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NOx RACT for Municipal Waste Combustors (MWCs)

Stakeholder Meeting – September 22, 2017

Topics Covered

- Background Information
  - Air Quality Overview
  - MD Efforts to Reduce Pollution
- Municipal Waste Combustors (MWCs) in Maryland
  - Purpose of NOx RACT review
  - Stakeholder comments
  - MWC overview
- MDE NOx RACT update
  - Proposed NOx RACT regulation
- Optional SIP Strengthening requirements
- Regulation Timeline

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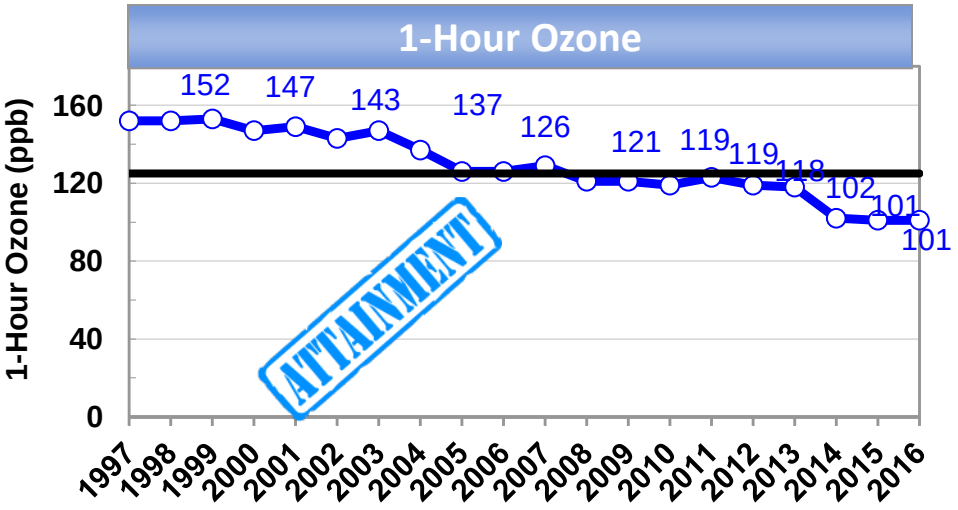
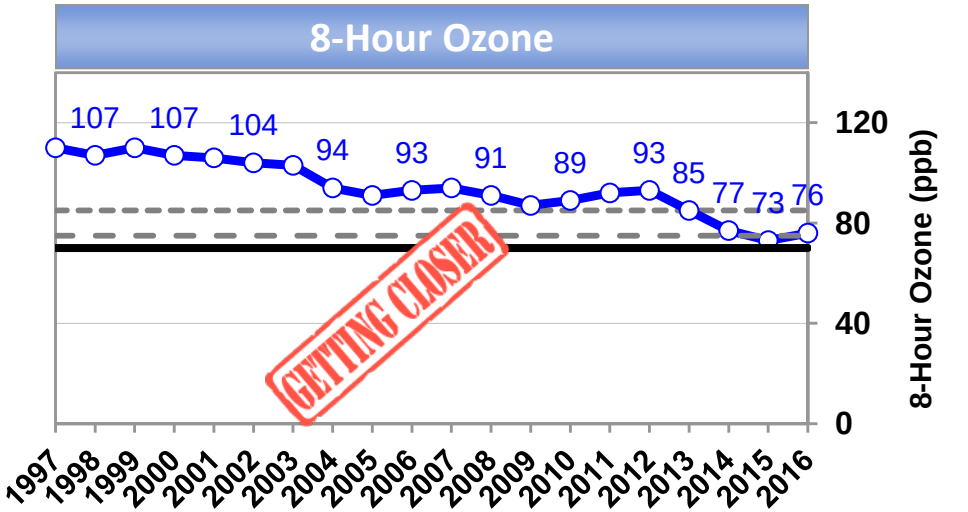
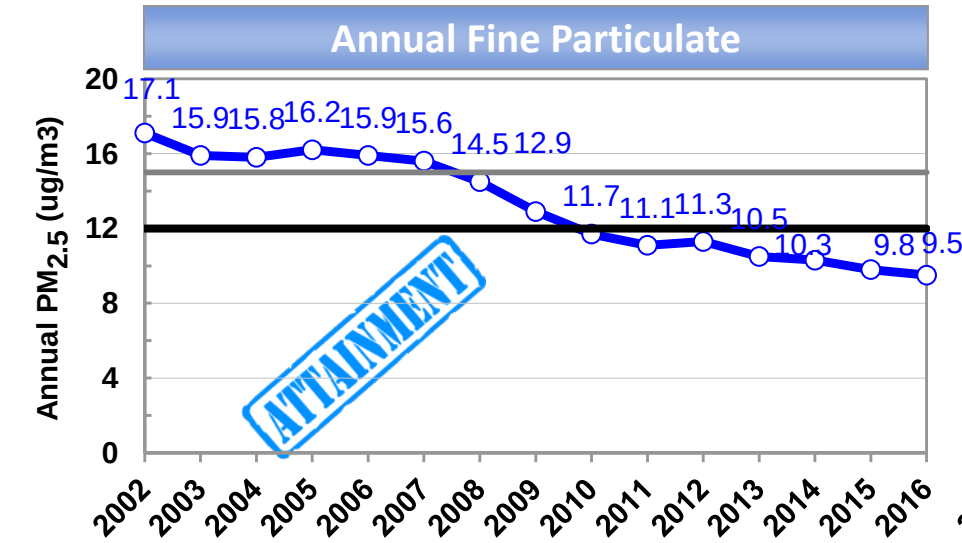
Why NOx?

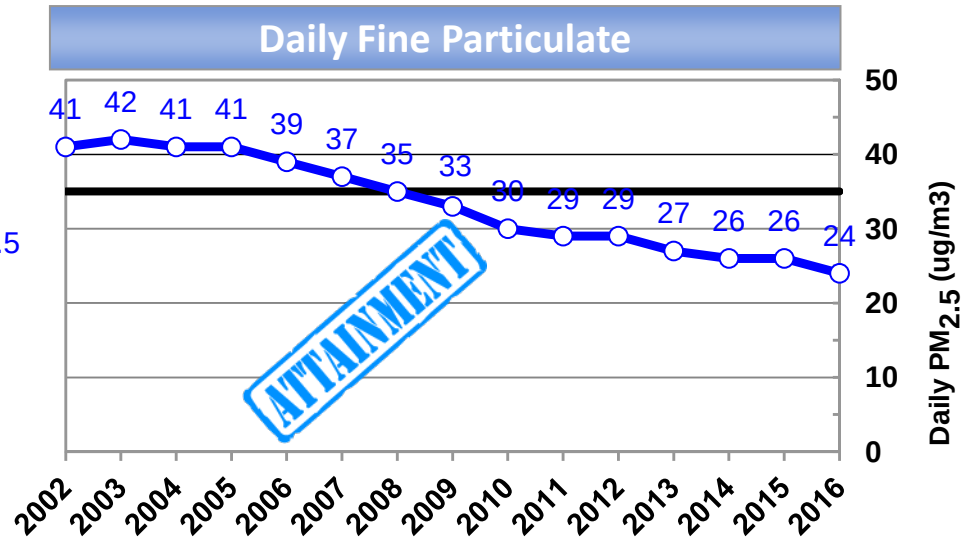
- Nitrogen oxide or NOx is the most important pollutant to reduce for continued progress on ground level ozone in Maryland
  - Ozone is formed when NOx and Volatile Organic Compounds react with sunlight
- There is very little doubt that the State's recent progress on cleaning up ozone air pollution is driven by NOx reductions
- NOx is also a contributor to nitrogen deposition into the Chesapeake Bay, fine particulate pollution in Maryland and regional haze

Progress in Cleaning Maryland's Air





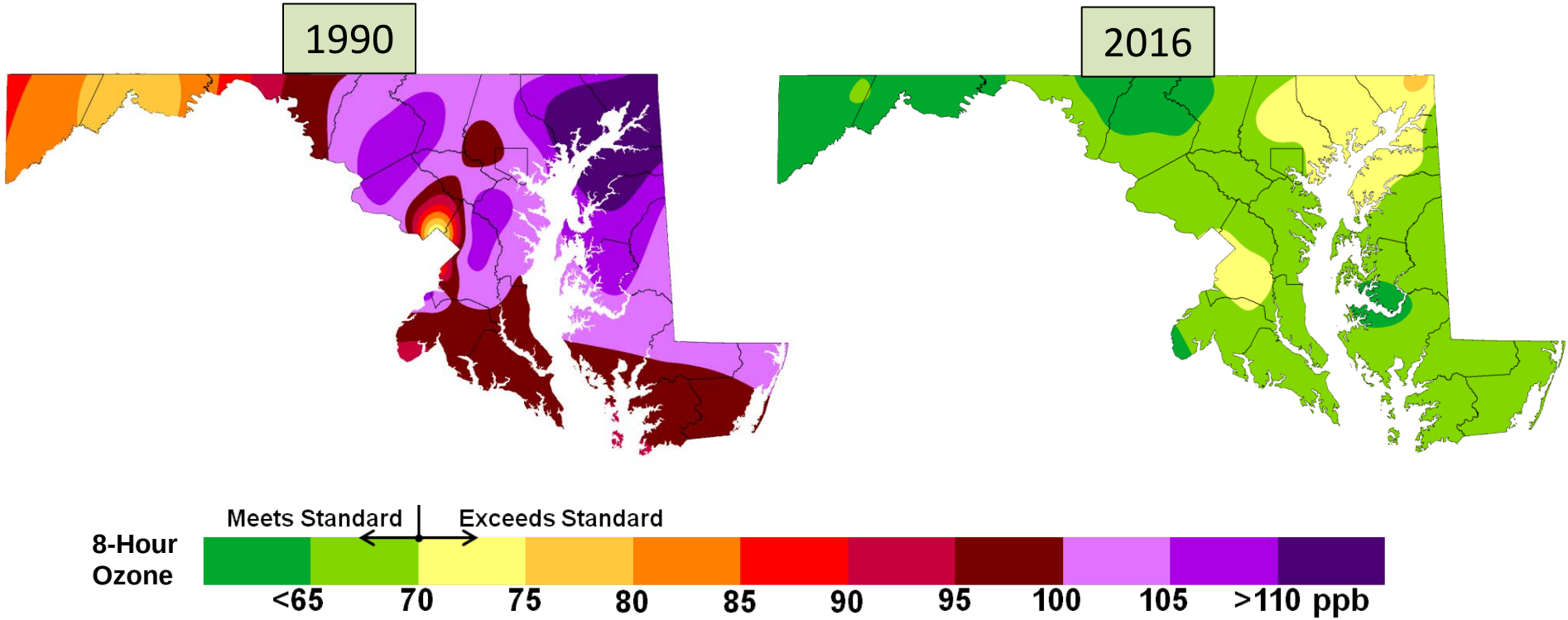




Clean Air Progress in Baltimore

- Baltimore has historically measured some of the highest ozone in the East
- From 2013 to 2015, the Baltimore area did not exceed the 75 ppb ozone standard
  - First time in 30 years … weather did play a role
- EPA has now finalized a "Clean Data Determination"
- With hotter, less ozone friendly weather, Baltimore may see higher ozone … but continued progress is indisputable
- New, lower ozone standard, 70 ppb

The Shrinking Ozone Problem



- In 2016 only areas of Baltimore, Harford, Kent, Cecil, and Prince George's Counties were above the ozone threshold of 70 ppb

Key Pollutants

- Over the past 10 years, MDE has worked to reduce emissions of many pollutants. Six of the most critical pollutants include:
  - Nitrogen oxides or "NO_x" - the key pollutant to reduce to further lower ozone levels. Also contributes to fine particle pollution and regional haze
  - Sulfur dioxide or "SO2" - the key pollutant to reduce for fine particulates and the new SO2 standard. Also a major contributor to regional haze
  - Carbon dioxide or "CO2" - the primary greenhouse gas that needs to be reduced to address climate change
  - Mercury (Hg) - a very important toxic air pollutant
  - Diesel particulate - diesel exhaust
  - Volatile Organic Compounds or "VOC" - also a contributor to ground level ozone. Many VOCs are also air toxics

Key Emission Reduction Programs

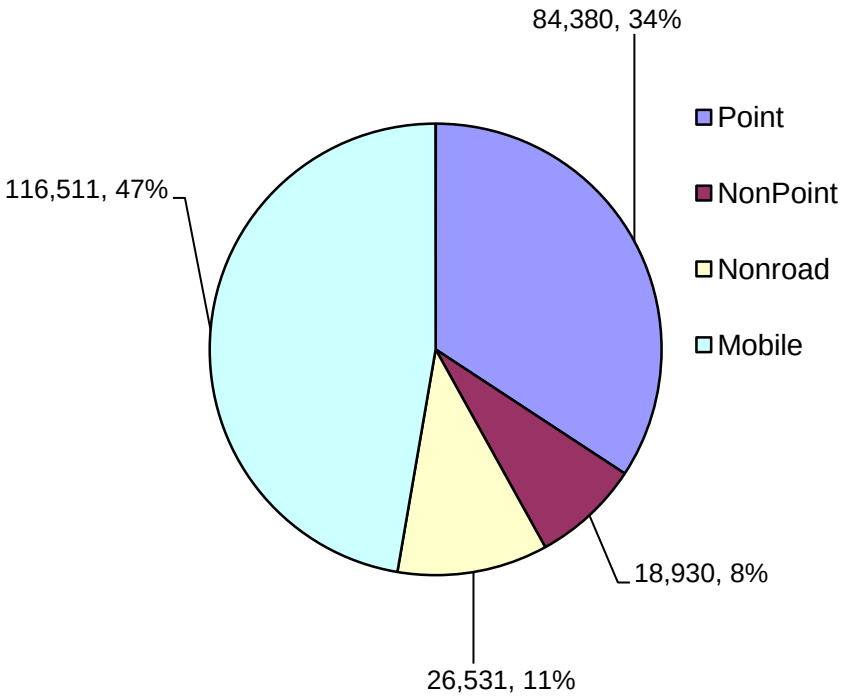
- Since around 2005, Maryland has implemented some of the country's most effective emission reduction programs:
  - Power Plants
  - Cement Plants
  - Cars and Trucks
  - Consumer Products
  - Area Source VOCs

2005 to 2017 Control Programs

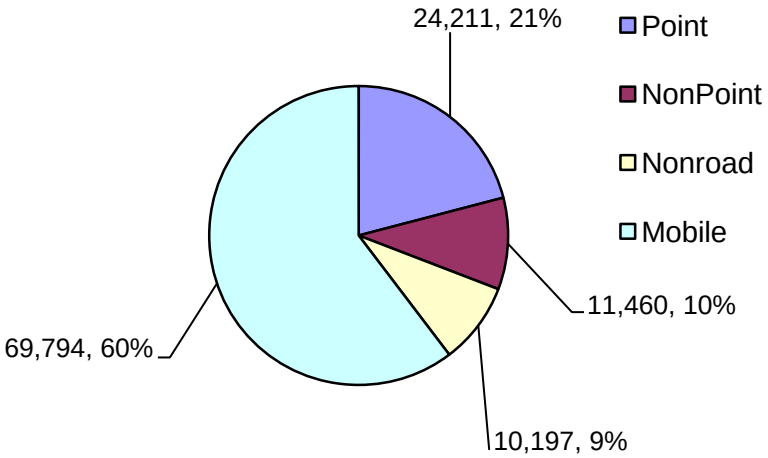
- Power Plants
  - The Maryland Healthy Air Act of 2006
  - 2015 NOx reductions for coal plants
- Portland Cement Plants
  - 2017 NOx RACT updates
- VOC Regulations
  - Architectural and Industrial Coatings
  - Consumer Products
  - Autobody Refinishing
- Mobile Sources
  - The Maryland Clean Cars Act of 2007 and 2017
  - Diesel Trucks, School Buses, Locomotives

NOx Emission Reductions 2005 – 2014

2005 Annual NO_x Emissions
246,000 tons per year



2014 Annual NO_x Emissions
115,000 tons per year
More than a 50% reduction



MD NOx RACT Review for Large MWCs

- The purpose of this review is to establish new NO_x RACT (Reasonably Available Control Technology) requirements for large MWCs with a capacity greater than 250 tons per day
- There are two large MWCs in Maryland;
  - Wheelabrator Baltimore, L.P. and
  - Montgomery County Resource Recovery Facility (MCRRF)
- The Department has been meeting with affected sources and EPA since the summer of 2015 to discuss MWC operations, emissions data and NOx RACT proposals
- August 30, 2016 – 1st Stakeholder Meeting
- October 27, 2016 – Stakeholder comments received
- January 17, 2017 – 2nd Stakeholder Meeting
- May 9, 2017 - Stakeholder comments received

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2015-16 Top MD NOx Emissions

No.	2016 Top 15 NOx Emissions Sources in MD	NOx Emissions (Tons Per Year)* 2016	NOx Emissions (Tons Per Year) * 2015
1	Lehigh Cement Company LLC	2,781	2,936
2	Raven Power Fort Smallwood LLC	2,569	3,102
3	NRG Chalk Point Generating Station	2,326	2,126
4	Luke Paper Company	1,927	1,887
5	**Wheelabrator Baltimore, LP**	**1,141**	**1,123**
6	NRG Dickerson Generating Station	987	987
7	NRG Morgantown Generating Station	949	897
8	C P Crane Generating Station	661	1,078
9	**Montgomery County Resource Recovery Facility (MCRRF)**	**418**	**441**
10	AES Warrior Run Inc	359	445
11	Holcim (US), Inc **	331	1,225
12	Constellation Power - Westport	195	65
13	Constellation Power - Perryman Generating Station	150	190
14	Rock Springs Generation Facility	141	127
15	KMC Thermo-Brandywine Power Facility	137	144

* Facility-wide NOx emissions

* * Company converted to preheter/precalciner kiln process, operating hours and NOx emissions were lower – operated for 153 days

Stakeholder Comments

- Detail human health and water quality impacts
- MDE must set a RACT limit no higher than 150 ppm on a 24-hour average
  - Point to NJ, CT and MA adoption of 150 ppm NOx RACT
  - Point to similar Wheelabrator MWCs meeting 150 ppm
- MDE should require Wheelabrator to analyze whether lower limits can be met through modern control technologies
- MDE should go beyond RACT to set lower NOx limits

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Wheelabrator

2,250
Tons of Waste Processed per day

722,789
Tons of Waste Processed Last Year

64 MW
Energy Generation Capacity

40,000
Homes Powered

1985
Began Operations

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Wheelabrator NOx Emissions

Year	NOx Tons	Long Term (Annual) Average NOx 24-Hr Block Concentration
2013	1067	169 ppm
2014	1076	162 ppm
2015	1123	168 ppm
2016	1141	169 ppm
Average	**1102**	**167 ppm**

Montgomery County Resource Recovery Facility

1,800
Tons of Waste Processed per day

599,250
Tons of Waste Processed Last Year

52 MW
Energy Generation Capacity

37,000
Homes Powered

1995
Began Operations

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MCRRF NOx Emissions

Year	NOx Tons	Long Term (Annual) Average NOx 24-Hr Block Concentration
2013	387.7	85 ppm
2014	426.7	88 ppm
2015	441.2	89 ppm
2016	418	87 ppm
Average	**418**	**87 ppm**

MCRRF NOx Control Technology

- An SNCR system is integrated to a combustion Low NOx (LN™) system with modifications to the location of the injectors
- The Covanta LN™ technology employs a unique combustion system design, including modifications to combustion air flows, reagent injection and control systems logic
- The LN™ control system and SNCR result in lowering the NOx emission rate range to 85-89 ppm long-term (annual average) basis
- Approximate 47 percent reduction on long term basis, but subject to high variability on daily basis, lesser can be assured on a short-term basis
- The LN™ control system installation started in 2008 and was completed in 2010 at a capital cost of $6.7 million and the average operating costs over the last three years has been $566,000 per year

MDE Updates to MWC NOx RACT

- Based upon:
  - regional RACT amendments in other states
  - review of MWC NOx emissions data analysis of optimization studies
  - recent combustion upgrades at Wheelabrator

- The Department has concluded that the NOx RACT standards for MWCs can be strengthened within the definition of RACT

- MDE proposing to pair daily (24-hour) limits with longer (30-day rolling average) limits

MDE Proposed NOx RACT

- Three key elements:
  - Requirement to optimize control technologies to minimize NOx emissions each day of operation
  - Daily, 24-hour block average limits to ensure peak daily emissions are addressed
  - Longer term, 30-day rolling average limits to ensure that even lower limits are met throughout the year

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Requirement to Minimize NOx Emissions Every Day

- .10A - Page 2 of draft regulation
- The owner and operator of a Large MWC shall minimize NOx emissions by operating and optimizing the use of all installed pollution control technology at all times the unit is in operation, including periods of startup and shutdown
  - Ensures NOx control technologies are operated in the best possible manner to minimize emissions
  - Satisfies part of EPA's SSM policy (more on that later)
- Not later than 45 days after effective date of regulation, a plan is due to the Department demonstrating how Large MWCs will operate controls during all modes of operation including but not limited to normal operations, startup and shutdown

Daily and Longer Term Limits

- .10B and C - Pages 2 and 3 of draft regulation
- 24-hour block average rates effective May 1, 2019
- 30-day rolling average rates effective May 1, 2020
    - Allows time to ensure more stringent, long-term rates can be met on a consistent basis

Unit	24 Hour Block Average Rate	30 Day Rolling Average Rate
Wheelabrator	150 ppmv	145 ppmv
MCRRF	140 ppmv	105 ppmv

ppmv = parts per million volume

Reporting Requirements

- .10 I - Page 3 of draft regulation

- Beginning July 1, 2019, the owner or operator of a Large MWC shall submit a quarterly report to the Department containing:
  - (1) Data, information, and calculations which demonstrate compliance with the NOx 24-hour block average emission rates
  - (2) Documented actions taken during periods of startup and shutdown in signed, contemporaneous operating logs

- Beginning July 1, 2020, the owner or operator of a Large MWC shall submit a quarterly report to the Department containing data, information, and calculations which demonstrate compliance with the NO_x 30-day rolling average emission rate

Monitoring and Compliance

- .10G and L - Page 3 of draft regulation
- The owner or operator of a Large MWC shall continuously monitor NOx emissions with a continuous emission monitoring system in accordance with COMAR 26.11.01.11 - Continuous Emission Monitoring (CEM) Requirements
- Compliance with NOx emission standards to be demonstrated with a CEM
- Compliance with NOx mass loading limits for periods of startup and shutdown demonstrated by calculating the 24-hr block averages of all hourly average NOx emission concentrations for all the hours during the 24-hour period that the affected facility is operating, including periods of startup and shutdown

EPA SSM Policy – June 12, 2015

- Provides a mechanism for facilities to meet alternative emission limits during periods of startup/shutdown
- EPA requires seven specific criteria be met when developing SS limits
- MDE addressing SS criteria directly in proposed regulation and within Technical Support Documents

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Startup/Shutdown Limits

- .10D - Page 3 of draft regulation
- Higher volumes of air are present in furnace during SS events & adjustment to 7% oxygen does not represent actual NOx emissions
- Mass based emission standards take into account the design flue gas flow rate & represent the worst case actual NOx emissions
  - Applied facility wide on a 24-hour block period
- Mass based calculations based upon 24 hour block average NOx RACT limits

Unit	24 Hour Block Average Rate	Mass Loading NOx Limit
Wheelabrator	150 ppmv	252 lbs/hr
MCRRF	140 ppmv	202 lbs/hr

ppmv = parts per million volume

Optional SIP Strengthening

MDE Seeking Input at Today's Meeting

- MDE considering a "SIP Strengthening" concept that is intended to address the many public comments we have received about the age of the Wheelabrator facility and how to move towards even lower NOx limits as the plant is modernized
- MDE is asking for comment on this option

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Optional SIP Strengthening

Basic Concepts

- Establish new NOx limits in 2022 for the Wheelabrator facility
- Builds upon ongoing modernization efforts that are already in place at Wheelabrator
- Two steps:
  - Feasibility study in 2020
  - New NOx limits in 2022

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Process for Establishing New 2022 NOx Limits - Feasibility Analysis

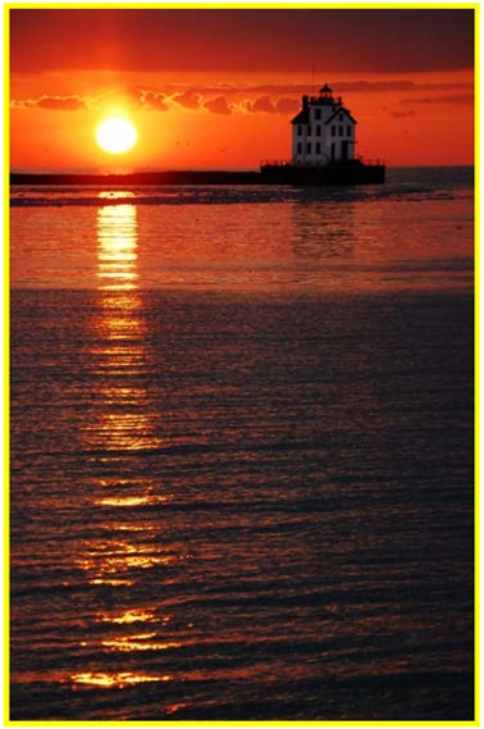
- Step 1 - Feasibility Analysis
  - In 2020, Wheelabrator would submit a feasibility analysis describing options for achieving lower NOx emissions based upon ongoing modernization efforts at the plant. Would include information like:
    - A written narrative and schematics detailing existing facility operations, boiler design, control technologies, and relevant emission performance
    - A written narrative and schematics detailing state of the art control technologies for new and retrofit MWCs
    - A feasibility analysis for achieving additional NOx reductions
    - A cost-benefit analysis
    - Proposed 2022 emission limits if appropriate
    - Any other information MDE deems necessary to evaluate the review

Process for Establishing New 2022 NOx Limits

- Step 2 - Two Options
  - Option 1 - Establish 2022 limits in current RACT rule:
    - Presumptive limit; or
    - "Alternative Limit" if supported by the 2020 feasibility study
      - Alternative limit would need to go through full public comment and hearing process required by Maryland law
  - Option 2 - Initiate rulemaking in 2020 or 2021 to adopt new 2022 NOx limits for the Wheelabrator facility

Timeline

- Stakeholder Meetings
  - August 30, 2016
  - January 17, 2017
  - September 22, 2017
- Air Quality Control Advisory Council (AQCAC) Briefing
  - June 6, 2016
- AQCAC Potential Action Item
  - December 11, 2017
- Regulation Adoption
  - NPA – February 2018
  - Public Hearing – March 2018
  - NFA – April 2018
- Effective Date
  - May 2018



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Discussion

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