Maryland
Department of
the Environment

NOx RACT for Municipal Waste Combustors (MWCs)

AQCAC Meeting – December 11, 2017

Topics Covered

- Municipal Waste Combustors (MWCs) in Maryland
  - Purpose of NOx RACT review
  - Stakeholder process
  - MWC overview
- MDE NOx RACT update
  - Proposed NOx RACT regulation
- Additional NOx Emission Control Requirements beyond 2020
- Timeline

Maryland
Department of the Environment

MD NOx RACT for Large MWCs

- The purpose of this action 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, Inc. and
  - Montgomery County Resource Recovery Facility (MCRRF)

- The Department has been meeting with affected sources and EPA since 2015 to discuss MWC operations, emissions data and NOx RACT proposals

- June 6, 2016 – AQCAC briefing

- August 30, 2016 – 1st Stakeholder Meeting
  - October 27, 2016 – Stakeholder comments received

- January 17, 2017 – 2nd Stakeholder Meeting
  - May 9, 2017 - Stakeholder comments received

- September 22, 2017 – 3rd Stakeholder Meeting
  - October 6-20, 2017 - Stakeholder comments received

Maryland
Department of the Environment

Key Stakeholder Comments

- MDE must set NOx RACT limits that are consistent with limits in other leadership states … at or below 150 ppm on a 24-hour basis
  - Consider even more stringent limits
- RACT requirements are intended to acknowledge the different design and age of equipment at existing MWCs and to require “reasonable” controls
  - New units are subject to BACT
- Requirements for SSM are important
  - Mass based versus rate based requirement

Maryland
Department of
the Environment

MWC NOx RACT - Other States

State	24-hour Limit	30-day Limit	Additional 2020 Requirements?
MD	150 ppmv at Wheelabrator 140 ppmv at MCRFF	145 ppmv at Wheelabrator 105 ppmv at MCRFF	Yes at Wheelabrator No at MCRRF
PA	180 ppmv	NA	NA
CT	150 ppmv	NA	NA
NJ	150 ppmv	NA	NA
MA	150 ppmv *	NA	NA
VA	Under development - Stringent limits under consideration		

* Proposed May of 2013

NOx Emissions: 2015/2016

Top 15 Stationary Sources

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

Total Mobile Source NOx Emissions in MD - 2014	88,568 tons per year

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

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

Maryland
Department of the Environment

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**

Wheelabrator NOx Control Technology

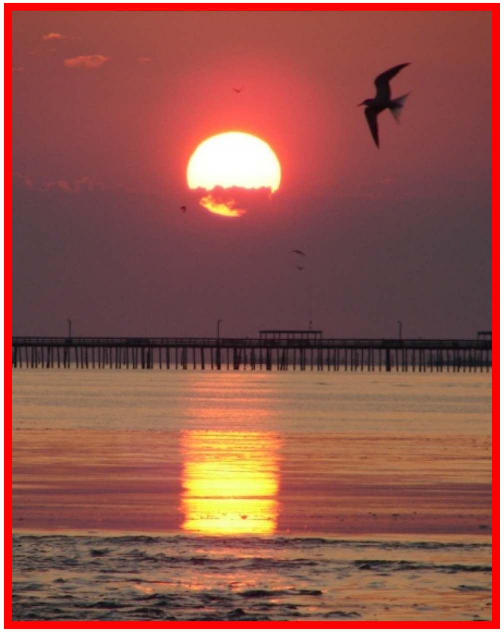
- Wheelabrator operates an SNCR for NOx Control (urea based)

- Optimized existing SNCR systems to target proposed NOx RACT limits

  - Injector locations, number of injectors, fuel-tip design, urea injection rate, operating parameters (dilution water flow, air pressure)

- Conducted long-term analysis of optimized system to ensure system capabilities

- The optimized control system and SNCR result in lowering the NOx emission rate range from 167 ppmv to below 150 ppmv



Maryland
Department of
the Environment

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

Maryland
Department of the Environment

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

Maryland
Department of the Environment

Requirement to Minimize NOx Emissions Every Day

- .10A - 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)

- .10G – 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 – NOx emission rates
- 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

- .10H and I – Reporting Requirements

- 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) NOx continuous emission monitoring data and stack flow data, which demonstrate compliance with the startup and shutdown mass NOx emission limits;
  - (3) Flagging of periods of startup and shutdown and exceedances of emission rates;
  - (4) NO_x continuous emission monitoring data and total urea flow rate to the boiler averaged over a 1-hour period, in a Microsoft Excel format; and
  - (5) 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

- .10F, K and L – Monitoring and Compliance
- 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 average of all hourly average NOx emission concentrations from continuous emission monitoring systems, utilizing stack flow rates derived from flow monitors, for all the hours during the startup or shutdown period

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

Maryland
Department of the Environment

Startup/Shutdown Limits

- .10D – Startup and Shutdown NOx Emission Limitations
- 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 period
  - When the unit is in periods of startup and shutdown, the NOx 24-hour block average emission rate will apply for the 24-hour period after startup and before shutdown
- 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

Additional NOx Emission Control Requirements

- .10E - Additional NOx Emission Control Requirements
- Requires feasibility analysis to be submitted by Wheelabrator by January 1, 2020
- Based upon the results of the feasibility analysis, Wheelabrator to propose new NOx emissions limits for consideration by the Department
- Two steps:
  - Feasibility analysis due January 1, 2020
  - MDE to initiate rulemaking after submittal of feasibility analysis

Maryland
Department of
the Environment

The Feasibility Analysis

- Step 1 - Feasibility Analysis
  - In 2020, Wheelabrator would submit a feasibility analysis describing options for achieving lower NOx emissions based upon results of third-party study. Would include information like:
    - A written narrative and schematics detailing existing facility operations, boiler design, NOx control technologies, and relevant emission performance
    - A written narrative and schematics detailing state of the art NOx control technologies for achieving additional NOx reductions from existing MWCs in consideration of the current boiler configuration at Wheelabrator
    - A feasibility analysis of whether each identified NOx control could be implemented at Wheelabrator
    - A cost-benefit analysis
    - An estimated timeline for implementation
    - Any other information MDE deems necessary to evaluate the review

Process for Establishing New NOx Limits

- Step 2 – Proposal and Promulgation
  - Not later than January 1, 2020, based upon the results of the feasibility analysis, Wheelabrator shall propose new NOx emission limits for approval by the Department
  - MDE to initiate rulemaking to adopt new NOx limits for the Wheelabrator facility after approval of feasibility analysis
    - The additional NOx emission control requirements would need to go through full public comment and hearing process as required by Maryland law

Timeline

- Stakeholder Meetings
  - August 30, 2016
  - January 17, 2017
  - September 22, 2017
- AQCAC
  - December 11, 2017
- Regulation Adoption
  - NPA – May 2018
  - Public Hearing – June 2018
  - NFA – August 2018
- Effective Date
  - September 2018

Maryland
Department of
the Environment

Discussion

Maryland
Department of
the Environment