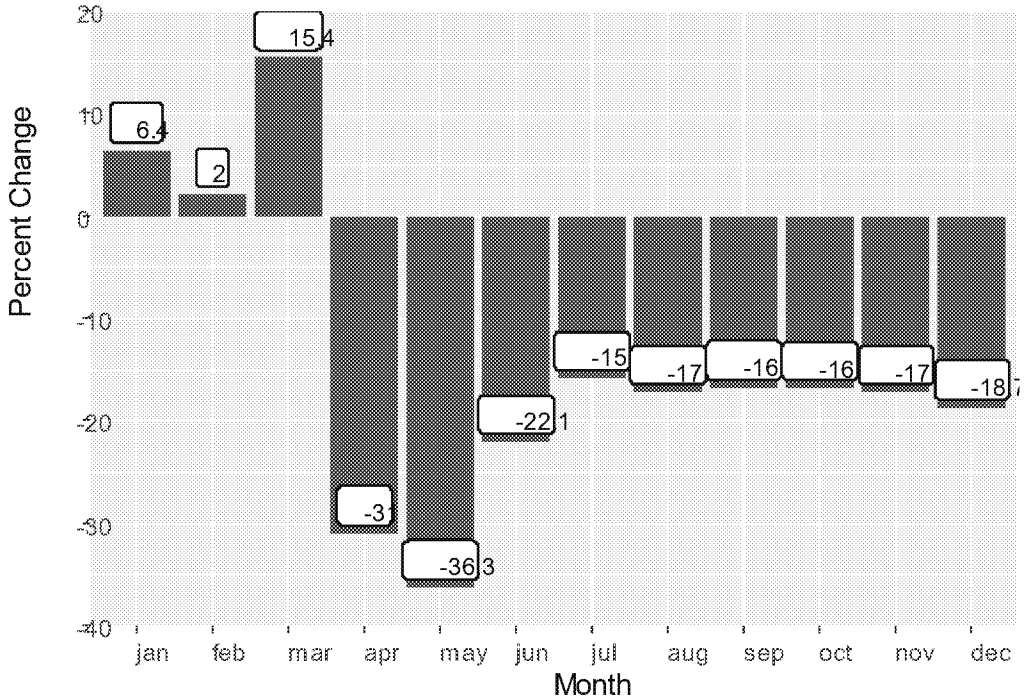

Figure 16: Percentage change in VMT from 2019 to 2020 by month

While data wasn't directly available for the District, Maryland Department of Environment (MDE) had data available from a traffic counter on I-95 located between Baltimore and Washington. This data showed that the reduced VMT was almost exclusively from the light-duty vehicle sector as implied by the nearly consistent levels of truck traffic as shown in Figure 17. It is reasonable to expect that a similar pattern of decrease in VMT would occur in the District.

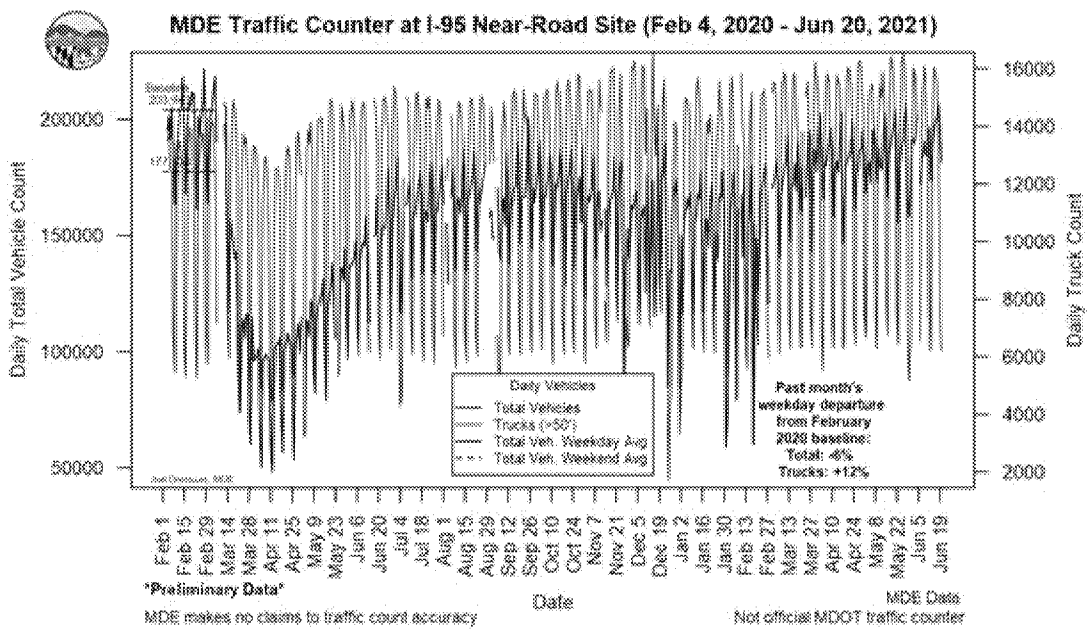

Figure 17: MDE traffic count from I-95 near road site (Feb 4, 2020 - June 20, 2021) (courtesy of MDE)

2.1.2.2 Link between Decreased Traffic Congestion and NO_X Reductions

To show the impact that the decreased traffic congestion had on NO_X emissions, two MOVES runs were completed. This work began before the introduction of MOVES3 so MOVES 2014b was used. A base case for 2019 was run using the inputs from Visualize 2045.[7] Then VMT and monthly VMT fractions were adjusted for a 2020 Covid-19 projected case. All other factors that could have changed are expected to have a minimal effect on emissions compared to the change in VMT and thus were not considered.

To adjust, VMT levels were set 81.27 percent (81.27%) less than annual VMT in 2019. This was applied exclusively to the HPMSVtypeID of 25 for light duty vehicles and corresponded to the annual percentage reduction in VMT from 2019 to 2020. Additionally, the monthVMTFraction was adjusted for light-duty passenger vehicles (sourceTypeIDs 31 and 32) as shown in Table 1.

Table 2: MOVES monthVMTFraction for light-duty vehicles

	1	2	3	4	5	6	7	8	9	10	11	12
Original	0.081544	0.075658	0.085371	0.08476	0.088264	0.087217	0.089758	0.089807	0.084391	0.086337	0.080828	0.066067
Adjustment	1.30915	1.255013	1.419887	0.861283	0.783768	0.958485	1.03477	1.017545	1.023697	1.022466	1.017545	1.000319
Projected	0.106753	0.094952	0.121217	0.073002	0.069178	0.083596	0.092879	0.091383	0.086391	0.088276	0.082246	0.066088

The results (Figure 18 and Figure 19) showed a striking reduction in April and May for both NO_X and VOCs, though the reduction in VOCs was lesser in magnitude. As expected, the reductions in pollution leveled off starting in June and remained consistent throughout the remainder of the year.

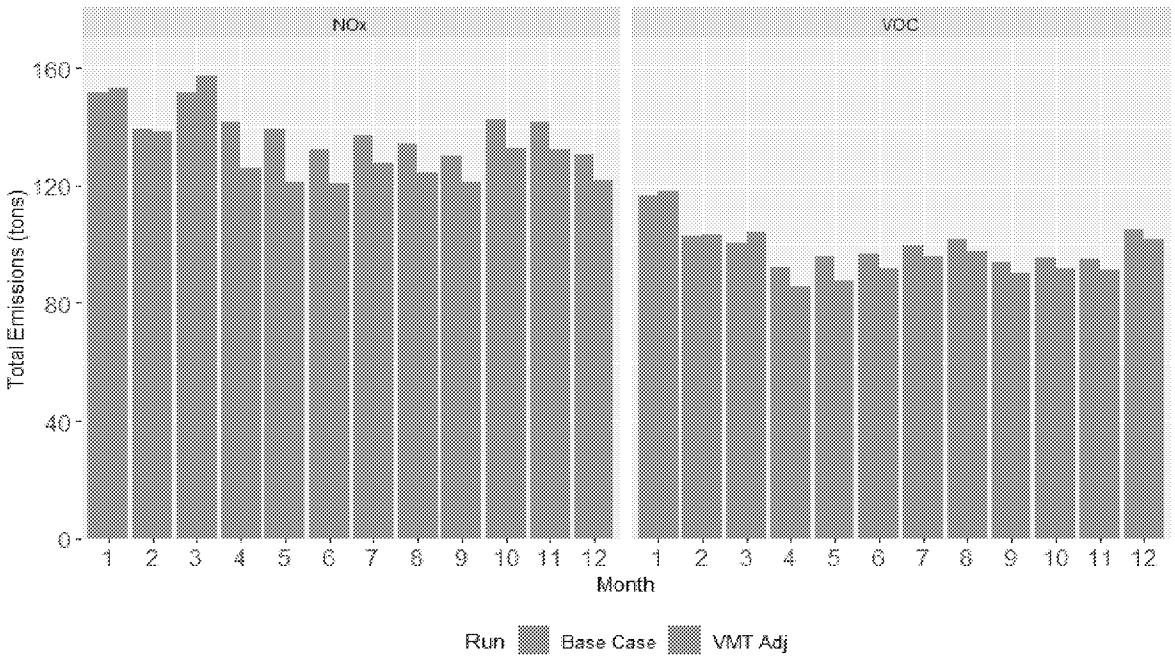

Figure 18: Total NO_X and VOCs (tons) from 2019 and 2020 VMT adjusted MOVES run.

[7] Metropolitan Washington Council of Governments, *Visualize 2045: A Long Range Transportation Plan for the National Capital Region*, (October 2018).

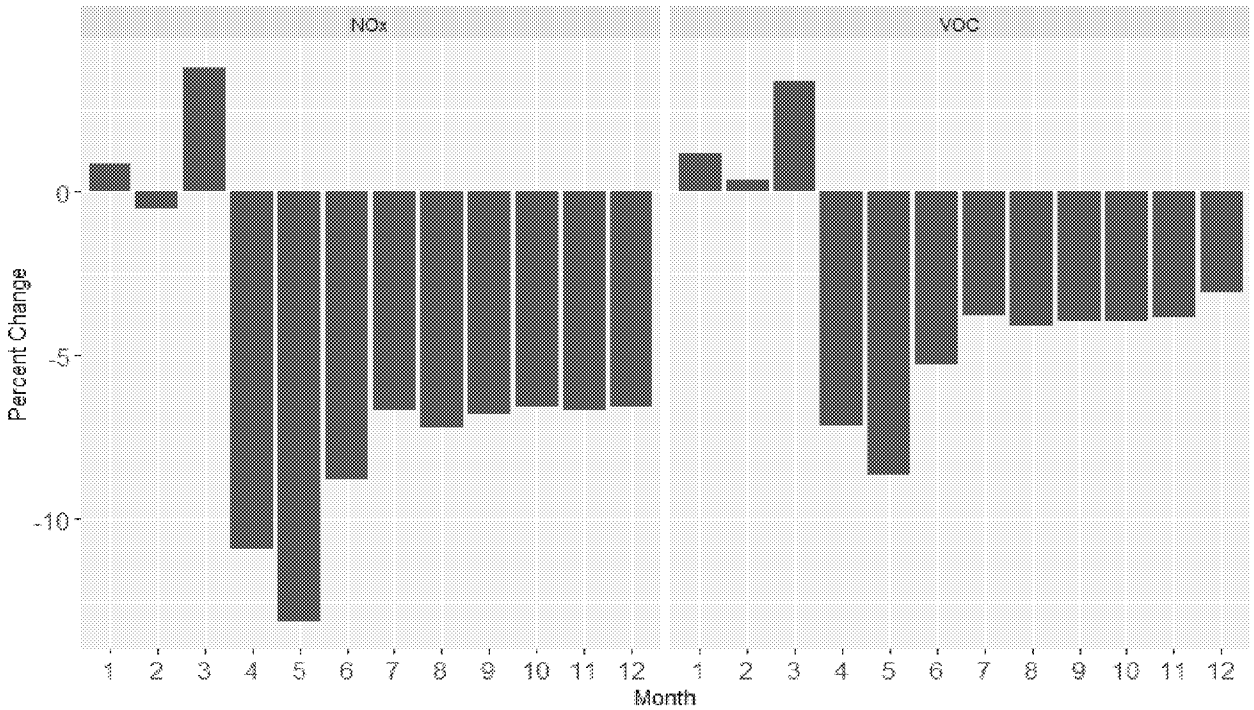

Figure 19: Percent monthly reduction in NO_X and VOCs from 2020 VMT adjusted MOVES run.

2.1.2.3 Link between NO_X Reductions and Ozone Reductions

The linkage between reductions in NO_X emissions and reduction in ozone emissions was discussed in detail in the previous section (2.1.1) on the conceptual model.

2.1.2.4 Refutations of Other Explanations for Ozone Reductions

Concerning the meteorological conditions in 2020, as shown in Figures 2 through 5 as well as in Table 2 of Attachment A, the meteorological variables from 2013 to 2019 are similarly correlated with ozone levels in 2020 as matched based on the ranking of the 8-hour ozone daily maximum and time of day. Of the variables, temperature and Global Horizontal Irradiance (GHI) both have stronger positive correlations, and relative humidity has a strong negative correlation with ozone. The other variables have less pronounced correlations. Wind speed has a less pronounced correlation with ozone levels but does maintain a similar level of correlation across years. In Figure 20, each of the variables maintains a similar relative correlation from year to year, including 2020, showing that meteorological conditions were consistent even in 2020.

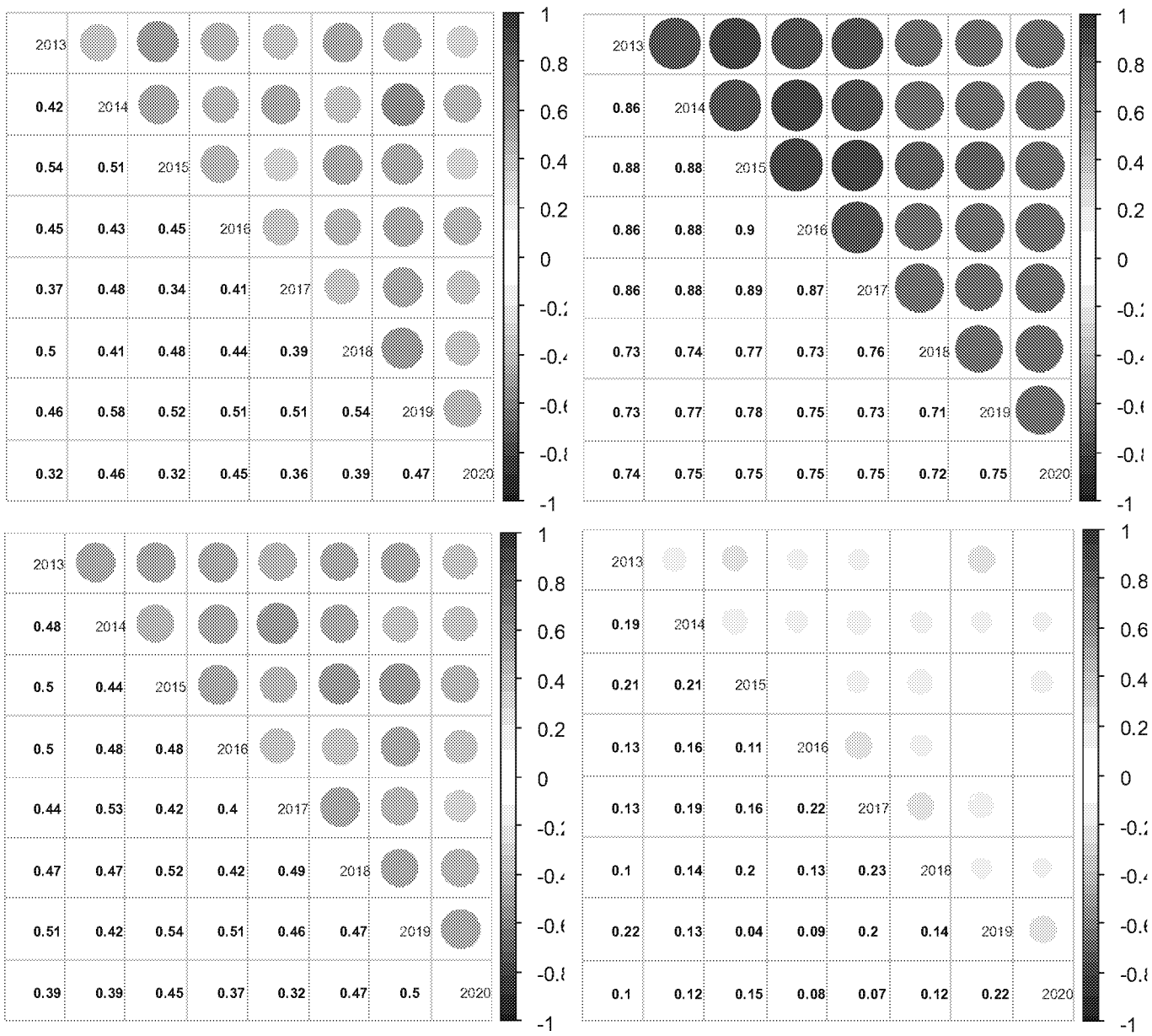

Figure 20: Correlation between ozone season temperature (upper left), GHI (right), humidity (lower left), and pressure (lower right) from 2013 to 2020 as matched based on 8-hour daily maximum rank and time of day

Concerning control measures, no major programs went into effect in 2020 that would have caused such a sharp drop in NO_X emissions. Table 3 examines programs that were recently implemented that lead to major reductions in NO_X emissions. The most recent year of such reductions was in 2017. While there is fleet turnover occurring as well, with light-duty vehicles in particular, that turnover also slowed greatly in 2020 as shown in Figure 21.

Table 3: Major federal NOX reduction control programs implemented in recent years

Sector	Rule	Date of Major NOX Reductions	Reference
EGUs	Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS	2017*	81 FR 74504
Light-duty Vehicles	Tier 3 Vehicle Emissions and Fuel Standards	2017	79 FR 23414
Heavy-duty Vehicles	Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements	2007	66 FR 5002
Marine Engines	Control of Emissions From New Marine Compression-Ignition Engines…	2016	75 FR 22896

* Smaller additional reductions from Arkansas in 2018

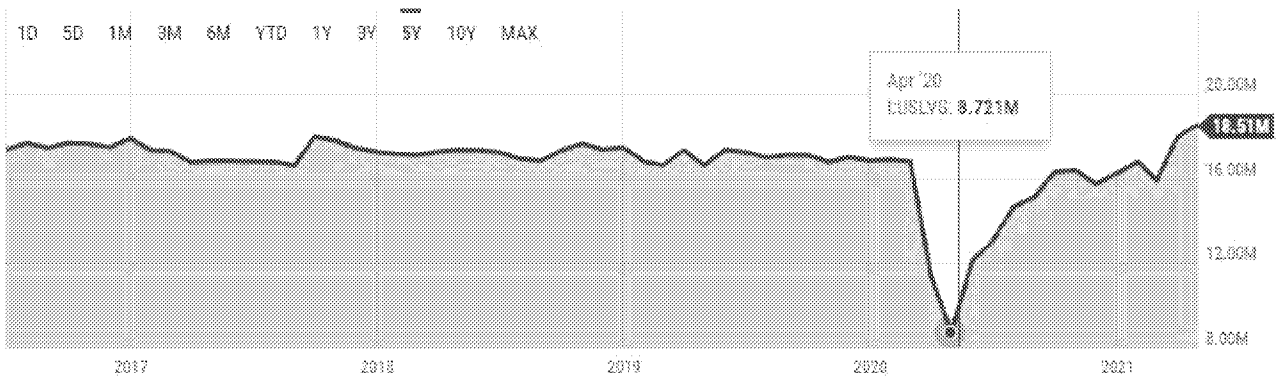

Figure 21: United States light-duty vehicle sales from April 2016 to April 2021

2.1.3 Comparison to Past Years

Concerning monitored values, the process for 2015 began with the 2015 design value, which was used as the basis for the District's Ozone Designation Recommendation.[8] Given that the design value is made up of data from the year in question and the preceding two years, we will examine the trends from 2013 to 2020.

As shown in Figure and Table 4, the 4th highest value for 2020 is quite low, a full 9 ppb lower than the average 4th highest values for the period from 2015 to 2019. Also, while the 2020 4th highest value is only 3 ppb lower than 2013, 2020 had over two and a half as many 90 degree days as 2013. Given that higher temperatures and high ozone levels are correlated, this is further evidence that 2020 ozone levels were indeed low. In fact, the same number of 90 degree days that were experienced in 2020 also occurred in 2016, and that year saw a 4th highest ozone value that was 9 ppb higher than experienced in 2020. The same pattern holds up, though to a lesser extent, for mean ozone season daily maximum 8-hour ozone.

[8] Muriel Bowser, "Nonattainment Designation Recommendation for the District under the 2015 Ozone Standards," September 23, 2016.

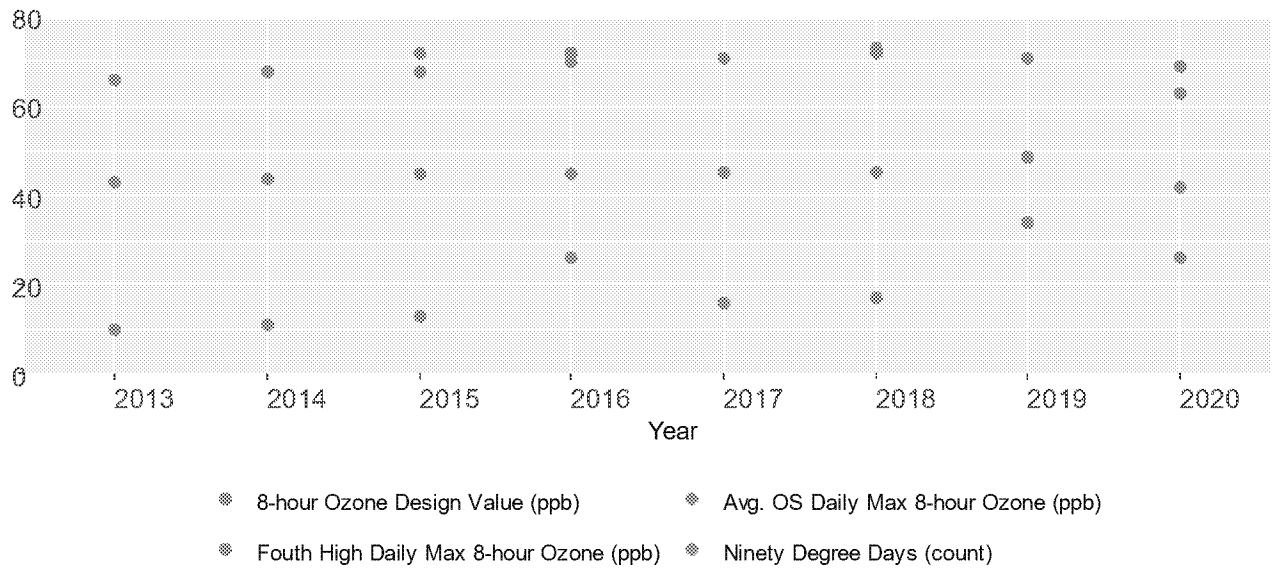

Figure 22: 2013-2020 ozone season summary.

Table 4: 2013-2020 ozone season summary

	Mean Daily OS Max 8-Hr Ozone (ppb)	4th High Daily Max 8-Hr Ozone (ppb)	Design Value (ppb)	90 Degree Days (count)
2013	42	66	79	10
2014	43	68	73	11
2015	44	72	68	13
2016	44	72	70	26
2017	45	71	71	16
2018	45	73	72	17
2019	48	71	71	34
2020	41	63	69	26

2.2 Not Reasonably Controllable nor Preventable

40 CFR § 50.14(c)(3)(iv)(D) also requires:

> *(D) A demonstration that the event was both not reasonably controllable and not reasonably preventable*

Whether this event was controllable or preventable is a significant question. However, given that the District is just one of many jurisdictions in our interconnected nation, it is reasonable to limit this question to whether or not the District itself could have controlled or prevented this exceptional event and its related air quality issues.

While the Exceptional Events Rule is limited to exceedances, 40 CFR § 51.14 (b)(8) provides a framework that can be applied to this situation for how to determine whether the Covid-19 health

emergency was indeed an exceptional event. We will follow the framework to the extent possible due while recognizing the framework is unnecessarily limited to exceedances.

40 CFR § 51.14 (b)(8) provides:

(8) Determinations with respect to the not reasonably controllable or preventable criterion.

(i) The not reasonably controllable or preventable criterion has two prongs that the State must demonstrate: prevention and control.

(ii) The Administrator shall determine that an event is not reasonably preventable if the State shows that reasonable measures to prevent the event were applied at the time of the event.

(iii) The Administrator shall determine that an event is not reasonably controllable if the State shows that reasonable measures to control the impact of the event on air quality were applied at the time of the event.

(iv) The Administrator shall assess the reasonableness of available controls for anthropogenic sources based on information available as of the date of the event.

(v) Except where a State, tribal or federal air agency is obligated to revise its state implementation plan, tribal implementation plan, or federal implementation plan, the Administrator shall consider enforceable control measures implemented in accordance with a state implementation plan, tribal implementation plan, or federal implementation plan, approved by the EPA within 5 years of the date of the event, that address the event-related pollutant and all sources necessary to fulfill the requirements of the Clean Air Act for the state implementation plan, tribal implementation plan, or federal implementation plan to be reasonable controls with respect to all anthropogenic sources that have or may have contributed to the monitored exceedance or violation.

(vi) Where a State, tribal or federal air agency is obligated to revise its state implementation plan, tribal implementation plan, or federal implementation plan, the deference to enforceable control measures identified in paragraph (b)(8)(v) of this section shall remain only until the due date of the required state implementation plan, tribal implementation plan, or federal implementation plan revisions. However, where an air agency is obligated to revise the enforceable control measures identified in paragraph (b)(8)(v) of this section in its implementation plan as a result of an action pursuant to Clean Air Act section 110(k)(5), the deference, if any, to those enforceable control measures shall be determined on a case-by-case basis.

(vii) The Administrator shall not require a State to provide case-specific justification to support the not reasonably controllable or preventable criterion for emissions-generating activity that occurs outside of the State's jurisdictional boundaries within which the concentration at issue was monitored. In the case of a tribe treated as a state under 40 CFR 49.2 with respect to exceptional events requirements, the tribe's jurisdictional boundaries for purposes of requiring or directly implementing emission controls apply. In the case of a federal land manager or other federal agency submitting a demonstration under the requirements of this section, the jurisdictional boundaries that apply are those of the State or the tribe depending on which has jurisdiction over the area where the event has occurred.

(viii) In addition to the provisions that apply to specific event types identified in paragraphs (b)(3)(ii) and (b)(5)(i) through (iii) of this section in addressing the requirements set forth in paragraph (c)(3)(iv)(D) of this section regarding the not reasonably controllable or preventable criterion, the State must include the following components:

(A) Identification of the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance or violation, including the contribution from local sources.

(B) Identification of the relevant state implementation plan, tribal implementation plan, or federal implementation plan or other enforceable control measures in place for the sources identified in paragraph (b)(8)(vii)(A) of this section and the implementation status of these controls.

(C) Evidence of effective implementation and enforcement of the measures identified in paragraph (b)(8)(vii)(B) of this section.

(D) The provisions in this paragraph shall not apply if the provisions in paragraph (b)(4), (b)(5)(vi), or (b)(6) of this section apply.

2.2.1 Reasonable Measures to Prevent the Event

Given the nature of the event, taking steps to prevent the event from the perspective of air quality would have been inappropriate. Any steps to prevent the unusually low pollution levels during the Covid-19 health emergency would have entailed purposefully raising emissions, which would not be an acceptable behavior.

2.2.2 Reasonable Measures to Control Air Quality

Given that in the short term this exceptional event led to temporarily healthier air, no measures were put in place to control the impact of the event on air quality. Doing so would run counter to the goals and aims of EPA and DOEE to protect the public health.

2.2.3 Reasonable Availability of Controls

Since this event was exceptional due to reductions in emissions levels, an assessment as to whether the emissions programs put into place in the District were sufficient is not directly relevant.

2.2.4 Implementation Plan Revisions

This is section argues the exceptional event needs to be approved in order to achieve and maintain healthy ozone levels in the District. If the low ozone levels from 2020 are not considered an exceptional event due to the Covid-19 event, the Washington, DC-MD-VA nonattainment area becomes a maintenance area, and the emissions reductions that occurred in 2020 cannot be incorporated into a SIP. This is because the emissions reductions from 2020 are not quantifiable, enforceable, or permanent and higher ozone levels will result when the Covid-19 emergency ends and travel patterns in particular return to normal.

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Furthermore, the District would not be required to develop an air quality attainment plan as air levels return to their normal NAAQS levels, which will remain in violations of the CAA.. As a result, a plan would not require and no federal action would be taken to reduce transported emissions, which will, in turn, lead to long-term health consequences for District residents.

2.2.5 Interstate Impacts

Given that over 90 percent of ozone pollution as modeled emanates from outside of the District's borders, that just under 30 percent of controllable ozone pollution comes from mobile sources that the District is preempted from setting emissions limits for, and that the District had little ability to control either what the Federal government, nor the fifty state governments, did in response to the Covid-19 health emergency, it reasonably follows that the air quality exceptional event related to the Covid-19 health emergency and subsequent unique traffic disruption was neither controllable nor preventable.[9]

2.2.6 Additional Provisions

The next three subsections will address 40 CFR § 50.14(b)(8)(viii)(A) – (C).

2.2.6.1 Identification of Natural and Anthropogenic Sources

The event was largely related to the drastic reduction in traffic in the Washington, DC metropolitan area due to Covid-19 shutdowns. As shown in Figure 15, there was a consistent drop in year over year VMT from April 2020 on. Though the most pronounced months (April and May) were towards the beginning of the ozone season, levels of monthly reduction in VMT remained steady from June onward with the smallest drop in the month of July still being 15.9 percent. MOVES modeling results in Figure 19 show how this reduction likely leads to the reductions in NO_2 and NO_X shown in Figure 4 and Figure 5.

2.2.6.2 Identification of Enforceable Controls in Relevant State Implementation Plans

Given that this event was the result of exceptionally low air pollution levels no controls are relevant to being able to prevent the event. This also makes 40 CFR § 50.14(b)(8)(viii)(C) irrelevant.

2.3 Human-caused Event Unlikely to Recur or a Natural Event

40 CFR § 50.14(c)(3)(iv)(E) requires the following in order to address the public process :

> *(E) A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event.*

[9] Ozone Transport Commission, "Technical Support Document for the 2011 Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union Modeling Platform - 2nd Revision."

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The fact that the virus originated due to a zoonotic transfer from a yet to be determined species to humans points to the Covid-19 health emergency being a natural event.

However, aspects of the Covid-19 health emergency such as the spread of the virus through travel and congregating in places of work and leisure, as well as the responses to protect public health such as implementation of telework for public and private business and the placing of restrictions on business activity to limit the spread, also point towards a human cause for the exceptional event. This brings us then to the question as to whether an event of this nature would be likely to occur again. Though it is not uncommon for instances of zoonotic transfer of respiratory virus to occur, such as Middle Eastern Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS), it has indeed been rare for such a virus to lead to such drastic impacts on regular human interactions. Only the 1918 influenza pandemic, and to a lesser extent, the 1957 influenza pandemic, resulted in a wholescale impact on society to such a scale that it could have an impact on air quality levels. Additionally, a repeat of the Covid-19 health emergency is most certainly less likely to recur than, for instance, fireworks displays, which are human-caused and occur annually at the same location, and are considered to be exceptional events in the Exceptional Events Rule.

The subsequent unique traffic disruption is also unlikely to recur. Studies have shown that the District was uniquely impacted by the decrease in traffic and related mobile source emissions. The transportation data firm INRIX found that between 2019 and 2020, there was a 77 percent decrease in congestion due to Covid-19, the most of any city analyzed.[10] By contrast areas such as New York City saw only a 28 percent decrease and Philadelphia a 34 percent decrease Other nonattainment areas that saw substantial drops in congestion such as Atlanta (75 percent) and Baltimore (68 percent) also saw significant drops in ozone. It is not expected that, once the emergency health measures are lifted in the District, the same level of decreased traffic congestion and related emissions would not occur as were experienced during 2020.

Though the Covid-19 health emergency has traits of both a human-caused event that is unlikely to recur and a natural event, the District concludes that the Covid-19 health emergency is not a human-caused event that is expected to regularly occur and, thus, meets the criteria of 40 CFR § 50.14(c)(3)(iv)(E).

2.4 Requirements in the Federal Regulations

Unfortunately, for purposes of addressing the current situation, the Exceptional Event Rule as promulgated solely to address exceedances. While it certainly is reasonable for exceedances to be considered in regards to exceptional events, and it is to be expected that such events would make up the majority of cases, there are also major health implications to the population of the District in the long run from using the exceptionally low ozone levels in 2020 to compare to the NAAQS. The Exceptional Event Rule begins by limiting the scope of the rule as follows from 40 CFR 50.14:

[10] Pishue, Bob. "INRIX 2020 Global Traffic Scorecard."

(i) This section applies to the treatment of data showing exceedances or violations of any national ambient air quality standard for purposes of the following types of regulatory determinations by the Administrator:

However, the Clean Air Act that the regulation is based on in no way limits consideration to exceedances or violations. To start, as we saw in the previous three sections that looked at the text from the Clean Air Act, none of the parts of the definition of an exceptional event are limited to just exceedances. CAA § 319(b)(1)(A) instead addresses any events that affect air quality, was neither controllable nor preventable, was either natural or anthropogenic, and was not recurring. Additionally, the specific list of exclusions in CAA § 319(b)(1)(B) does not mention an exclusion for neither pandemics nor events that do not result in exceedances. CAA § 319(b)(3)(A) also outlines principles related to exceptional events that are in no way limited to exceedances.

Exceedances are only specifically addressed in section CAA § 319(b)(3)(B), in particular CAA § 319(b)(3)(B)(ii), which requires a demonstration of a linkage between exceedances and the exceptional event, and § 319(b)(3)(B)(iv), which requires there be a process for excluding exceedances from calculation of the NAAQS. Of course, EPA more than adequately developed these processes in the Exceptional Event Rule. However, there is nothing in these two mandates from the Clean Air Act that limits EPA from excluding other exceptional events that don't result in exceedances.

It is understandable that exceptionally low monitored levels would not have been a Congressional priority to address as exceptional events when the provisions were enacted at a time that wildfires, volcanic eruptions, and Saharan dust events were happening with regularity. But the clear language regarding the scope of events to be addressed under CAA § 319(b) is not limited to exceedances either. As addressed earlier in the discussion of the legislative history in Section 1.2, not once in the bill summary, nor in the discussion, is the word exceedance mentioned.

If limiting the scope of CAA § 319(b) solely to exceedances was the goal, Congress would have addressed such limitation in the primary statutory definition of an exceptional event, and they would have included in the principles outlined for EPA to use when developing regulations.

The District suggests that in the short-term, EPA should evaluate the District's contention that reduction in ozone levels that resulted from the COVID-19 public health emergency was an exceptional event against the statutory text solely, and, in the long-term, that the Agency should create a mechanism in the Exceptional Event Rule to exclude consideration of data from unique events that result in exceptionally low emissions levels either on a case-by-case basis or within a specific regulatory framework.

2.5 Exclusions

As the District has demonstrated in the previous sections, the Covid-19 health emergency led to emissions reductions largely from the onroad mobile source sector, which means that this exceptional

event is not specifically excluded under the statutory definition of exception event at CAA § 319(b)(1)(B).

3.0 Principles of Exceptional Events

The request for treatment of COVID-19 related reductions in ozone as an exceptional event is in accordance with the principles of exceptional events outlined in the Clean Air Act, § 319(b)(3)(A).

3.1 Protection of the Public Health is the Highest Priority

It is precisely because of this principle that the District is submitting this exceptional event for exclusion, since evaluating compliance using 2020 values will not lead to the necessary air quality improvements to protect the health of District residents. Including 2020 data in the design value calculation to evaluate the NAAQS will result in a metric that shows attainment even though the emissions reductions that led to this state are not quantifiable, enforceable, or permanent. As a result, once the anomalous 2020 data has worked its way out of the design value calculation in 2023, it is quite likely that the District will once again return to monitored ozone values that are above the public health standard. The appropriate course of action to protect the public health would be to consider the 2020 monitored data as exceptional and evaluate the NAAQS against 2017, 2018, and 2019 data. This would in turn lead to the need for measures being put in place by upwind contributing states and the District that would be permanently protective of the public health. This approach would be the proper approach to protect public health, rather than accepting the likelihood that ozone levels more in line with normal levels will occur as a result of increased motor vehicle usage once the COVID-19 emergency ends, which in turn result in residents in the District breathing unhealthy air for several years.

3.2 Timely Dissemination of Information to Protect the Public Health

The District reports hourly data on ozone and other required precursors to the Air Quality System (AQS). This data is then publicized on EPA's airnow.gov website. The District also, through the Metropolitan Washington Council of Governments, partners with Clean Air Partners to disseminate air quality alerts through the media, email alerts, websites, and more when pollution levels reach unhealthy levels. The District takes the utmost care in making sure that the public is aware of any unhealthy air pollution. Additionally, because pollution levels did not reach unhealthy levels as a result of the COVID-19 exceptional event, this principle is not relevant to this analysis, though the District does regularly adhere to the principle that unhealthy air needs to be reported.

3.3 Submission of Air Quality Data to Federal Air Quality Databases

As discussed in Section 3.2, the District reports hourly data on ozone and other required precursors as well as other to the Air Quality System (AQS). This data is then publicized on EPA's airnow.gov website. The District designated air quality monitoring personnel as essential staff, allowing the District's complete monitoring network to remain active for the entirety of the Covid-19 health emergency.

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Additionally, the District flagged all data in AQS with a "RR" flag denoting a "unique traffic disruption" exceptional event. Given that the Covid-19 health emergency led to unprecedented disruption of daily traffic patterns as shown in Section 2, this was the most accurate description of the event provided.

3.4 Necessary Measures to Safeguard Public Health

Concerning air quality, the Covid-19 health emergency in itself did not lead to air quality that was detrimental to public health so no additional efforts were made to reduce pollution levels. However, since the use of air quality data from 2020 when comparing against the NAAQS will lead in the long term to quantifiable, enforceable, and permanent controls not being put in place to protect the public's health, treatment of the anomalous ozone levels as an exceptional event is a necessary step to safeguard the public health.

3.5 Air Quality Data Screening

Given the nature of this exceptional event, this principle is not directly applicable. Although the ozone levels during the Covid-19 health emergency are lower than typical, especially during the summer months, they are in ranges experienced normally in the District during other seasons and with those in less urban areas during average ozone seasons. As a result, no particular scrutiny of the District's data screening techniques was necessary in response to this exceptional event.

4.0 Requirements of Exceptional Events

This section will document how this exceptional event meets the Clean Air Act requirements for exceptional events. Clean Air Act § 319 (b)(3)(B)(iv) is a directive to EPA and is not discussed.

4.1 Prompt Demonstration

DOEE certified its air quality ozone and meteorological data for year 2020 on April 30, 2021. It then proceeded to complete the analysis of 2020 data with respect to this demonstration as expeditiously as practicable. The data relied on in this analysis, for all criteria pollutants and many meteorological factors, have all been certified as accurate by DOEE and the certification letter is included as Attachment B.

DOEE also is required under the exceptional events rule to undertake a communicative process with EPA called "Initial Notification of Potential Exceptional Event" (40 CFR § 50.14). DOEE is obligated to initiate this and it can take variety of forms as discussed in the Exceptional Events Rule (81 FR 68216. October 2016).

> *As previously indicated, the Initial Notification could include any form of communication (e.g., letter, email, in-person meeting with an attendees list and discussion summary or phone conversation with follow-up email) that ultimately identifies the potential need to develop an exceptional events demonstration and communicates key information related to the data identified for potential exclusion.*

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DOEE held phone calls with EPA Region 3 staff on May 4, June 1, and July 13during which the treatment of the COVID-19 reductions in ozone as an Exceptional Event was discussed.

4.2 Clear Causal Relationship between Event and Monitored Air Quality

This linkage was discussed thoroughly in Section 2.1. In Section 2.1, the District found there to be a clear linkage between the Covid-19 health emergency and subsequent unique traffic disruption and the lower levels of monitored ozone pollution.

4.3 Public Process

40 CFR § 50.14(c)(3)(v) addresses the public process with the following requirements:

> *(v) With the submission of the demonstration containing the elements in paragraph (c)(3)(iv) of this section, the State must:*
>
> > *(A) Document that the State followed the public comment process and that the comment period was open for a minimum of 30 days, which could be concurrent with the beginning of the Administrator's initial review period of the associated demonstration provided the State can meet all requirements in this paragraph;*
> > *(B) Submit the public comments it received along with its demonstration to the Administrator; and*
> > *(C) Address in the submission to the Administrator those comments disputing or contradicting factual evidence provided in the demonstration.*

The District held a thirty day public comment period related to this issue and held hearing at 5:30 p.m. on Monday, September 20, 2021. A Notice of Public Hearing with Public Comment Period was posted in the D.C. Register on August 21, 2021 (68 DCR 008218). No written or oral comments were received. The Public Notice is Attachment B and the Hearing Officer's Certification is Attachment C.

5.0 Summary

In summation, the District has shown that beginning on March 16, 2020, and running through to December 31, 2020, the Covid-19 health emergency and subsequent unique traffic disruption has led to exceptionally low levels of ozone pollution that should be considered an exceptional event and thus should not be evaluated against the NAAQS and, specifically, these levels should not be used in calculations of the 2020, 2021, or 2022 design values.

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Attachment A - 2020 Ozone Exceptional Events Analysis for the District of Columbia

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Attachment B – 2020 Data Certification Letter

Attachment C – Notice of Public Comment Period and Hearing

Attachment D – Hearing Officer's Certification