



Maryland
Department of
the Environment

Modernization of the Vehicle Emissions Inspection Program (VEIP)



AQCAC Meeting - June 14, 2021 - Tad Aburn and Daniel
Newell, MDE



Air Quality Control Advisory Council Meeting Materials

- Welcome to today's meeting!
- This meeting is being **Recorded**. The webinar recording, presentations and related resources will be made available on the Air Quality Control Advisory Council web page:

<https://mde.maryland.gov/programs/workwithmde/Pages/AQCACmeetingminutes.aspx>





Overview

- The VEIP has been a cornerstone program for MDE's air quality efforts
- Significant air quality progress has been made in Maryland over the last decade
- Vehicle emissions technology continues to get better, and vehicles with on-board diagnostics (OBD) – model year 1996 and newer – make up over 98% of the fleet
- Because of this, we are continuing to reinvent the VEIP to fully utilize technology, modernize, and simplify the program to improve customer service to Maryland motorists



A bright sun shining through a blue sky with white clouds. The sun is positioned in the upper right quadrant, casting rays across the sky. The clouds are scattered and fluffy, with some larger ones on the left and right sides. The overall scene is bright and clear.

A Short History



Background on VEIP

- Maryland's program, originally adopted in 1984, underwent significant updates in 1996 to meet the requirements of the 1990 Clean Air Act Amendments (CAA)
 - Maryland's air quality was among the worst in the Country in the early 1990's
- Vehicles of the 1990's were less advanced
 - Vehicles had much higher emissions
 - They deteriorated much sooner
 - Emission control systems were simpler and less effective than the emission control systems of today



Background on VEIP (cont.)

- The original VEIP focused on reducing volatile organic compounds (VOC)
 - In 1990, VOCs were believed to be the key to reducing ground level ozone pollution
 - We now understand that nitrogen oxide (NOx) reductions are actually much more important than VOC reductions
 - NOx testing was added to the 1996 VEIP but over time it became clear that a greater effort was needed to reduce mobile source NOx
- In 2021, this has all changed
 - Requirements for computer-controlled OBD systems worked along with tougher standards for new vehicles and improved fuels to dramatically reduce mobile source NOx emissions
 - These measures have contributed significantly to Maryland's clean air progress



Air Quality Differences Between 1996 and 2020

Key Criteria	1996	2020
Ozone Designation	Severe (Only areas in California were worse)	Marginal (Cleanest designation) – 3 days barely above standard in 2020
Days above current standard	71	3
Spatial exposure to unhealthy ozone	Statewide	Very small – 3 days ... small part of 1 or 2 counties on each day
Other air pollutants	High fine particle levels, high carbon monoxide levels, high nitrogen dioxide (NO ₂) levels, etc.	State attaining all criteria pollutants under the CAA except for ozone. Often well below health-based standards



Vehicle Differences Between 1996 and 2020

Key Criteria	1996	2020
Statewide emissions - NOx	126,740 TPY	49,769 TPY
Statewide emissions - VOC	72,139 TPY	21,105 TPY
Improvement - NOx	NA	98% cleaner
Improvement - VOC	NA	98% cleaner
Percent of vehicles with mandatory on-board diagnostic control systems	<1% of the fleet	98% of the fleet
Length vehicle manufacturers must demonstrate compliance with emissions standards	50,000 miles/ 5 years	150,000 miles/ 15 years



Time to Modernize

- Maryland continually looks for opportunities to modernize and enhance customer service – some earlier VEIP enhancements have been implemented, most recently in 2018
- Many other leadership states have already begun to modernize their programs
 - California, the state with the worst ozone air quality and the Country's best mobile source technical expertise, began to modernize in 2005
 - Other neighbors like DE and NJ have also moved ahead with modernization
- The VEIP underwent previous steps toward modernization
 - 2002 – Implementation of OBD testing ... 2009 – End of dynamometer testing ... 2018 – Delay testing of new vehicles until age 3 and begin phasing-in the OBD-only program by exempting some pre-OBD, idle-tested vehicles
- Today's effort will have virtually no impact on the State continuing to make air quality progress while providing significantly enhanced customer service to Maryland motorists
- Maintains consistency with the CAA and with the VEIP statute adopted by the General Assembly in 1991 and as amended in subsequent years

A bright sun shining through a blue sky with scattered white clouds. The sun is positioned in the upper right quadrant, casting rays across the sky. The clouds are fluffy and white, scattered across the blue background.

Air Quality Progress



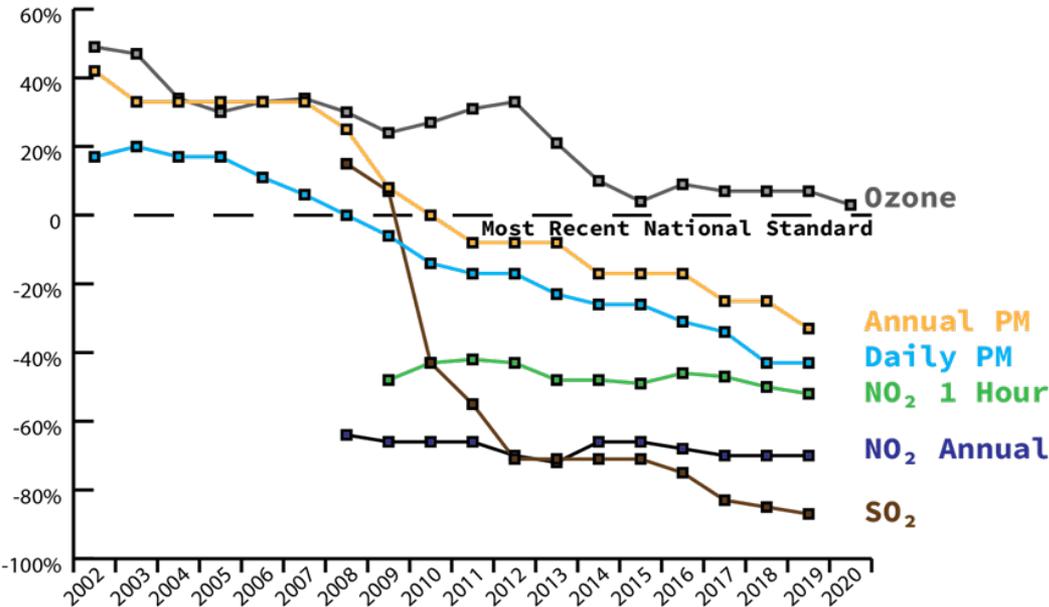
Air Pollution in Maryland

- Maryland has a long history of having bad air quality
- Up until around 2005, the State's air quality was ranked among the worst in the Country
- In 2005, in an important MIT study ... because of fine particle levels ... Maryland's air was described as the riskiest air to breathe east of the Mississippi
- In 2008, the Environmental Protection Agency (EPA) designated Maryland (actually Baltimore) as the worst ozone area anywhere outside of California and Texas



Clean Air Highlights

- For nearly 30 years, Maryland's air quality has dramatically improved
- Air quality policies and regulations have lowered levels of six common pollutants — particles, ozone, lead, carbon monoxide, nitrogen dioxide, and sulfur dioxide



- ↓ Nitrogen Dioxide (NO₂) Annual 16% (2008-2019)
- ↓ Nitrogen Dioxide (NO₂) 1-Hour 8% (2009-2019)
- ↓ Ozone (O₃) 28% (2002-2020)
- ↓ Particles (PM_{2.5}) Annual 53% (2002-2019)
- ↓ Particles (PM_{2.5}) 24-Hour 51% (2002-2019)
- ↓ Sulfur Dioxide (SO₂) 1-Hour 88% (2008-2019)

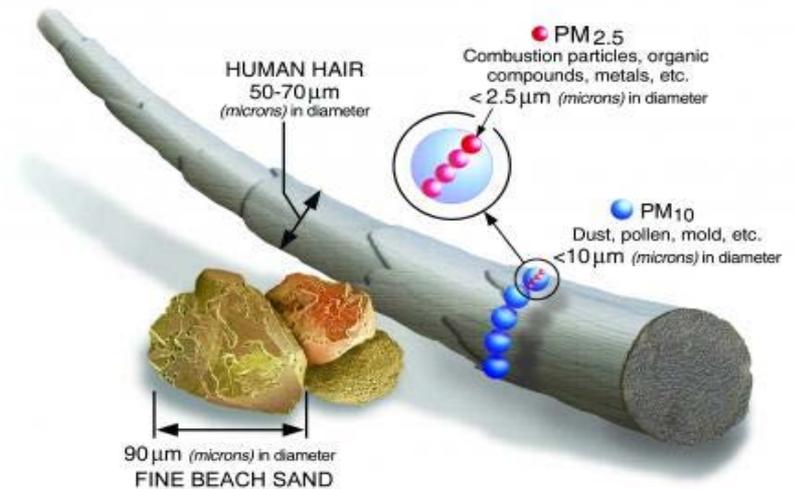
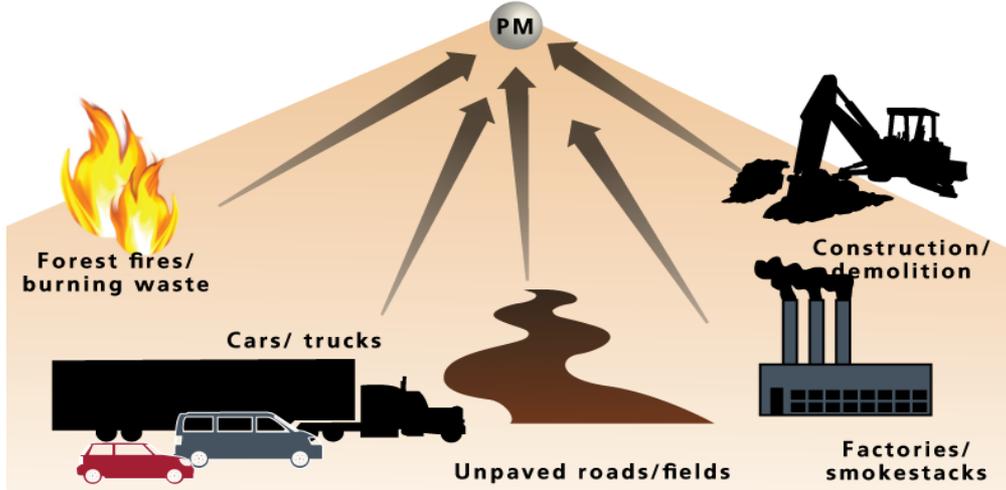


Fine Particulate Matter

- The highest risk air pollutant we regulate
- For the past 10 years, fine particle levels have met the federal air quality standards. Typically, particle levels are higher in urban areas

PRIMARY PARTICULATE MATTER

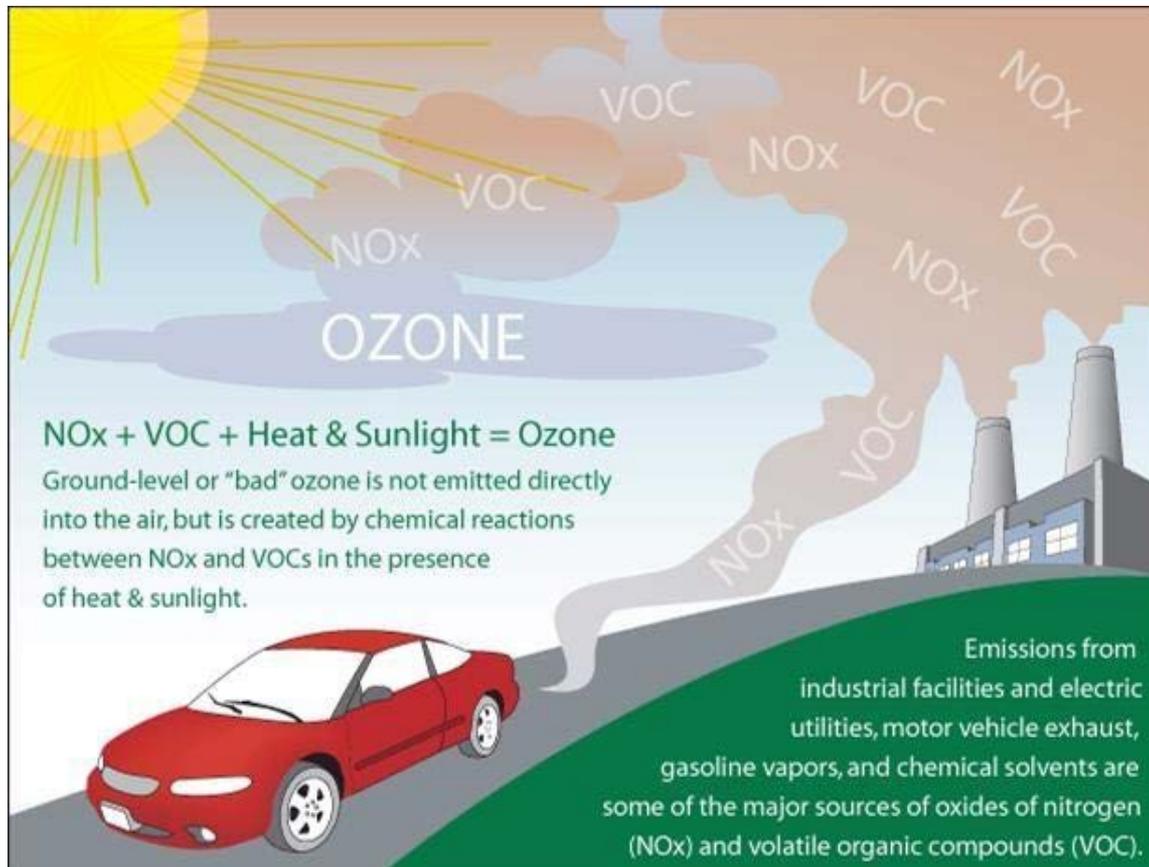
Emitted directly from a source into the atmosphere.





Ground-Level Ozone

- The most pervasive air pollutant in Maryland and many other parts of the Country...





The Past...

- Up until 2010, Maryland continued to experience numerous bad air quality events with ground-level ozone and particulate matter levels in the unhealthy range
 - 2005 MIT PM Study - Maryland identified as the riskiest place to breathe the air east of the Mississippi
 - 2008 - EPA designates the Baltimore area as the worst ozone area outside of California and Texas





The Present...

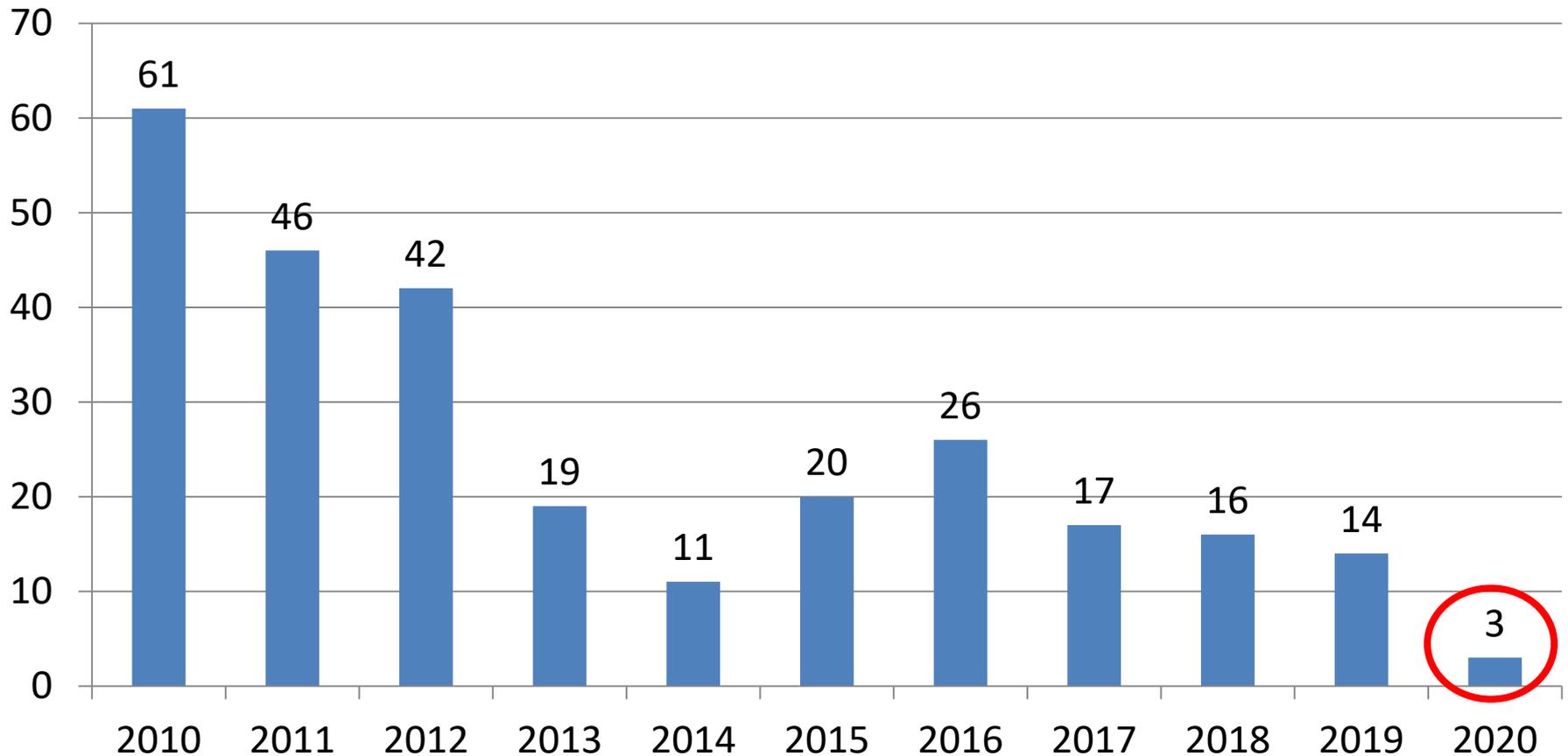
- In recent years, Maryland has achieved the federal fine particle standard, as well as the 2008 ozone standard, and is moving towards achieving the more stringent 2015 ozone standard – in 2020, Maryland recorded the fewest number of bad ozone days ever recorded in a year





Maryland's Bad Ozone Days

Exceedance Days



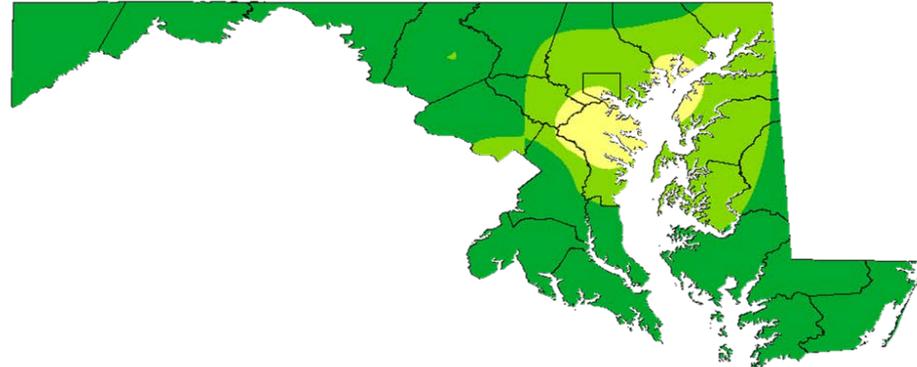
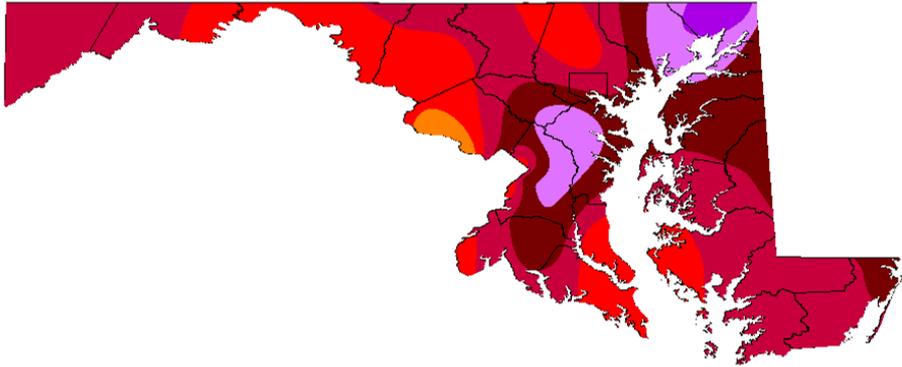
* 2020 data is preliminary¹⁷



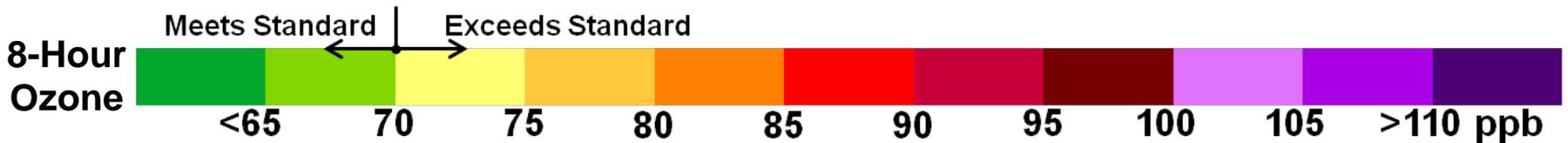
The Shrinking Ozone Problem

1998

2020*



Lower Ozone Levels and Significant Spatial Risk Reduction



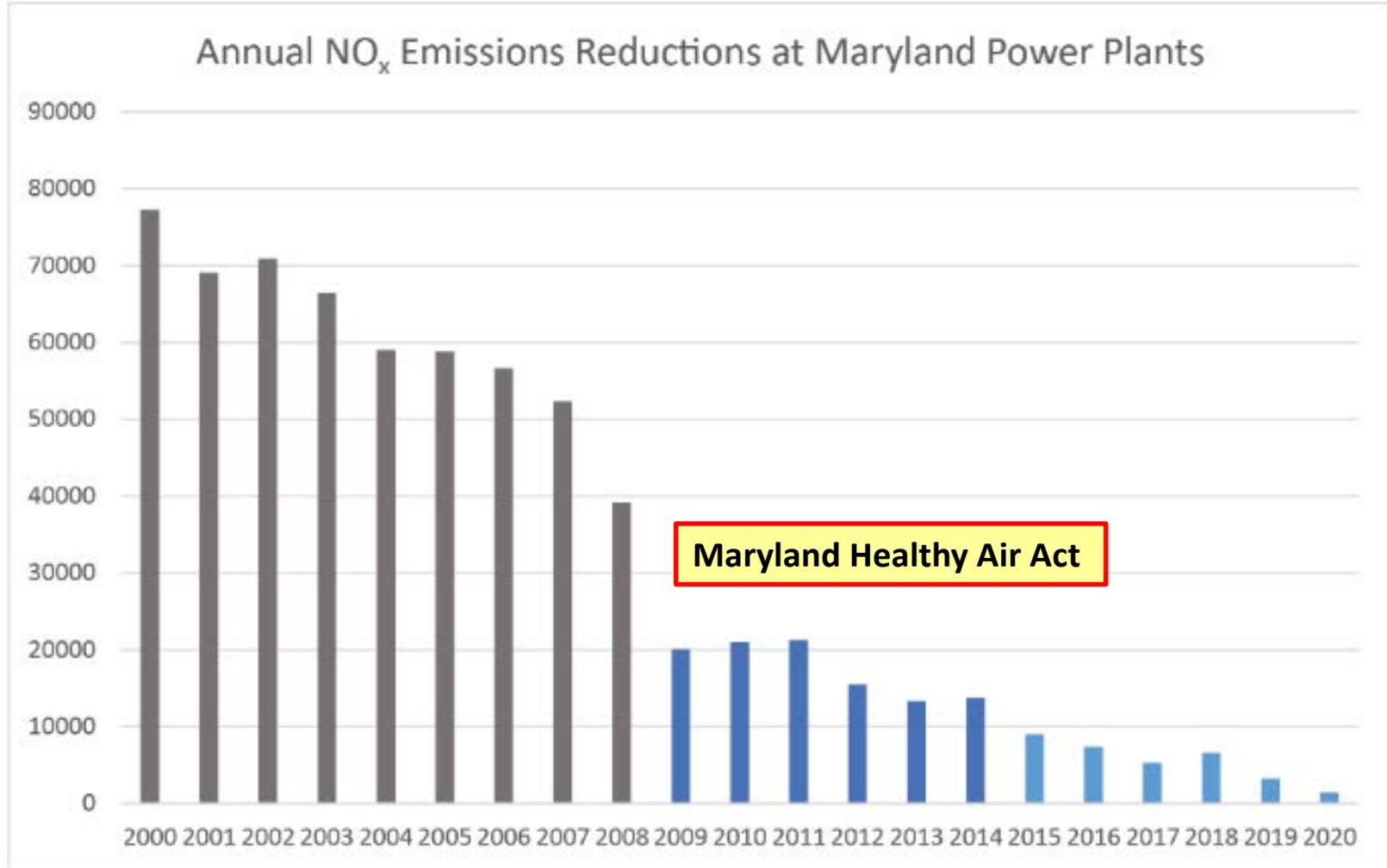


What Has Driven the Progress?

- Maryland has adopted hundreds of emission control programs to reduce air pollution
 - A few of the higher profile efforts are listed below
- Stationary (smokestack) sources:
 - The Maryland Healthy Air Act, The Regional Greenhouse Gas Initiative (RGGI), Maryland's 2015 NOx Regulations ... many more
- Mobile sources:
 - The 2007 Clean Cars Program, Federal Tier 2 and 3 tailpipe standards, numerous diesel emission reduction efforts ... many more
- Potential future emission reduction efforts:
 - Zero Emission Medium and Heavy Duty Trucks , more stringent NOx standards for Heavy Duty Trucks... many more



NO_x Reductions from Coal-fired Power Plants





Deactivation of Coal-fired Power Plants

- All of Maryland's coal-fired power plants to close by 2030
 - HA Wagner 2 - June 1, 2020
 - Dickerson - July 30, 2020
 - Chalk Point - June 1, 2021
 - Brandon Shores - October 1, 2025
 - HA Wagner - October 1, 2025
 - Morgantown - 2022
 - AES Warrior Run - 2030
- Gas and oil-fired units within facilities may continue operation
- Renewable energy and battery storage projects being planned as on-site replacement



Cleaner Vehicles

- The Maryland Clean Cars Program (2007 Legislation)
 - Requires Maryland cars to be the cleanest allowed by federal law
 - Works in tandem with federal vehicle and fuel standards
 - Includes requirements to push manufacturers to develop and sell electric vehicles (EVs)
- 2017 Clean Cars Act - Extends and increases incentives for buying EVs and EV infrastructure
- Tier 3 vehicle and fuel standards
- Diesel initiatives - Volkswagen Trust and Diesel Emissions Reduction Act



A bright sun is positioned in the upper right quadrant of the image, casting a strong glow and creating a lens flare effect. The sky is a deep, clear blue, and several large, fluffy white cumulus clouds are scattered across the scene, particularly on the left and right sides. The overall atmosphere is bright and clear.

Vehicle Technology Changes



Older Technology Vehicles

- When older technology vehicles were operating on Maryland's roads, the VEIP was critical and provided significant air quality benefits
 - Vehicles were big polluters in the 1980's and 1990's
- As newer, cleaner vehicles began to constitute a larger portion of the population, the VEIP has become a smaller factor in Maryland's clean air progress
- Larger reductions can now be had from power plant controls, controls in upwind states, heavy duty truck improvement, and vehicle electrification



Technology Game Changer

- New vehicles are now 98% cleaner than new vehicles were in the 1980's
- Catalytic converters, fuel mixture controls, electronic controls and computer advancements are key contributors to emissions reductions
- All of these advancements are integrated into a vehicle's OBD system
- OBD allows modern, increasingly more stringent standards to be possible
- Monitors virtually every component that can affect emissions performance and identifies malfunctioning and deteriorating components



Game Changer (cont.)

- OBD ensures that vehicles maintain the low levels they were designed to meet throughout the vehicle's entire lifetime
- OBD started as an engineering analysis system for automotive designers, then evolved into a powerful emissions monitoring and testing system
- The technology advancements that have pushed the Maryland fleet to be dominated by newer, cleaner cars, combined with the current process to refresh the VEIP contract, have made the modernization of the VEIP essential



Testing Technology

- Current emissions testing technology is far superior to past methods
 - OBD testing is now possible on the vast majority of the fleet
 - Much more thorough and virtually non-invasive compared to older test types
 - Possible on 1996 and newer passenger vehicles
 - More recently introduced in heavy duty vehicles
- OBD testing also provides new customer convenience opportunities





VEIP Modernization



VEIP Responsibilities

Who Does What?

- Maryland's VEIP is a joint venture between the Maryland Department of Transportation - Motor Vehicle Administration (MDOT-MVA) and MDE; significant contractor support is also a major part of implementation
- MDOT-MVA handles operational oversight, and contract monitoring
- MDE provides technical oversight, and ensures program quality
- The contractor performs vehicle testing; operates and maintains the testing stations and kiosks
- VEIP Regulations are in COMAR Title 11- Department of Transportation, Subtitle 14, Motor Vehicle Administration - Vehicle Inspections, Chapter 8 - Vehicle Emissions Inspection Program



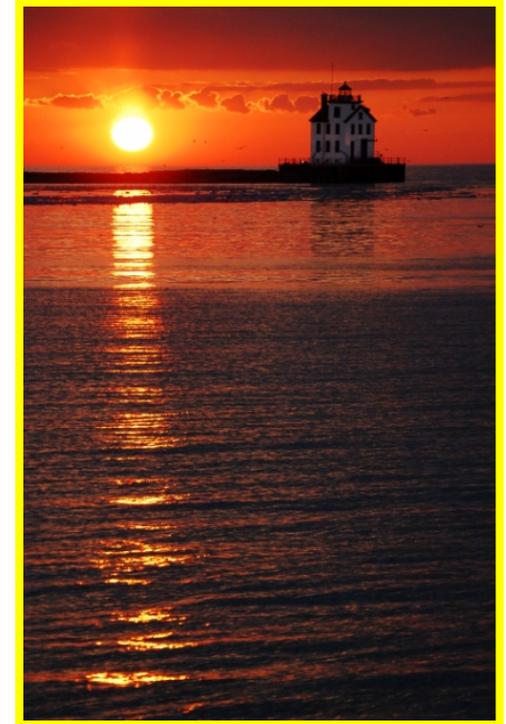
Current Program

- The current program is composed of 2 test types, OBD and idle (tailpipe) tests
 - Testing is delayed for new vehicles for three years, or upon change of ownership
- OBD (98.44% of fleet)
 - 1996 and newer passenger cars and light trucks
 - 2008 and newer heavy duty vehicles <14,000lbs
- Idle (1.56% of fleet)
 - 2007 and older heavy duty vehicles <14,000lbs
 - 1977 and newer heavy duty vehicles >14,000lbs



VEIP Reinvention

- Step 1 – Kiosks introduced in 2015
- Step 2 – 2018 regulatory changes
 - New vehicles got one extra year delay until they get tested
 - Began phasing in the OBD-only program by exempting pre-1996 light duty vehicles
- **Step 3** – Additional changes starting in 2022





Step 3 – VEIP Modernization Effort

- This modernization effort consists of the following features:
 - Motorist Assistance Centers (MACs) and other types of motorist support
 - 6-year delay of initial testing
 - Completion of the OBD-only program phase-in by eliminating the VOC-only, low-tech idle test
 - Improved kiosk functionality
 - Implementation of emerging “Remote OBD” testing
 - Via onboard telematics (e.g. GM On-Star, Toyota Safety Connect) or plug-in devices
 - Private sector assistance for motorists who may choose to have their VEIP test completed using the remote OBD technology option



Immediate VEIP Changes

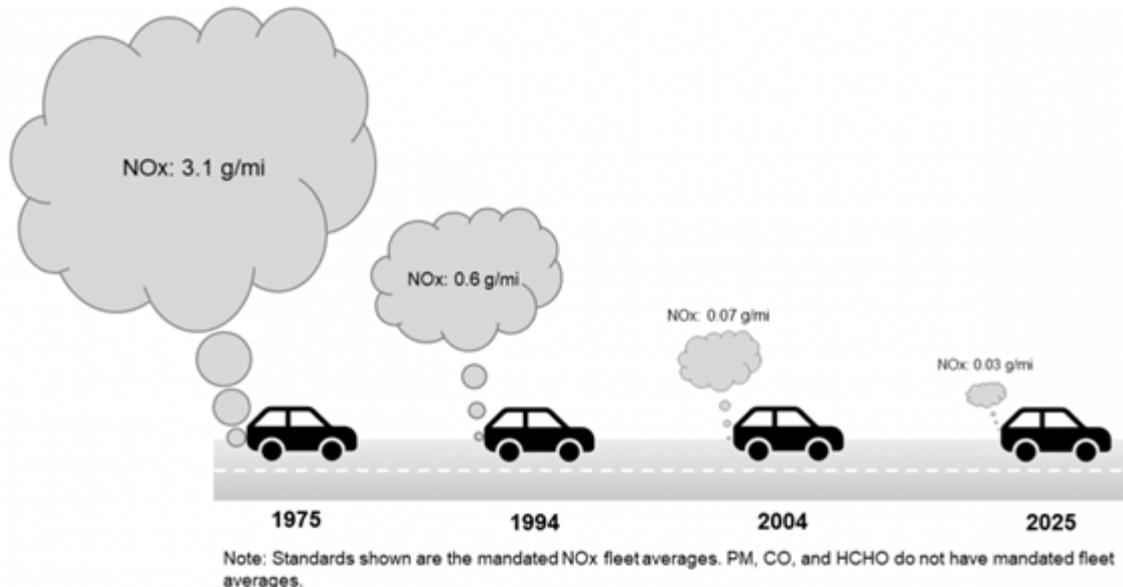
- Three additional years delay of initial testing for new vehicles
 - From the current three years to six years
 - Newer vehicles still tested on transfer of ownership
- Enhanced MACs and other MDOT-MVA and MDE initiatives to dramatically reduce initial failures through early customer assistance
- Adopt an OBD-only program
 - Cessation of outdated idle testing
 - Most cost-effective option moving forward
 - Idle test only affects VOC emissions, which are no longer critical to reducing ozone
- This is common-sense streamlining to allow Marylanders to benefit from vehicle technology and the significant air quality progress we have made





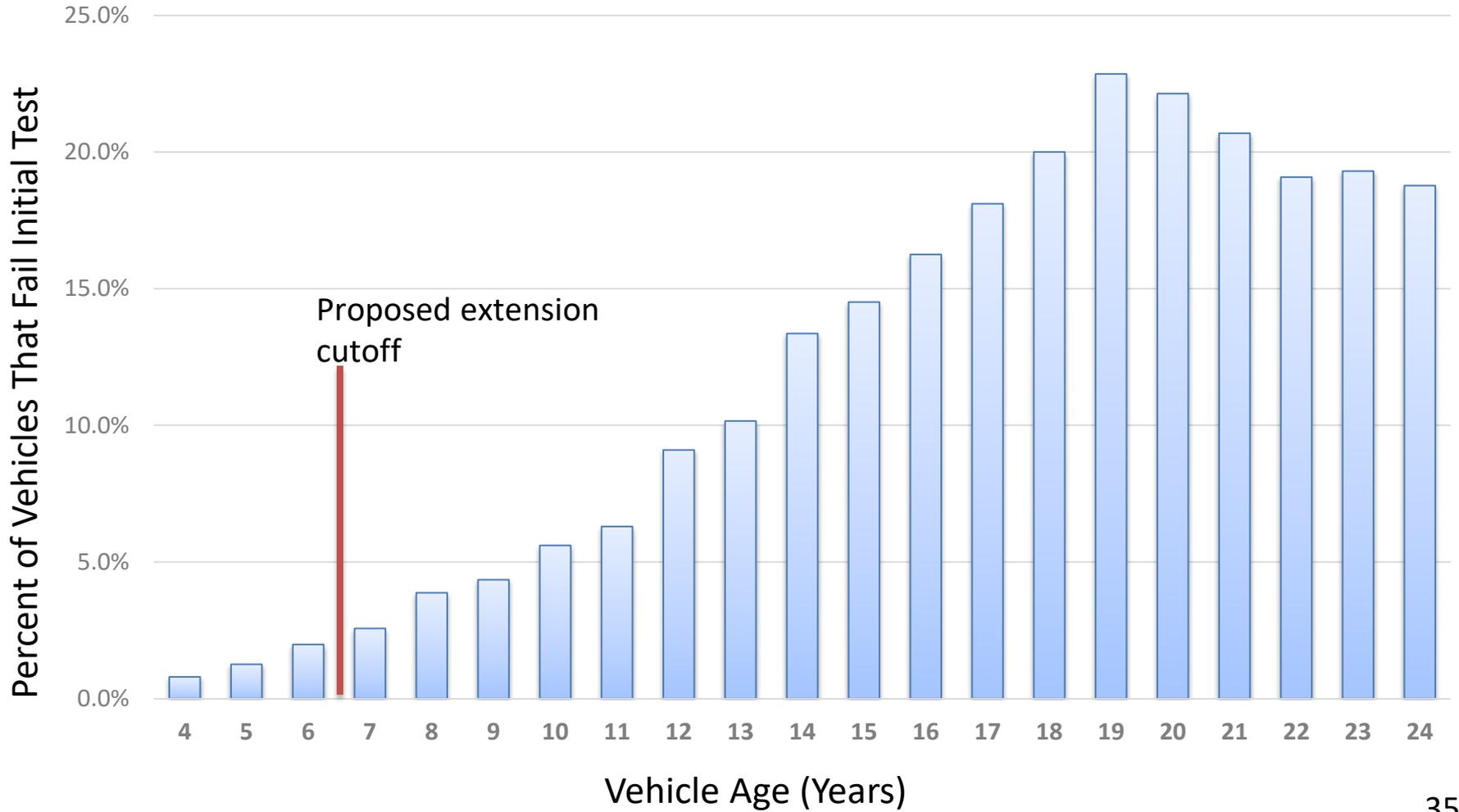
Moving to a 6-Year Delay for Initial Testing of New Vehicles

- Following California's lead which is already at an 8-year extension
- These vehicles have a VEIP failure rate of 1.3%
- Extremely low emitting with remarkably dependable emissions control systems
- When building new vehicles, manufacturers are required to demonstrate that the low emissions levels are long-lasting and backed by robust warranties





Initial OBD Fail Rate by Vehicle Age





Motorist Assistance Centers (MACs)

- This enhancement will include an emissions repair specialist available at the stations for support
 - Assists both motorists and the repair industry at getting the right repairs done the first time
 - The improvements in repair success will carry through multiple VEIP test cycles, reducing overall fail rates and ensuring continued air quality progress
- MACs are becoming a common enhancement among other states' programs to ensure effective, lasting emissions repairs
- This is an especially important component of the program, given the complexity of modern vehicle emissions technology



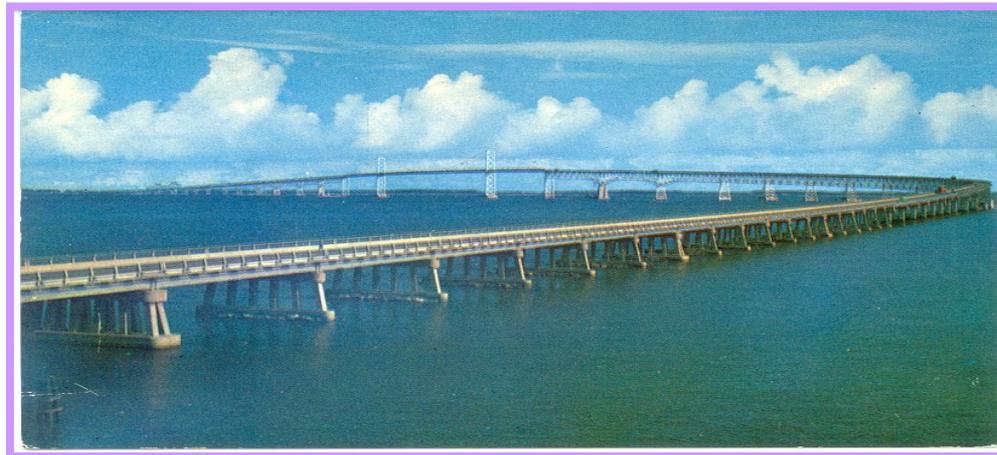
Motorist-Friendly Assistance

- MACs will improve the repair industry's ability to maintain vehicles, and help more people get the repairs needed to pass their VEIP test
- MDOT-MVA has implemented an important computer system upgrade called Customer Connect, which includes an online portal to provide motorists with direct access to VEIP information and related apps. People can get notifications of their VEIP due dates, and will be more aware of when their test date is approaching
- MDE will continue to work with the repair industry to help ensure that technicians have access to the training, skills development, and diagnostic tools needed to perform effective emissions-related repairs
- Other efforts to assist Maryland motorists are also under development at MDE and MDOT-MVA
- The overall goal of these efforts is to implement customer-friendly technical assistance to reduce initial failures as much as possible



OBD-Only Program

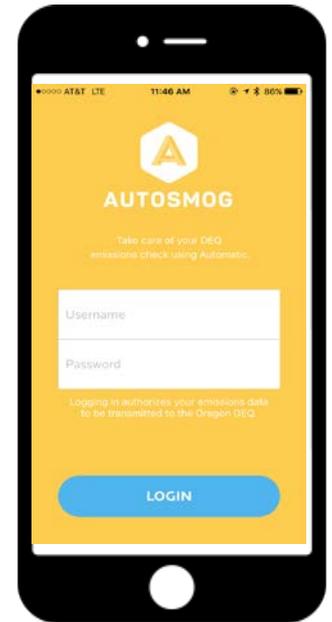
- Exemption of the small number of remaining vehicles built before OBD computer controls
 - Rapidly retiring from the vehicle population
 - Heavy duty vehicles are making transition to OBD compliance
 - Idle testing of vehicles only affects VOC emissions
- Pre-OBD cars and light trucks were exempted in 2018 in the first step of implementing an OBD-only program
- The idle test has no impact on NO_x emissions... this is important





Remote OBD

- This is the iPhone version of VEIP testing
 - Will be voluntary only; emissions snapshot, no continuous monitoring
 - Exciting and rapidly evolving
- Remote OBD technology provides the opportunity to test your vehicle yourself or at various facilities - currently possible with the telematics (computer systems) installed in many cars
- Takes advantage of existing technology, piggybacking on a vehicle's onboard electronics or conveniently located at repair facilities or dealerships
- Remote OBD technology can allow for motorists to test at their convenience
- Increases consumer choice and customer convenience
 - Your next VEIP test could be right down the street
- Maryland is looking to follow the success of Oregon's remote OBD program





Additional Testing Outlets

- Marylanders will soon have the option for testing at new testing outlets
- In addition to existing stations and kiosks, motorist options may include remote OBD tests done at a selected number of repair facilities and dealerships
- This option provides motorists with private sector assistance to submit their VEIP test using the remote OBD technology

A bright sun shining through a blue sky with scattered white clouds. The sun is positioned in the upper right quadrant, casting rays across the sky. The clouds are fluffy and white, scattered across the blue background.

Regulation Changes and Impacts



Proposed Amendments

There are three key regulatory amendments composing the modernization effort

- Amendment 1 - New vehicles will now get tested after reaching age 6
 - Was after 3 years of age
- Amendment 2 - Final step in phase-in of an OBD-only program
 - All pre-OBD technology vehicles will now be exempt
- Amendment 3 - Defining MACs
- Other amendments ... Various “clean up” revisions are included in the proposal

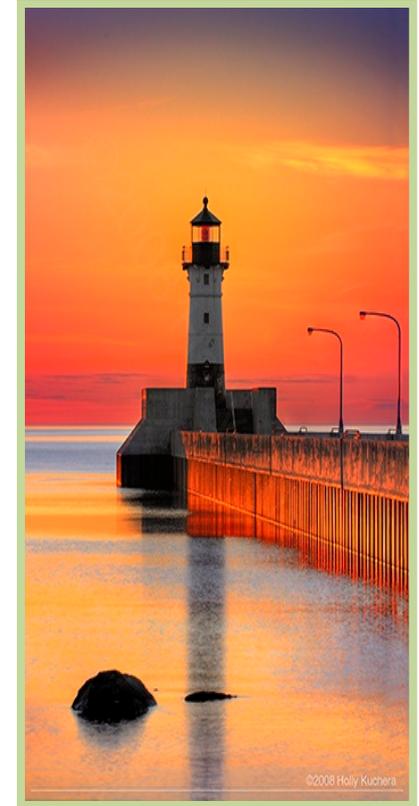




Year 6 Extension

Proposed Regulatory Language

- 11.14.08.05 B(4)(b) ... for a vehicle [of the current or preceding model year] that has not been previously titled or registered in any jurisdiction and for which the ownership document is a manufacturer's certificate of origin, the Administration shall assign a date of scheduled inspection which is at least [36] 72 months after the model year of the vehicle





Motorist Assistance Center

Proposed Regulatory Language

- .03 Definitions. *B(25) "Motorist assistance center" means a resource center operated by the contractor that provides technical emissions-related repair guidance to motorists and vehicle repair technicians.*
- *07B. Repair Waiver. (4) The Administration or the contractor may require approval by the motorist assistance center prior to issuing a waiver.*
- .13 Failed Vehicle and Reinspection Procedures *B. The contractor or the Administration may refer the vehicle operator to the motorist assistance center.*

...



Completion of OBD-Only Phase-In

Proposed Regulatory Language

- 11.14.08.04B. Exempt vehicles include the following vehicles:

...

(16) Of a gross vehicle weight of 8,501 through 14,000 pounds and of model year earlier than 2008;

(17) Of a gross vehicle weight of 14,001 through 26,000 pounds and model year earlier than 2013;

...



OBD-Only Impact

- While the VEIP tests ~1.5 Million vehicles per year, only 1.6% of them are currently idle tested
 - These older vehicles are rapidly retiring from operation
- Heavy duty vehicles from 8,501 - 14,000 pounds are OBD tested from model year 2008 on
- Model year 2013+ vehicles over 14,000 lbs will remain subject to inspection requirements and switch from idle testing to OBD testing
- Idle testing only impacts VOC, does not help with NOx



Estimated Annual Motorist Benefits

- About 260,550 motorists will benefit from the additional 3-year delay in testing
- 20,000 motorists with pre-OBD vehicles will no longer need to have their vehicles tested
- \$5.36 Million in cost savings





Negligible Emission Reduction Losses

- Total impact is negligible
 - With MACs and other program improvements (repair facility involvement, etc.) an approximate 0.02 tons per day (tpd) NO_x increase is projected
 - Modeled maximum potential NO_x increase is 0.20 tpd
- For comparison purposes
 - 2015 power plant regulations achieved over 20 tpd of NO_x reductions
 - MDE legal action against upwind power plants have or will reduce NO_x emissions by 40 tpd
 - The anti-tampering effort will achieve over 5 tpd of NO_x reductions
 - State efforts to electrify the vehicle fleet will eventually drive NO_x emissions from vehicles to zero





What about Climate Change?

- VEIP testing has a negligible effect on the emissions levels of greenhouse gases
 - Greenhouse gas emissions from vehicles are based primarily on CO₂ from fuel consumption
- It is estimated that these regulatory enhancements will have no impact on the State's climate change efforts
- Maryland has made dramatic progress towards reducing greenhouse gases and is implementing initiatives that will continue this trend
 - The 2030 Greenhouse Gas Emission Reduction Act Plan
 - [https://mde.maryland.gov/programs/Air/ClimateChange/Pages/Greenhouse-Gas-Emissions-Reduction-Act-\(GGRA\)-Plan.aspx](https://mde.maryland.gov/programs/Air/ClimateChange/Pages/Greenhouse-Gas-Emissions-Reduction-Act-(GGRA)-Plan.aspx)



Implementation



Working With EPA

- EPA has and continues to encourage states to modify their programs as air quality progress allows
 - Take advantage of better technology and adopt OBD-only programs
- States have authority to make these changes – many other states have undergone or are planning to do similar program modernization
 - MDE is working with EPA to ensure compliance with all federal requirements
- EPA has already approved all changes being proposed by Maryland in other states





What About Other States?

Year After Which New Vehicles are Tested	States
8	CA
7	CO, DE
5	AZ, ID, NJ
4	CT, IL, IN, NC, OH, OR, VA
3	DC, GA, MD, NM, WI



Regulation Adoption Schedule

- June 14, 2021 AQCAC
- August 2021 Regulations to AELR Committee
- September 2021 Notice of Proposed Action (NPA)
- October 2021 Public Hearing/Comment Period
- November 2021 Notice of Final Action (NFA)
- December 2021 Effective Date of Regulations



Recap

- As part of continual program enhancements, Maryland is looking to extend initial testing for vehicles out from 3 to 6 years, complete the phase-in of the OBD-only program, and implement MACs
- These changes are part of the VEIP reinvention started in 2018
- These enhancements, along with future testing options and remote OBD will allow for a more customer-friendly, streamlined program



Action Requested Today

- A favorable vote, so MDE and MDOT-MVA can move ahead with these regulation changes with the support of AQCAC



A bright sun is positioned in the upper right quadrant of the image, casting a strong glow and creating a lens flare effect. The sky is a vibrant blue, and several large, fluffy white clouds are scattered across the scene, particularly on the left and right sides. The overall atmosphere is clear and bright.

QUESTIONS