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**State Implementation Plan Revision:
Maintenance Plan for the 2008 Ozone
National Ambient Air Quality Standards
for the Moderate Baltimore
Nonattainment Area**

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**Prepared by:
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1. Introduction

Maryland Department of the Environment (MDE) is submitting a redesignation request and maintenance plan for the Baltimore Nonattainment Area for the 2008 Ozone National Ambient Air Quality Standard (NAAQS) to the United States Environmental Protection Agency (EPA). Section 2 contains the redesignation request, and Section 3 contains the maintenance plan. Altogether, this document demonstrates that air quality in the Baltimore Nonattainment Area will remain compliant with the 2008 Ozone NAAQS until 2038.

1.1 National Ambient Air Quality Standard (NAAQS) for Ozone

When EPA establishes a NAAQS, this standard applies to the concentration of a pollutant in ambient outdoor air. If the air quality in a geographic area is at or below the national standard, EPA designates the area as attainment/unclassifiable. EPA designates areas that do not meet the national standard or contribute to nearby areas that violate the air quality standard as nonattainment.

Ground-level ozone is an extremely reactive gas comprised of three atoms of oxygen. Ozone, the primary constituent of smog, continues to be a pollution problem throughout many areas of the United States. Unlike other pollutants, ground-level ozone is not directly emitted into the atmosphere from a specific source. Instead, ground-level ozone forms when nitrogen oxides (NO_x) chemically react with volatile organic compounds (VOCs) through a series of chemical reactions in warm, sunny conditions.

Because ozone formation is greatest when the sunlight is most intense, the peak ozone levels typically occur during hot, dry, and stagnant summertime conditions. Peak ozone concentrations exhibit a clear seasonal cycle, with concentrations rising at the onset of warmer weather in spring and declining again as autumn approaches. Changing weather patterns can significantly contribute to yearly differences in ozone concentrations. Years with summertime weather conditions that are hot and dry will generally result in many more days of poor air quality than cool and wet summers.

The formation of ozone is not an instantaneous process, nor is it limited in geographical scope. While many urban areas tend to have high levels of ozone, even rural areas may experience increased ozone levels because wind carries ozone and its precursors hundreds of miles from their original sources. Numerous studies and modeling data show compelling evidence that weather patterns often result in the transport of ozone and the pollutants responsible for ozone formation well beyond the locality that produced the emissions. In many cases, unhealthy days of air pollution experienced in the Baltimore Nonattainment Area are exacerbated by pollutants transported into the area from other states.

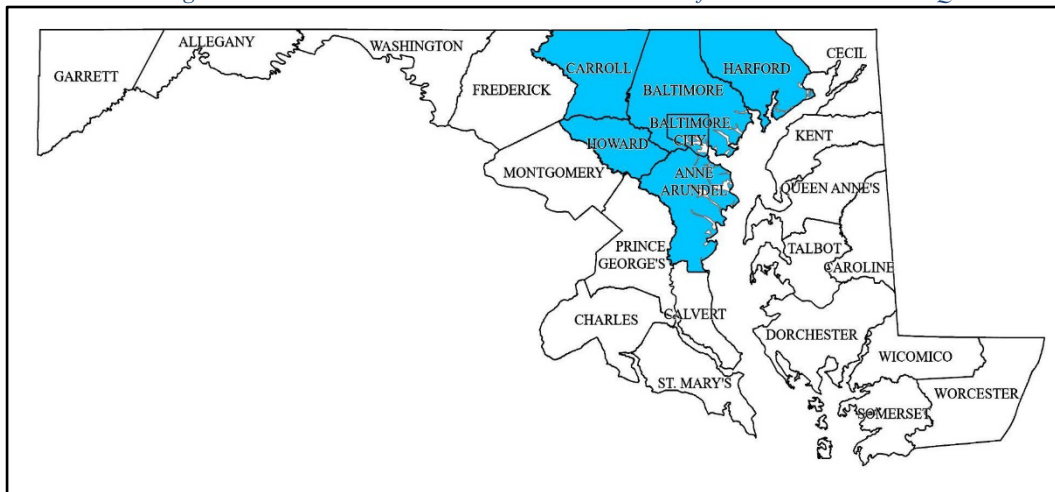
Ozone can have significant impacts on human health, particularly people with existing respiratory disease, the elderly, and children. Ozone also impacts the environment and ecosystem health. Scientific evidence suggests that air pollution weakens the immune systems of many types of vegetation and can cause significant crop damage. In addition, rain and snow wash air pollution deposited on vegetation and architectural surfaces into the streams and rivers of the region and finally into the Chesapeake Bay.

1.2 2008 Ozone National Ambient Air Quality Standard (NAAQS) in the Baltimore Nonattainment Area

The EPA promulgated a primary NAAQS of 75 parts per billion (ppb) for ozone in 2008.¹ The standard is measured over 8 hours, with the average fourth highest concentration over a 3-year period determining if an area is monitoring attainment. The ozone NAAQS, as a primary standard, is defined in CAA Section 109(b)(1) as a standard “the attainment and maintenance of which in the judgment of the [EPA] Administrator, based on [the air quality] criteria and allowing an adequate margin of safety, are requisite to protect the public health.”² The NAAQS aims to protect the health of populations who are particularly sensitive to air pollution, such as children, the elderly, and those with conditions, such as asthma and emphysema.

In 2012, the EPA designated the Baltimore metropolitan area as a “moderate” nonattainment area for the 2008 Ozone NAAQS.³ The nonattainment area is composed of Baltimore City, and Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties. The entire nonattainment area is contained in Maryland.

Figure 3-1: Baltimore Nonattainment Area Boundaries for the 2008 Ozone NAAQS



On June 1, 2015, EPA determined that the Baltimore Nonattainment Area had attained the 2008 Ozone NAAQS by the Moderate attainment deadline.⁴ EPA granted a Clean Data Determination based on a Design Value utilizing 2012-2014 monitoring data. Under EPA's Clean Data Policy, certain SIP elements are suspended for a nonattainment area when EPA issues a determination that air quality data demonstrates that the NAAQS is being attained. EPA deems these suspended SIP elements as no longer applicable as long as air quality continues to meet the NAAQS.

¹ *National Ambient Air Quality Standards for Ozone*, Final Rule, 73 FR 16436, March 27, 2008.

² 42 U.S.C. 7409

³ *Air Quality Designations for the 2008 Ozone National Ambient Air Quality Standards*, Final Rule, 77 FR 30088, May 21, 2012.

⁴ *Approval and Promulgation of Air Quality Implementation Plans; Maryland; Determination of Attainment of the 2008 8-Hour Ozone National Ambient Air Quality Standard for the Baltimore, Maryland Moderate Nonattainment Area*, Final Rule, 80 FR 30941, June 1, 2015.

1.3 Health Effects from Elevated Concentrations of Ozone

Ozone is a highly reactive gas that reacts strongly with living tissues, as well as many synthetic substances. As an oxidizing gas, it can cause oxidative damage to the cells and the lining fluids of the airways, which may trigger immune-inflammatory responses.⁵ Excess ozone in the air can be harmful to people who work or exercise outdoors regularly, people with respiratory difficulties, and especially children. The most common symptom of ozone exposure is pain when taking a deep breath. Exposure to ozone can result in both long-term and short-term effects in healthy individuals, as well as those who are already sensitive to air pollution, such as children, asthmatics, and elderly individuals. Research suggests that repeated exposure to ozone may cause damage to lung tissue, thereby reducing lung function. According to EPA, “Long-term exposure to ozone is linked to aggravation of asthma and is likely to be one of many causes of asthma development. Studies in locations with elevated concentrations also report associations of ozone with deaths from respiratory causes.”⁶ Short-term effects of ozone exposure among healthy populations include impaired lung function, throat irritation, pain or burning in the chest when taking a deep breath, chest tightness, wheezing, shortness of breath, and reduced ability to perform physical exercise. Additionally, other potential short-term effects include increased hospital admissions and emergency room visits for respiratory reasons and increased school absences.⁷

1.4 Redesignation Request Requirements

Nonattainment areas can be redesignated to attainment providing that States meet specific conditions. EPA provided guidance on the redesignation request and maintenance plan process in the memorandum entitled *Procedures for Processing Requests to Redesignate Areas to Attainment*.⁸ The memorandum provides guidance regarding the processing of redesignation requests for ozone, carbon monoxide (CO), particulate matter, sulfur dioxide, nitrogen dioxide (NO₂), and lead nonattainment areas. MDE followed the redesignation guidance while preparing this maintenance plan and redesignation request.

The CAA lists five obligations that must be met during the redesignation process. Section 107(d)(3)(E) states:

- The Administrator may not promulgate a redesignation of a nonattainment area (or portion thereof) to attainment unless –
- (i) the Administrator determines that the area has attained the national ambient air quality standard;
 - (ii) the Administrator has fully approved the applicable implementation plan for the area under section 110(k);
 - (iii) the Administrator determines that the improvement in air quality is due to permanent and enforceable reductions in

⁵ Kelly FJ. *Oxidative stress: its role in air pollution and adverse health effects*. Occupational and Environmental Medicine 2003; 60:612-616. <http://dx.doi.org/10.1136/oem.60.8.612>

⁶ “Health Effects of Ozone Pollution.” Ground-level Ozone Pollution, Environmental Protection Agency, <https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution>

⁷ “Health Effects of Ozone in the General Population.” Ozone Pollution and Your Patients' Health, Environmental Protection Agency, <https://www.epa.gov/ozone-pollution-and-your-patients-health/health-effects-ozone-generalpopulation#short%20term>

⁸ *Procedures for Processing Requests to Redesignate Areas to Attainment*. John Calcagni. September 4, 1992.

emissions resulting from implementation of the applicable implementation plan and applicable Federal air pollutant control regulations and other permanent and enforceable reductions;

- (iv) the Administrator has fully approved a maintenance plan for the area as meeting the requirements of section 175A; and
- (v) the State containing such area has met all requirements applicable to the area under section 110 and part D.

2. Redesignation Request

2.1 Attainment of the Standard

A State requesting redesignation must show that the area is attaining the applicable NAAQS. For the 2008 Ozone NAAQS, the design value (DV) must be less than or equal to 0.075 ppm (or 75 ppb). EPA determined that the Baltimore Nonattainment Area had attained the 2008 Ozone NAAQS based on 2012-2014 ambient air quality monitoring data. MDE has evaluated the data from the ozone monitoring network within the nonattainment area to confirm that the ambient air quality concentrations show continued attainment of the NAAQS.

The ozone DVs for the 2014 to 2025 time period are shown in Table 4-1 below. The monitored design values in the nonattainment area all meet the 75 ppb standard as shown in the table, demonstrating continued attainment of the 2008 Ozone NAAQS.

Table 2-1: Ozone Monitoring Data and NAAQS Attainment for the Baltimore Nonattainment Area

Monitor Name	County	AQS Site ID	2012-2014 DV	2013-2015 DV	2014-2016 DV	2015-2017 DV	2016-2018 DV	2017-2019 DV	2018-2020	2019-2021 DV	2020-2022 DV	2021-2023 DV	2022-2024 DV	2023-2025 DV
Aldino	Harford	24-025-9001	0.073	0.070	0.073	0.073	0.073	0.07	0.067	0.068	0.067	0.071	0.069	0.068
Edgewood	Harford	24-025-1001	0.075	0.071	0.072	0.075	0.075	0.075	0.072	0.072	0.068	0.071	0.070	0.070
Essex	Baltimore	24-005-3001	0.072	0.069	0.072	0.073	0.073	0.072	0.069	0.070	0.068	0.073	0.069	0.068

Lake Montebello*	Baltimore	24-510-5253	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.069	0.069
Furley**	Baltimore	24-510-0054	0.064	N/A	0.066	0.069	0.07	0.073	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Padonia	Baltimore	24-005-1007	0.072	0.071	0.072	N/A	N/A	N/A	0.068	0.069	0.068	0.068	0.069	0.070	
South Carroll	Carroll	24-013-0001	0.069	0.067	0.068	0.069	0.068	0.066	0.064	0.064	0.064	0.067	0.066	0.066	

*Lake Montebello’s first complete year of data collection was 2022, so the first available DV is 2024.

**Furley was discontinued as the Baltimore City monitor and replaced by Lake Montebello.

2.2 Fully Approved Implementation Plan Under Section 110(k)

The Baltimore Nonattainment Area was classified as “moderate” nonattainment in 2012. According to EPA’s final rule titled *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements*, all States with nonattainment areas had 3 years to submit moderate attainment demonstrations from the effective date of designation, which was July 20, 2012.⁹ However, on June 1, 2015, EPA finalized a rule determining that the Baltimore Nonattainment Area had attained the 2008 Ozone NAAQS using certified 2012-2014 monitoring data.¹⁰ As a result, “the requirement for the Baltimore Area to submit an attainment demonstration and associated reasonably available control measures (RACM), reasonable further progress plans (RFP), contingency measures, and other State Implementation Plan (SIP) revisions related to attainment of the standard are suspended for as long as the area continues to attain the 2008 8-hour ozone standard.” Maryland provided other provisions required of States after the promulgation and designation of a NAAQS, which are outlined in Section 2.5.

⁹ U.S. Environmental Protection Agency (EPA). *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements* (March 6, 2015). 80 FR 12264. <https://www.federalregister.gov/documents/2015/03/06/2015-04012/implementation-of-the-2008-national-ambient-air-quality-standards-for-ozone-state-implementation>

¹⁰ U.S. Environmental Protection Agency (EPA). *Approval and Promulgation of Air Quality Implementation Plans; Maryland; Determination of Attainment of the 2008 8-Hour Ozone National Ambient Air Quality Standard for the Baltimore, Maryland Moderate Nonattainment Area* (June 1, 2015). 80 FR 30941. <https://www.federalregister.gov/documents/2015/06/01/2015-13030/approval-and-promulgation-of-air-quality-implementation-plans-maryland-determination-of-attainment>

2.3 Permanent and Enforceable Improvements to Air Quality

2.3.1 Emissions Reductions between 2011 and 2023

For the 2008 Ozone NAAQS, MDE developed and submitted a base-year inventory for 2011. Between 2011 and 2023, the attainment year inventory, significant emissions reductions have occurred thanks to a variety of federal and state control measures. Overall, there has been a 66.36% reduction in NO_x emissions and a 30.25% reduction in VOC emissions. A comparison of the inventories is presented in Table 2-2, while Section 2.3.2 contains a list of control measures that have benefited air quality in the Baltimore Nonattainment Area.

Table 2-2: 2011 and 2023 Emissions Inventory for the Baltimore Nonattainment Area

Sector	2011		2023	
	NO _x (tpd)	VOC (tpd)	NO _x (tpd)	VOC (tpd)
Point	107.68	8.23	29.06	4.41
Quasi-Point	5.38	1.08	9.83	1.64
Area	8.50	68.09	12.72	71.17
Nonroad	28.63	36.62	9.84	18.11
Onroad	116.73	45.34	24.42	16.38
M-A-R	18.43	1.64	10.11	0.58
Total	285.35	161.00	95.98	112.29

2.3.2 Control Measures for Maintenance of Good Air Quality

Emission projections for 2032 and 2038 include a variety of control strategies that are in place and will continue to reduce emissions of NO_x and VOCs in future years. The following list of control measures is non-comprehensive, and many were instituted as part of SIP submittals for previous iterations of the Ozone NAAQS or due to Maryland's inclusion in the Ozone Transport Region (OTR). Some of these programs are federal programs that are enforced on a regional or national level while other programs are delegated to states for compliance and enforcement purposes. A full write up of current control measures, including supplemental and voluntary measures, can be found in Chapter 6 of MDE's Moderate Attainment SIP for the Baltimore Nonattainment Area.¹¹ EPA-approved regulations in Maryland can be found on EPA's web page.¹²

Point Measures

- Healthy Air Act¹³
- Control of VOC Emissions from Expandable Polystyrene Operations¹⁴

¹¹ Maryland Department of the Environment (MDE). *Cecil County, MD Moderate Nonattainment Area 0.070 ppm 8-Hour Ozone State Implementation Plan Attainment Demonstration*, July 17, 2023. https://mde.maryland.gov/programs/air/AirQualityPlanning/Documents/New_SIP_Folder/Ozone/Philadelphia_Wilmington_Atlantic_City_NAA/Standards/8_Hr_2015/Attainment_Maintenance_SIP/SIP%2070%20ppb%20Philadelphia%20NAA%20Final%20Draft%20%281%29.pdf

¹² U.S. Environmental Protection Agency (EPA). EPA Approved Regulations in the Maryland SIP. <https://www.epa.gov/air-quality-implementation-plans/epa-approved-regulations-maryland-sip>

¹³ Annotated Code of Maryland Environment Title 2 Ambient Air Quality Control Subtitle 10 Health Air Act Sections 2-1001 - 2-1005. COMAR 26.11.27.

¹⁴ U.S. Environmental Protection Agency (EPA). Maryland SIP, Control of Volatile Organic Compounds (VOC) Emissions from Expandable Polystyrene Operations. <https://www.epa.gov/air-quality-implementation-plans/maryland-sip-control-volatile-organic-compounds-voc-emissions-2>. COMAR 26.11.19.19

- Control of VOC Emissions from Yeast Manufacturing¹⁵
- Control of VOC Emissions from Commercial Bakery Ovens¹⁶
- Federal Air Toxics
- State Air Toxics
- Enhanced Rule Compliance
- RACT
- NOx Phase II/Phase III Ozone Transport Commission (OTC)/NOx Budget Rule (Phase II) and NOx SIP Call (Phase III)

Nonpoint/Area Measures

- Municipal Landfills
- Burning Ban
- Surface Cleaning and Degreasing
- Architectural and Industrial Maintenance Coatings¹⁷
- Commercial and Consumer Products
- Automobile Refinishing
- Motor Vehicle and Mobile Equipment Coating Operations
- Lithographic and Letterpress Printing¹⁸
- Screen Printing and Digital Imaging¹⁹
- Lithographic Printing
- Flexographic and Rotogravure Printing²⁰
- Gasoline and Volatile Organic Compound Storage and Handling²¹

Onroad Mobile Measures

- Vehicle Inspection and Maintenance²²
- Tier I Vehicle Emission Standards for New Federal Evaporative Test Procedures
- Reformulated Gasoline

¹⁵ U.S. Environmental Protection Agency (EPA). Maryland SIP, Control of Volatile Organic Compounds (VOC) Emissions from Yeast Manufacturing. <https://www.epa.gov/air-quality-implementation-plans/maryland-sip-control-volatile-organic-compounds-voc-emissions-1>. COMAR 26.11.19.17

¹⁶ U.S. Environmental Protection Agency (EPA). Maryland SIP, COMAR 26.11.19.21 - Control of Volatile Organic Compounds (VOC) Emissions from Commercial Bakery Ovens <https://www.epa.gov/air-quality-implementation-plans/maryland-sip-comar-26111921-control-volatile-organic-compounds-voc>. COMAR 26.11.19.21

¹⁷ U.S. Environmental Protection Agency (EPA). Maryland SIP, Architectural and Industrial Maintenance (AIM) Coatings <https://www.epa.gov/air-quality-implementation-plans/maryland-sip-architectural-and-industrial-maintenance-aim-coatings> COMAR 26.11.39

¹⁸ U.S. Environmental Protection Agency (EPA). Maryland SIP, Control of Volatile Organic Compounds (VOC) Emissions from Sheet- Fed and Web Lithographic Printing <https://www.epa.gov/air-quality-implementation-plans/maryland-sip-control-volatile-organic-compounds-voc-emissions-3>. COMAR 26.11.19.11

¹⁹ U.S. Environmental Protection Agency (EPA). Maryland SIP, Control of Volatile Organic Compounds (VOC) Emissions from Screen Printing and Digital Imaging <https://www.epa.gov/air-quality-implementation-plans/maryland-sip-control-volatile-organic-compounds-voc-emissions>. COMAR 26.11.19.18

²⁰ U.S. Environmental Protection Agency (EPA). Maryland SIP, Volatile Organic Compounds from Specific Processes - Flexographic and Rotogravure Printing <https://www.epa.gov/air-quality-implementation-plans/maryland-sip-volatile-organic-compounds-specific-processes-0>. COMAR 26.11.19.10

²¹ U.S. Environmental Protection Agency (EPA). Maryland SIP, Control of Gasoline and Volatile Organic Compound Storage and Handling. <https://www.epa.gov/air-quality-implementation-plans/maryland-sip-control-gasoline-and-volatile-organic-compound-storage> COMAR 26.11.13

²² U.S. Environmental Protection Agency (EPA). Maryland SIP, Vehicle Emissions Inspection Program <https://www.epa.gov/air-quality-implementation-plans/maryland-sip-vehicle-emissions-inspection-program> COMAR 11.14.08

- Tier II Vehicle Emission Standards
- National Low Emission Vehicle Program
- Federal Heavy-Duty Diesel Engine Rule
- Stage II and New Vehicle On-Board Vapor Recovery Systems

Nonroad Mobile Measures

- Nonroad Small Gasoline Engines
- Nonroad Diesel Engines - Tier I and Tier II
- Marine Engine Standards
- Emission Standards for Large Spark Ignition Engines
- Reformulated Gasoline
- Railroad Engine Standards

2.3.3 Meteorology

States should demonstrate that attainment of the NAAQS for the area were not a result of either temporary economic conditions or unusually favorable meteorology during the attainment timeframes.²³ In order to comply with EPA guidance, MDE has done an analysis of the annual surface meteorological conditions in the area to look at the variance in the meteorology over the 2012-2025 time period in which the Baltimore Nonattainment Area continued to attain the 2008 Ozone NAAQS after receiving its CDD. The data indicates that the continued attainment of the NAAQS in the Baltimore Nonattainment Area is not a result of a significant change in or development of unusually favorable meteorology during the attainment timeframe.

Table 2-2 shows various meteorological factors that influence ozone formation on both annual and ozone season (May-September) timeframes. These include temperature, dew point, relative humidity, wind speed, wind direction, mean sea level pressure, and precipitation. The meteorological data is from the National Weather Service's Baltimore Washington International Airport (BWI), MD, US Weather Station.²⁴

A coefficient of variation of less than 1 suggests a low variance in the data set. All the meteorological factors have coefficients of 0.42 or less, which indicates that none of the years had significantly unusual weather for the time period and does not indicate any unusually favorable meteorological conditions. The data suggests that temperature, dew point, relative humidity, wind speed, wind direction, mean sea level pressure, and annual precipitation remained relatively consistent over the years.

²³ *Procedures for Processing Requests to Redesignate Areas to Attainment*. Calcagni, John, Director, Air Quality Management Division, OAQPS, U.S. EPA, Research Triangle Park, N.C. September 4, 1992. Page 4.

²⁴ Surface meteorological measurements were taken from the Baltimore-Washington International Airport (BWI) ASOS monitor. Network: GHCND, ID: USW0009372

Table 2-3: 2012-2025 Meteorological Conditions in Maryland

Year	Ozone Season (May-September)							Annual					
	Avg Max Temp (°F)	# 90° days	Precip. (in)	DP (°F)	RH (%)	WS (mph)	WD (deg)	Avg Temp (°F)	Annual Precip. (in)	RH (%)	WS (mph)	WD (deg)	MSLP (mb)
2012	83.71	38	15.93	45.96	67.95	0.62	265.04	58.69	37.42	66.13	1.75	290.56	1016.49
2013	80.72	23	16.79	43.35	69.22	1.02	245.19	55.78	42.93	66.09	1.90	286.41	1018.03
2014	80.32	10	20.32	41.92	68.96	0.24	270.47	54.34	52.58	65.84	1.58	299.69	1017.22
2015	82.83	18	24.27	44.29	69.16	0.42	250.02	56.24	51.16	67.37	1.52	296.16	1018.32
2016	82.13	40	22.33	44.69	69.53	0.70	267.35	57.30	40.52	66.09	2.09	284.54	1017.41
2017	80.80	26	20.70	46.49	74.12	1.01	275.15	57.55	38.28	69.92	1.95	283.82	1016.90
2018	82.80	33	42.70	46.71	76.71	0.85	81.84	56.78	71.82	72.07	1.63	299.43	1018.22
2019	85.29	50	14.86	45.49	67.84	0.61	273.35	58.10	38.13	66.02	1.64	293.91	1017.29
2020	82.33	39	27.34	45.90	67.14	0.55	260.48	58.80	57.38	65.22	1.70	282.73	1017.35
2021	84.21	45	20.43	45.00	65.72	1.26	245.15	58.90	40.79	63.14	2.04	283.38	1017.16
2022	83.49	40	21.42	44.31	66.61	0.72	259.19	57.67	46.87	64.19	1.78	287.17	1017.79
2023	82.64	31	21.70	45.86	65.49	0.56	328.90	59.59	42.39	63.75	1.75	292.77	1016.03
2024	83.86	41	13.69	46.50	70.30	0.51	128.22	58.86	36.78	67.02	1.21	285.18	1016.75
2025	82.01	23	20.91	62.11	71.53	0.32	86.20	56.94	35.97	64.62	2.05	286.21	1016.99
SD	1.42	11.30	7.09	4.74	3.13	0.28	75.23	1.44	10.07	2.38	0.24	5.97	0.65
CV	0.02	0.35	0.33	0.10	0.05	0.42	0.33	0.03	0.22	0.04	0.14	0.02	0.00

DP: dew point, RH: relative humidity, WS: wind speed, WD: wind direction, MSLP: mean sea level pressure, SD: standard deviation, CV: coefficient of variation, SD: standard deviation, CV: coefficient of variation

2.4 Maintenance Plan

The redesignation process provides that States may petition EPA to redesignate a nonattainment area to attainment and that EPA may approve the redesignation provided certain criteria are met. Section 107(d)(3)(D) states:

(D) The Governor of any State may, on the Governor's own motion, submit to the Administrator a revised designation of any area or portion thereof within the State. Within 18 months of receipt of a complete State redesignation submittal, the Administrator shall approve or deny such redesignation. The submission of a redesignation by a Governor shall not affect the effectiveness or enforceability of the applicable implementation plan for the State.

States may submit both the redesignation request and the maintenance plan at the same

time, and rulemaking on both may proceed on a parallel track. All applicable nonattainment area requirements must remain in place, and the maintenance plan constitutes a SIP revision. The maintenance plan must contain the following elements:

- A comprehensive “attainment year” emissions inventory of the ozone precursors NO_x and VOCs;
- A projection of the emissions inventory forward to a year at least 10 years after redesignation and a demonstration that the projected level of emissions is sufficient to maintain compliance with the ozone NAAQS;
- A demonstration of maintenance by showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory over the 10-year period following redesignation;
- A commitment that, once redesignated, the state will continue to operate an appropriate monitoring network to verify maintenance of the attainment status;
- A demonstration of legal authority to implement and enforce all control measures contained in the SIP;
- Provisions for future updates of the inventory to enable tracking of emissions levels, including an annual emissions statement from major sources;
- MVEBs for transportation conformity for the 10-year maintenance period;
- A commitment to submit a revised maintenance plan eight years after redesignation;
- A commitment to enact and implement additional contingency measures expeditiously in the event that future violations of the NAAQS occur; and a list of potential contingency measures that would be implemented in such an event.

Section 3 contains the maintenance plan for the Baltimore Nonattainment Area for the 2008 Ozone NAAQS.

2.5 Requirements of Section 110 and Part D

According to EPA’s final rule titled *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements*, all States with nonattainment areas must submit emission inventories, RACT SIPs, emission statement SIPs, vehicle I/M program SIPs, and Nonattainment New Source Review (NNSR) program SIPs. Table 2-4 contains Maryland’s submittals to address these requirements, as well as Infrastructure SIP requirements. Maryland has fulfilled its requirements under Section 110 and Part D for the 2008 Ozone NAAQS.

Table 2-4: Status of 2008 Ozone NAAQS SIP Requirements

Requirement	Title of SIP	Date of SIP	EPA Approval ²⁵
Emissions Inventory	2011 Base Year Emissions Inventory for the Baltimore, MD 2008 Ozone NAAQS Nonattainment Area	November 21, 2016	08/09/2018, 83 FR 39365
NOx RACT	State of Maryland 0.075 ppm 8-Hour Ozone Nitrogen Oxide Reasonable Available Control Technology (NOx RACT) State Implementation Plan	July 2, 2018	2/20/2019, 84 FR 5004
VOC RACT	State of Maryland 0.075 ppm 8-Hour Ozone Volatile Organic Compound Reasonable Available Control Technology (VOC RACT) State Implementation Plan	July 26, 2016	2/20/2019, 84 FR 5004
Emissions Statement	Emission Statement Requirement Certification Addressing CAA Section 182(a)(3)(B) for the State of Maryland 2008 Ozone NAAQS Nonattainment Areas	June 27, 2017	07/16/2018, 83 FR 32796
I/M	Basic Motor Vehicle Inspection and Maintenance Program Certification for the State of Maryland 2008 Ozone National Ambient Air Quality Standard Baltimore Nonattainment Area	March 15, 2018	7/11/2019, 84 FR 33006
Nonattainment New Source Review	Nonattainment New Source Review (NNSR) Certification for the State of Maryland 2008 Ozone NAAQS Nonattainment Areas	April 19, 2017	1/29/2018, 83 FR 3982
Infrastructure – Implementation, Maintenance, and Enforcement	Implementation, Maintenance, and Enforcement of the 0.075 ppm 8-hour Ozone National Ambient Air Quality Standard State Implementation Plan	December 21, 2012	10/16/2014, 79 FR 62018

3 Maintenance Plan

MDE has developed a maintenance demonstration that meets all EPA requirements and shows that because of permanent and enforceable measures, emissions over the 10 years following redesignation approval will remain sufficiently low to maintain attainment of the NAAQS while allowing for economic growth. The period covered by this maintenance plan is 2023 through 2038.

²⁵ U.S. Environmental Protection Agency (EPA). *EPA Approved Nonregulatory Provisions and Quasi-Regulatory Measures in the Maryland SIP* (October 30, 2025). <https://www.epa.gov/air-quality-implementation-plans/epa-approved-nonregulatory-provisions-and-quasi-regulatory-39>

3.1 Attainment Inventory

MDE has developed an attainment year inventory that identifies the level of emissions sufficient to achieve the 2008 Ozone NAAQS. This attainment inventory consists of the actual emissions for a year, during a period associated with compliant monitoring data showing attainment. EPA guidance specifies that States should “develop an attainment emissions inventory to identify the level of emissions in the area which is sufficient to attain the NAAQS”.²⁶ The guidance also specifies that “Where the state has made an adequate demonstration that the air quality has improved as a result of the SIP..., the attainment inventory will generally be the actual inventory at the time the area attained the standard.”²⁷ EPA provided a CDD for the Baltimore Nonattainment Area based on 2012-2014 DVs. Since then, the region has continued to attain the 2008 Ozone NAAQS, indicating that any year between 2012 and present could be representative of levels of emissions that are sufficient to attain the NAAQS. The attainment year in this maintenance demonstration is 2023, and the plan includes a demonstration that emissions will remain at or below 2023 levels for a 10-year period by keeping in place key elements of the current federal and state regulatory programs. While 2023 is eight years after the Baltimore Nonattainment Area received its CDD, the monitoring data indicates that 2023 continues to be representative of emissions levels sufficient to attain and maintain the 2008 Ozone NAAQS.

A summary of the 2023 attainment year inventory is presented in Table 3-1. A more detailed accounting of the attainment inventory is contained in Appendix A and Appendix D.

Table 3-1: Baltimore Nonattainment Area Attainment Year Inventory

Source Category	NOx (tpd)	VOC (tpd)
Point	29.06	4.41
Non-Point (Area)	12.72	71.17
Marine, Air, Rail (M-A-R)	10.11	0.58
Non-Road	9.84	18.11
On-Road Mobile	24.42	16.38
Quasi-Point	9.83	1.64
TOTAL	95.98	112.28

3.2 Projection Year Inventory

A maintenance plan must contain a demonstration that the levels of emissions projected for the 10-year period following redesignation are sufficient to maintain the NAAQS. Accordingly, MDE has projected NOX and VOC emissions for the Baltimore Nonattainment Area for 2038, as well as an interim year of 2032. Emissions for 2038 must be equivalent to or lower than emissions levels in 2023 to ensure that air quality continues to meet the 2008 ozone NAAQS during this period.

Typically, a projected emissions inventory includes all source categories: on-road mobile, non-road mobile, major point sources, non-point sources, quasi point sources, and marine/air/rail emissions. This is accomplished by applying a “growth factor” to the 2023 baseline emissions.

²⁶ *Procedures for Processing Requests to Redesignate Areas to Attainment*. Calcagni, John, Director, Air Quality Management Division, OAQPS, U.S. EPA, Research Triangle Park, N.C. September 4, 1992. Page 8.

²⁷ *Procedures for Processing Requests to Redesignate Areas to Attainment*. Calcagni, John, Director, Air Quality Management Division, OAQPS, U.S. EPA, Research Triangle Park, N.C. September 4, 1992. Page 8.

Growth in emissions can be affected by future control programs, fuel switching, shutdowns, or any number of reasons. Growth can also reflect a change in source activity as a result of wider societal changes, such as employment, population, energy use, and vehicle miles traveled. In some cases, growth is positive, resulting in increased future activity, while in others, growth is negative, resulting in a reduction of future activity. In some states, where emissions from shutdowns are preserved as offsets for future growth, those states may elect to reset negative growth values to “1” reflecting no growth. Table 3-2 in Section 3.3 contains the projection year inventory for the Baltimore Nonattainment Area.

A more detailed accounting of the 2032 and 2038 projection inventories is contained in Appendix B, Appendix C, and Appendix D.

3.3 Demonstration of Maintenance

Table 3-2 demonstrates how future emissions of NOx and VOCs will not exceed the levels of the attainment year inventory for a minimum of 10 years following redesignation. The projected emissions reflect the expected daily emissions based on the best available growth rates and projections. The total NOx and VOC emissions in 2038 are lower than 2023; therefore, the projected inventory demonstrates future maintenance of the 2008 Ozone NAAQS.

Table 3-2: Baltimore Nonattainment Area NOx and VOC Emissions for 2023, 2032, and 2038

Source Category	NOx (tpd)			VOC (tpd)		
	2023	2032	2038	2023	2032	2038
Point	29.06	39.40	39.94	4.41	4.95	5.06
Nonpoint	12.72	13.32	13.72	71.17	72.75	73.60
M-A-R	10.11	10.28	10.39	0.58	0.59	0.60
Nonroad	9.84	8.60	9.00	18.11	18.42	19.05
Onroad	24.42	9.71	5.77	16.38	10.78	7.69
Quasi-Point*	9.83	10.63	11.14	1.64	1.88	2.03
Total	95.98	91.95	89.95	112.28	109.37	108.03
Δ (2038-2023)	-4.25			-6.03		

*Quasi-point sources are generally considered part of the area or nonroad emissions sectors but are included in the point source emissions inventory for a particular reason. Such reasons include, but are not limited to, federal guidance (such as in the case of certain airports) or to facilitate future general conformity determinations (such as in the case of military bases, ports, and other similar facilities).

3.4 Commitment to Operate Air Quality Monitoring Network

EPA guidance specifies that “...once an area has been redesignated, the state should continue to operate an appropriate air quality monitoring network, in accordance with 40 CFR Part 58, to verify the attainment status of the area. The maintenance plan should also contain provisions for continued operation of air quality monitors that will provide such verification”.²⁸

MDE will continue to operate its enhanced air monitoring network in accordance with 40 CFR Part 58 with no reductions in the number of sites from those in the existing network unless

²⁸ *Procedures for Processing Requests to Redesignate Areas to Attainment*. John Calcagni. September 4, 1992. Page 11.

pre-approved by EPA. The monitoring network is reviewed on an annual basis, and an annual network design plan with any proposed changes for the upcoming year is submitted to the EPA and shared publicly. In addition, the MDE provides EPA Region III with prior notification of any planned changes to the network between formal network design submissions. A monitoring network assessment is also conducted every 5 years, and the report is shared publicly.

3.5 Legal Authority to Implement and Enforce

MDE has the legal authorities to develop, implement, and enforce regulations regarding air pollution including the requirements of this SIP submittal. The following regulations demonstrate MDE's legal authority to develop, implement, and enforce regulations regarding air pollution including the requirements of this SIP submittal.

- Legal Authority to Implement and Enforce – Maryland Annotated Code § 2-103
- Authority for MDE to set emission standards and ambient air quality standards for each air quality control area in the State– Environment Article, §2-302 (a)-(d), Annotated Code of Maryland
- Authority for MDE to enforce the standards and impose penalties– Environment Article, §§2-601-614, Annotated Code of Maryland.
- Emissions Statements: COMAR 26.11.01.05-1.
- I/M program requirements: COMAR 11.14.08.
- Permitting Requirements: COMAR 26.11.02 & COMAR 26.11.03.
- PSD Requirements: COMAR 26.11.06.14.

Please also refer to the approved sections of Maryland's 110(a)(2) 2008 and 2015 Ozone NAAQS SIPs.

3.6 Emissions Inventory Data to Verify Continued Attainment

Periodic emissions inventories, as developed by MDE, will be examined for comparison to the attainment inventory for the relevant sources in the nonattainment area. MDE expects that future conditions will reflect emissions levels that will not exceed the levels of the attainment inventory.

The emissions data will not be solely relied upon as an indicator of nonattainment for the area. Periodic or intermittent increases in emissions above the attainment year inventory do not automatically indicate a failure to continue to attain the NAAQS. Further investigation would be required to determine if the emissions produce ambient air concentrations above the NAAQS.

3.7 Motor Vehicle Emissions Budgets (MVEB)

Transportation conformity is required under § 176(c) to ensure that transportation plans, transportation improvement programs (TIPs), and federally-supported highway and transit project activities are consistent with ("conform to") air quality planning goals outlined in the applicable SIP. These requirements ensure that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS or any interim milestones. For the purposes of this document this is specific to attainment and maintenance of the 2008 ozone NAAQS. These requirements are found in §176(c)(B)(i), (ii), and (iii), which states:

Conformity to an implementation plan means—That such activities will not cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emissions reductions or other milestones in any area.

The federal Transportation Conformity Rule is codified in 40 CFR Part 93, Subpart A, entitled *Determining Conformity of Federal Actions to State or Federal Implementation Plans*. Transportation conformity applies to areas that are designated nonattainment and those areas redesignated to attainment after 1990 (*i.e.*, “maintenance areas”) for transportation-related criteria pollutants: CO, ozone, NO₂, and particulate matter (PM_{2.5} and PM₁₀).

The responsible metropolitan planning organization (MPO) addressing transportation planning for the Baltimore 2008 Ozone NAAQS Nonattainment Area is the Baltimore Regional Transportation Board (BRTB), which is housed at the Baltimore Metropolitan Council (BMC). In order for a transportation plan to “conform”, the estimated emissions from the region’s transportation plan cannot exceed the mobile budgets set by MDE in conjunction with Maryland Department of Transportation (MDOT) and BMC. The MVEB acts as the federally enforceable cap or control measure on the onroad mobile transportation source sector. If the estimated emissions are shown to exceed the budget, then mitigation measures must be taken to ensure emissions will not exceed the budgets. Prior to this maintenance plan, the most recent MVEBs were established in the *Baltimore Moderate Nonattainment Area 0.070 ppm 8-Hour Ozone State Implementation Plan Attainment Demonstration* and were deemed adequate by EPA on August 3, 2023.²⁹

Per 40 CFR part 93, a MVEB must be established for the last year of the maintenance plan. However, a State may adopt MVEBs for other years as well. If the maintenance plan does not establish MVEBs for any years other than the last year of the maintenance plan, the demonstration of consistency with the motor vehicle emissions budget(s) must be accompanied by a qualitative finding that there are no factors which would cause or contribute to a new violation or exacerbate an existing violation in the years before the last year of the maintenance plan. This maintenance plan establishes MVEBs for NO_x and VOC for 2023 the attainment year, 2032 the interim year, and 2038 the last year of the maintenance plan.

These budgets represent the level of mobile source emissions that can be emitted in the area while supporting the air quality plan. 2023, 2032, and 2038 onroad emissions were calculated using the most recent EPA MOVES (motor vehicle emissions simulator) model (MOVES5) and are presented in Table 3-3.

Table 3-4 presents the MVEBs for 2023, 2032, and 2038, which include a transportation buffer.³⁰ A transportation buffer or safety margin is the amount by which the total projected emissions from all sources of a given pollutant is less than the total emission needed for Reasonable Further Progress (RFP), attainment, or maintenance. The maintenance plan demonstrates that the region attained the standard in 2023 and can therefore emit up to the

²⁹ *Adequacy Status of Motor Vehicle Emissions Budgets for the Baltimore 2015 8-Hour Ozone Moderate Nonattainment Area*, Notice, August 3, 2023, 88 FR 51310.

³⁰ Section 93.124(a) of the Code of Federal Regulations (CFR) allows for the use of transportation buffers (or safety margins) in setting motor vehicle emissions budgets.

attainment year emission level. Buffers have been included to account for any uncertainty in transportation planning assumptions in the future

The MVEBs provided in Table 3-4 have been developed by adding a transportation buffer to the mobile emissions inventory projections for VOC and NO_x. The buffers add 4.04 tpd of NO_x and 2.91 tpd of VOC to the 2032 emission inventories and 6.03 tpd of NO_x and 4.25 tpd of VOC to the 2038 emission inventories. Even with buffered MVEBs, the projected 2038 inventory remains at or below the attainment year inventory for NO_x and VOCs as shown in Table 3-5. Further details regarding the development of the MVEBs can be found in Appendix E.

Table 3-3: Baltimore Maintenance Plan On-Road Mobile Source Emissions without Buffers

Year	NO _x (tpd)	VOC (tpd)
2023 - Attainment Year	24.42	16.38
2032 – Interim Year	9.71	10.78
2038 – Final Year	5.77	7.69

Table 3-4: Baltimore Maintenance Plan On-Road Mobile Source Emissions Budgets with Buffers

Year	NO _x Emissions (tpd)	VOC Emissions (tpd)
2023 - Attainment Year	24.42	16.38
2032 – Interim Year	13.75	13.69
2038 – Final Year	11.80	11.94

Table 3-5: Baltimore Maintenance Plan NO_x and VOC Emissions Including MVEBs with Buffers

Source Category	NO _x (tpd)			VOC (tpd)		
	2023	2032	2038	2023	2032	2038
Point	29.06	39.40	39.94	4.41	4.95	5.06
Nonpoint	12.72	13.32	13.72	71.17	72.75	73.60
M-A-R	10.11	10.28	10.39	0.58	0.59	0.60
Nonroad	9.84	8.60	9.00	18.11	18.42	19.05
Onroad MVEB	24.42	13.75	11.80	16.38	13.69	11.94
Quasi-Point*	9.83	10.63	11.14	1.64	1.88	2.03
Total	95.98	95.98	95.98	112.28	112.28	112.28

3.8 Commitment to Submit a Maintenance Plan for an Additional 10 Years

This plan provides an analysis of emissions required for maintenance of the 2008 Ozone NAAQS up to 2038. MDE commits to the submittal of an additional maintenance plan eight years after the original redesignation request is approved that provides for maintenance of the NAAQS for an additional 10 years.

3.9 Contingency Measures

Section 175A of the CAA requires a maintenance plan to contain contingency provisions so that any violation of the NAAQS which occurs after redesignation will be promptly corrected.³¹ These provisions should include measures that will lead to additional emissions reductions, beyond those included in the SIP that were needed for attainment of the area.

³¹ 42 U.S.C.7505a(d)

Per EPA guidance, contingency provisions for a maintenance area are not required to “have fully adopted contingency measures that will take effect without further action by the state in order for the maintenance plan to be approved”.^{32,33} However, the contingency provisions are an enforceable part of the maintenance plan and should ensure that contingency measures are adopted expeditiously if needed to maintain attainment. Furthermore, contingency provisions should clearly identify the measures to be adopted, a schedule and procedures for adoption and implementation, and specific indicators or triggers which will be used to determine the need for contingency measures. The contingency measures identified in this section are measures that have not been used previously to meet SIP requirements or any other air quality planning purpose.

3.9.1 Triggering Mechanism

The official monitored ambient air ozone concentration will serve as an indicator for the triggering of contingency measures. The monitored data will be based on fully validated and quality-assured results from all EPA-approved monitors operated and maintained by MDE.

An initial “warning level” response will be triggered if any monitor in the Baltimore Nonattainment Area has a 1-year fourth-high 8-hour ozone concentration greater than 75 ppb. A warning level response will consist of a study to determine whether the ozone value indicates a trend toward a higher ozone value and whether emissions appear to be increasing. The study will evaluate whether the trend, if any, is likely to continue and, if so, the control measures necessary to reverse the trend taking into consideration ease and timing for implementation.

A second “action level” response will be triggered if any monitor in the Baltimore Nonattainment Area has a fourth-high 8-hour ozone concentration, averaged over two years, greater than 75 ppb. A violation of the NAAQS (4th high, daily maximum 8-hour average, averaged over three years, with a value of 75 ppb or greater) shall also prompt an “action level” response. An action level response, where appropriate, will trigger procedures for contingency measure implementation.

3.9.2 Trigger Responses

An initial “warning level” response will be triggered if any monitor in the Baltimore Nonattainment Area has a 1-year fourth-high 8-hour ozone concentration greater than 75 ppb. A one-year monitoring exceedance is concerning but does not constitute a violation of the NAAQS as attainment is determined based on a 3-year design value. Therefore, the initial response will consist of a study conducted by MDE to gain insight into the exceedance and determine if further action is necessary to ensure maintenance going forward. The study would include:

- An assessment of whether actual emissions have deviated significantly from the attainment and/or maintenance level emissions, along with an evaluation of which sources are responsible for any emissions increases; and
- A study of whether unusual meteorological conditions during the high-ozone year led to elevated monitored ozone concentrations

³² *Procedures for Processing Requests to Redesignate Areas to Attainment*. Calcagni, John, Director, Air Quality Management Division, OAQPS, U.S. EPA, Research Triangle Park, N.C. September 4, 1992. Page 12.

³³ EPA specifies in its March 2023 *Draft: Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter (page 2)*.that the guidance "...does not address contingency provisions required for maintenance plans in section 175A(d)..."

Should it be determined that action is necessary to ensure maintenance, MDE will follow the procedures for contingency measures. The “warning level” study will be completed no later than the beginning of the following ozone season. A second “action level” response will be triggered if any monitor in the Baltimore Nonattainment Area has a fourth-high 8-hour ozone concentration, averaged over two years, greater than 75 ppb or has recorded a 3-year design value exceeding the NAAQS. In the event an “action level” response is triggered and is not found to be due to an exceptional event, malfunction, noncompliance with applicable regulatory requirements, or interstate transport, MDE will follow the procedures for contingency measures as outlined in this maintenance plan. MDE will adopt and implement additional control measures, as necessary and appropriate, in order to correct the violation as expeditiously as practicable.

3.9.3 Implementation Schedule – As Expeditiously as Possible

Regulatory measures for contingency measures, if needed, will follow all requirements and procedures of the CAA³⁴ and MDE’s regulatory implementation process. If triggered, MDE will evaluate the nature of the violations and, if necessary, select, adopt, and implement contingency measures according to the following (non-binding) schedules for regulatory measures (with durations given from the time of MDE’s determination of a violation of the NAAQS based on fully validated and quality-assured data). The implementation of regulatory measures would be expected for completion within 12 to 18 months following a violation of the NAAQS based on fully validated and quality-assured data.

- Rule Development -5 months to 13 months
 - [3 months] - MDE will select one or more measures to be implemented and will obtain approval to initiate the process for a new regulatory action.
 - [1-6 months] - MDE will initiate a stakeholder process and seek input on the development of the regulation.
 - [1-6 months] - MDE will develop the fact sheet, regulation and technical support document
- Adoption Process - 6-7 months
 - [start] - MDE will begin the formal adoption process by presenting the proposed regulatory action(s) to the Air Quality Control Advisory Council (AQCAC) for its review and vote.
 - [2 months] - Secretary signature and Administrative, Executive and Legislative Review (AELR) Committee review
 - [1 month] - Notice of Proposed Action in the Maryland Register
 - [1 months] - Public Hearing
 - [2-3 months] - Notice of Final Action & Adoption

3.9.4 Contingency Measure Selection

The selection of a contingency measure (or measures) to be adopted and implemented in the event of an anticipated failure to maintain the NAAQS would be based on the following criteria:

- Air quality analysis indicating the nature of the violation (location, source, upwind conditions, etc.)
- Degree of the violation
- Emission reduction potential
- Timeliness
- Cost-effectiveness

³⁴ 42 U.S.C. 7401 et seq.

MDE has identified several potential regulatory contingency measures for this maintenance plan. Depending on the nature of the violation(s), measures could be selected individually or in combination, in complete or partial fashion, and/or area wide or source specific. The measures identified here are not exclusive to the potential use as contingency measures for ozone maintenance. If MDE chooses to adopt one or more measures without the triggering of contingency measures for this maintenance plan, those same measures would then not be available for use as future contingency measures.

- Commercial and Consumer Products Phase V³⁵
- Dripless gas nozzles and low permeation hoses
- Updated NOx RACT for stationary internal combustion sources, utility boilers, or process heaters
- Updated VOC RACT for surface coatings
- Traffic flow improvements
- Anti-idling control programs

³⁵ Ozone Transport Commission (OTC). *OTC Regulatory and Technical Guideline for Reduction of Ozone Precursor Emissions from Consumer Products - Phase V*. (November 20, 2018). https://otcair.org/upload/Documents/Reports/OTC_RegAndTechGuidelineOnConsumerProducts_Phase_V_Final_11202018.pdf