Comments from Ozone Transport Commission (OTC) Municipal Waste Combustor (MWC) Stakeholders and OTC Responses

1. **Joe Walsh (Covanta):** Is there an email to send comments to?

OTC response: ccooper@nescaum.org

2. **MHB:** Has OTC or OTC member states considered whether recent pricing for urea affects the results of the study?

OTC response: The workgroup recognizes that the cost of consumables, including reagents, and material and labor related to NOx control has increased since the performance of the engineering studies that the workgroup referenced in developing its cost effectiveness estimates. The cost effectiveness estimates were developed with the goal of using those values, or range of values, to compare with pollution control RACT threshold values sometimes utilized by the states in judging the cost effectiveness of a proposed control strategy. Therefor the existing estimates allow a more even comparison to cost effectiveness thresholds that have been in place for some time to allow the reader to better judge the relative value of cost effectiveness estimates cited in the report. It is anticipated that unit specific RACT analysis performed in accordance with the applicable state's RACT procedure would be performed using the latest cost information to compare with the state's RACT threshold.

3. **George Drew (Covanta):** Has the MWC workgroup looked at other Covanta designs, such as Martin stoker or RDF combustion? If not, can that be reviewed as part of this project?

OTC response: The workgroup reviewed publicly available data for all MWC units located in the OTR. The bulk of the report concentrated on MWCs where there have been recent engineering studies or completed NOx reduction projects to assess commercially available NOx reduction technologies, the applicability and effectiveness of those reduction technologies, and the estimated cost effectiveness of those technologies. Additional analysis to address additional differences in MWC designs would require more unit specific NOx reduction project information than the workgroup was able to locate. The workgroup identified a number of NOx reduction technologies that are commercially available and applicable to many MWC designs. The report contains a brief discussion for a number of generic MWC designs and, where applicable, provides some information about the applicability of various NOx control for those generic MWC designs.

4. **George Drew (Covanta)**: is this recommendation based on RACT criteria?

OTC response: The goal of the workgroup was to identify commercially available, technically feasible NOx reduction technologies applicable to large MWCs. Where engineering studies were available, cost effectiveness values were estimated. Presumptive NOx RACT rates were proposed, coinciding with the selected NOx reduction technologies and the associated cost effectiveness. It is anticipated that the proposed presumptive RACT rates could be utilized by a state for use in conducting unit

specific NOx RACT evaluations for MWC units. The cost effectiveness values presented in the report are consistent with what a RACT analysis would conclude is feasible.

5. **Tim Porter (Win-Waste):** Has any modeling been conducted that indicates the additional NOx reductions will reduce high ozone days?

OTC response: The Stationary and Area Sources Committee of OTC is working with the OTC Modeling Committee to conduct an air quality analysis of additional NOx controls on MWCs. Until we see the results of the modeling, we won't know if the additional NOx reductions will reduce ozone on high ozone days. However, if the MWC additional NOx reductions alone don't reduce ozone, they are still important because, when combined with reductions from other planned control measures, the reductions could impact ozone concentrations. It's important to note that even a one part per billion reduction in ozone can make the difference between attainment and non-attainment. In addition, we know that MWCs operate continuously and therefore are emitting significant amounts of NOx during the ozone season. Our work with the Modeling Committee will provide more information. The total OTR point source NOx in the 2017 National Emissions Inventory (NEI) is 184,173.3 tons. Given this, the MWC contribution to point source NOx emissions in the OTR is approximately 11 percent.

6. **Joseph Walsh (Covanta)**: is OTC considering a similar air quality analysis for the transportation sector?

OTC response: Although mobile sources are outside the scope of the Stationary and Area Sources Committee, OTC has a Mobile Sources Committee (MSC) that continues to evaluate mobile source strategies. The OTC MSC evaluated a 90% reduction in NOx from heavy-duty trucks last year. In addition, the Modeling Committee has done some source apportionment work with a focus on the on-road mobile sector.

7. **Tim Porter (Win-Waste)**: Will OTC complete the air quality modeling analysis and include the results in the final MWC report?

OTC response: The report itself was developed to evaluate the technical feasibility of the retrofit of cost-effective NOx controls on existing MWCs. Air quality modeling to estimate the impact of these cost-effective NOx controls is the logical next step in measuring the value of those controls to the environment. Due to the magnitude of the estimated emissions reduction and the operational characteristics of most MWCs, it is anticipated that there will be an identifiable impact on air quality on high ozone days. It is also anticipated that the modeling information will be useful in the development of an MOU and will assist states in conducting RACT analysis for MWCs located in their state. However, any reduction in ozone precursors within the region is going to assist OTC states in attaining or maintaining the ozone NAAQS, so the NOx reductions are valuable even if such reductions alone do not impact modelled ozone levels. Furthermore, every state in the Ozone Transport Region is required under the CAA to perform a RACT review with each new ozone NAAQS. RACT measures are required regardless of a demonstrated impact on ambient ozone levels from a single measure.

8. **Patricia Earls (Covanta)**: Are costs for urea comparable to costs for aqueous ammonia as the reagent for SNCR?

OTC response: The Babcock and Wilcox study cited costs for aqueous ammonia that were comparable with urea ($0.78 per gallon for aqueous ammonia).

9. **Tim Porter (Win-Waste):** Projected urea costs are $2.60 to $2.75 per gallon currently.

OTC response: Thank you for the information. The workgroup recognizes that the cost of consumables, including reagents, and material and labor related to NOx control has increased since the performance of the engineering studies that the workgroup referenced in developing its cost effectiveness estimates. Costs from those studies were escalated to the time when the workgroup evaluation took place. It is anticipated that when the information presented in the report is referenced by any state for use in a unit specific RACT analysis, that analysis will be based on costs escalated from the baseline to the present time of the RACT analysis.

10. **Padma Baru (NH DES)**: Does the OTC 110 ppmvd 24-hour standard cover start-up, shut down, and malfunction (SSM)?

OTC response: The presumptive standards discussed in the report do not specifically include accommodation for SSM. The presumptive standards were proposed based on normal daily operational variability for MWC units that typically operate on a full-time basis. Many of the NOx controls considered in the development of the presumptive limits cannot be operated or are otherwise ineffective during low load periods associated with startups and shutdowns, requiring other considerations to limit NOx emissions during those periods. It is anticipated that such unit specific considerations would be better addressed in unit specific RACT analysis performed by the applicable state. In addition, any RACT or SIP updates submitted to EPA would need to meet EPA's SSM SIP Guidance policy which, in part, requires that applicable emission standards cover all operating conditions including periods of startup, shutdown and malfunction.

11. **Mike Ewall (Energy Justice Network)**: There are a number of units that are totally uncontrolled in the region – at least 5. Has the OTC looked separately at units that have no controls? OTC may need to look at that and there might be different economics than units that are already controlled. It might be more cost effective. SCR may be more cost effective on these units.

OTC response: SCR NOx reduction technology was reviewed by the workgroup as an efficient NOx control technology for many MWC units. While technically feasible at most if not all MWCs from a NOx reduction perspective, it may not be technically feasible from an installation standpoint in retrofit or from a cost effectiveness standpoint. In addition to installation of a catalyst vessel and reagent storage/pumping/control capability, it will likely be necessary to install capability to reheat or otherwise regulate flue gas temperature across the load range to ensure the flue gas temperatures are in the proper range for the SCR catalyst. This would include the flue gas heat exchanger and

associated additional draft fan capacity and control. While perhaps possible for some retrofit projects, the cost effectiveness justification in retrofit seems unlikely. However, an individual state could explore SCR installation for any particular facility as part of a RACT evaluation for any specific unit or facility.

12. **Leah Kelly (Environmental Integrity Project)**: This is an important sector to evaluate. We've done some analysis and found that MWCs emit more NOx/MWhr than coal plants. The EPA regulations are very out of date. They are at least 10 years overdue for an update, and you may have seen a lawsuit on that. We encourage the OTC to set a 24/hr limit because EPA has established an 8-hour ozone concentration limit for health effects. Also, MWCs have a very variable waste stream. We want to acknowledge that OTC is proposing a NOx limit of 110 ppmvd/24 hour which is currently well below what is currently in place, and we appreciate it.

OTC response: OTC thanks you for your support in evaluating this source of NOx emissions. The MWC report recommended a 24-hour NOx averaging time emission limit and we are considering inclusion of a recommendation of a 24-hour NOx averaging time emission limit in the MOU. Lastly, OTC is sharing information with EPA on the MWC work and encouraging EPA to set new national standards for MWCs.

13. **Peter Manoogian (resident, Saugus, MA)**: there is an MWC facility that used to be Wheelabrator but has since been converted. It handles 1,500 tons per day of waste. The NOx discussion has come up in 2020 and 2021. MA DEP revised the Wheelabrator limit to 185 ppm. The plant is relying on offsets for compliance. It's unjust to grandfather a unit like this and have the community subsidize waste disposal for other communities. Offsets should not be allowed. The incinerator is from the 70s.

OTC response: We make note of this comment. OTC and its member agencies are increasing their focus on communities that are overburdened by air pollution. The workgroup agrees that requiring each MWC unit comply with a stringent short term NOx emissions limit is more effective in reducing the local and downwind air quality impact than allowing that unit to comply utilizing a multi-unit emissions averaging or cap-and-trade compliance strategy. The workgroup is proposing stringent short term presumptive NOx rate limits that will help ensure each unit is controlled and operates those controls appropriately.

14. **Ralph Perron (USDA)**: please use 3% discount rate rather than the one used in the analysis. See circular A -94https://www.wbdg.org/ffc/fed/omb-circulars/a94#:~:text=of%20Federal%20Programs-,OMB%20Circular%20A-94%20Guidelines%20and%20Discount%20R for a cite to the 3% discount rate.

OTC response: The 7% discount rate used in the analysis was from Trinity Consultants and Babcock and Wilcox studies that assumed a 7% rate. The workgroup believes this reflects a reasonable discount rate.

Written Comments Received

15. Mike Ewall (Energy Justice Network):

Please separately review the cost of installing NOx controls at trash incinerators (municipal waste combustors) that have no NOx controls in place, especially including a look at the cost of installing selective catalytic reduction (SCR). SCR is the most protective control system and is the only one capable of meeting the modern standard of 45 ppm. 45 ppm or the use of SCR has been specified in the permits issued for all new incinerators we're aware of that were permitted in the past decade. Only one was built (West Palm Beach Unit #2 in Florida). However, the permits issued for Energy Answers in Baltimore, MD and Arecibo, Puerto Rico, for Delta Thermo Energy in Allentown, PA, and for Wheelabrator Frederick in Frederick County, MD were all required to meet this modern limit. Except for Arecibo, the permits for the others mentioned here are cited on page 36 of our Beyond Incineration report:
http://www.energyjustice.net/md/beyond.pdf

This limit is more than twice as protective as what OTC is recommending. Since the main consideration for not finding it financially viable to install SCR on an existing incinerator is the higher cost of making space for the equipment (rebuilding part of the incinerator facility), these costs might look quite different at the incinerators that have no NOx controls in place at all. A recommendation to install Low-NOx technology at one of these incinerators might be comparable to going further and installing SCR. The largest incinerator in the U.S. is Covanta Delaware Valley, a six unit facility in the City of Chester, PA. They have never had any NOx controls and claim to be doing a feasibility study of doing so. We encourage you to see if this study is complete and to get a copy of this in order to put this information into the public record and to include it in your analysis. Since their facility uses rotary kiln burners, a design unlike other trash incinerators, the cost considerations could very well be different than the other studies you've looked at.

OTC Response: The MWC workgroup's current analysis and report was focused on opportunities for retrofit of NOx controls on exiting MWCs. The OTC appreciates your comment and acknowledges that SCR may be a technically feasible option for NOx control at existing MWCs with no controls, or for new unit installations. However, as noted in your comment, it may not be technically feasible from an installation standpoint in retrofit or from a cost effectiveness standpoint. In addition to installation of a catalyst vessel and reagent storage/pumping/control capability, it will likely be necessary to install capability to reheat or otherwise regulate flue gas temperature across the load range to ensure the flue gas temperatures are in the proper range for the SCR catalyst. This would include the flue gas heat exchanger and associated additional draft fan capacity and control. While a number of SCR subsystems could be common between multiple units at a given facility, generally each combustion source will require its own SCR reactor, ductwork, fans and reagent pumping and control components. It is anticipated that this would result in higher costs, per ton reduced, for a facility with multiple small units than would be experienced at a facility with a single large unit. While perhaps possible for some retrofit projects, the cost effectiveness justification in retrofit seems unlikely. However, an

individual state could explore SCR installation for any particular facility as part of a RACT evaluation for any specific unit or facility.

The report focuses more on urea than ammonia injection systems.
EPA's May 2016 report on Selective Noncatalytic Reduction
(https://www3.epa.gov/ttn/ecas/docs/SNCRCostManualchapter7thEdition2016.pdf)
states that "Urea-based reduction generates significantly more N2O than ammonia-based systems; up to 30% of the NOx can be transformed into N2O." See page 13. We recommend that OTC look at this impact on greenhouse gas emissions, given how potent nitrous oxide is as a global warming pollutant.

OTC Response: Thank you for this information, and the MWC workgroup will review this report as OTC moves forward with its MOU process. Although the OTC's mission is focused on ozone reduction, its member agencies are heavily invested in the climate issue. Since each individual MWC has its own unique considerations and challenges, it will be up to each owner/operator to find the most appropriate solution for their circumstances. However, an individual state could address this issue for any particular facility in conjunction with a RACT evaluation for that facility.

Please review the sizes of the facilities you list. You have Wheelabrator Hudson Falls listed as having 275 ton/day boilers, though their website and the industry's directory claim 250 tons/day, which could place them in the small category. Wheelabrator Hudson Falls is one of the facilities with no NOx controls at all, according to EIA data. The incinerators with no NOx controls in the OTC region, based on EIA data, are:

Small (units 250 ton/day or less):

Dutchess County, NY
Hampton-NASA (VA)
MacArthur (NY)
Mid-Maine (ME)
Wheelabrator Hudson Falls, NY

Large (units over 250 tons/day):

Chester (PA)
Covanta York (PA)
PERC (ME)
SEMASS (MA)
Wheelabrator Portsmouth (VA)

OTC Response: The unit capacities cited in the report were those values identified in the permits issued to the subject facilities that govern the environmental operation of the facilities. Estimates and calculations, for the purposes of the workgroup, are based on the unit and facility operation as allowed by the applicable permits. In the above listed facilities, some are controlled according to information obtained from the facility permits. They are: SEMASS (equipped with SNCR) and Hudson Falls. The Wheelabrator Hudson Falls facility permit indicates the facility is rated to handle 275 tons of refuse per day, so that is a large MWC.

16. Michael Van Brunt (Covanta):

Thank you for the opportunity to participate in the OTC's December 14, 2021 stakeholder meeting regarding the Stationary and Area Sources Committee Municipal Waste Combustor (MWC) Workgroup Report, dated June 2021 (the "Report"). The Report summarized research and recommendations related to NOx emissions from MWCs within the OTC region. Specifically, the Report identified existing NOx reduction efforts undertaken at various MWCs, either voluntarily or in response to regulatory rule adoptions, with a specific focus on facilities located in Maryland and Virginia. The Report concludes, in part, that Covanta's Low NOx (LN™) proprietary technology can be deployed at our MWCs to achieve significant NOx emission reductions. As discussed further below, Covanta owns and/or operates a variety of combustion technologies that require case-by-case evaluation of the effectiveness and feasibility of LN™ and other NOx emission reduction technologies.

The following are our comments on the Report.

The limitations of Covanta Low NOx (LN™) should be more fully characterized in the Report.

Covanta's proprietary LN™ technology involves the staging of combustion air within the combustion chamber, along with the use of selective non-catalytic reduction (SNCR) to achieve lower NOx emissions, as described in the Report. Specifically, the Report addresses Covanta's LN™ technology as implemented at the Covanta Fairfax (Lorton, VA), Covanta Alexandria (Alexandria, VA) and Montgomery County (Dickerson, MD) MWCs, along with references to the Hillsborough FL, Bristol, CT and Essex County, NJ MWCs. Based on public sources of information related to these facilities, the Report concludes that "information indicates that Covanta run facilities across a wide range of sizes and manufacturers, can be retrofitted with the proprietary Covanta LN™ technology and achieve significant [NOx] reductions".

Covanta owns and/or operates MWC's located both within and outside of the OTC region. Our MWCs include multiple technology types as outlined in Tables 1 and 2 in the attached Appendix A. LN™ is currently operated on only two of those technologies.

Some of the remaining technologies may be amenable to LN™; however, the efficacy of LN™ has not yet been demonstrated in practice. Differences related to combustion air flows, flue gas velocities, length and width of the combustion grate and furnace, heat transfer potential, number and location of auxiliary burners, etc. can have a significant impact on both the initial formation of NOx in the furnace, as well as the effectiveness of combustion air staging in reducing that formation. For these technologies, we believe that it is premature to recommend a numerical limit that has been demonstrated through LN™.

Other MWC technologies, including rotary combustors in place at two of our facilities in Pennsylvania, cannot be retrofitted with our current LN™ technology due to their unique equipment configuration. In addition, the Aireal grate technology deployed at the Susquehanna Resource Management Complex (Harrisburg, PA) has insufficient waste agitation and underfire air (combustion air below the grate) distribution to accommodate a LN™ retrofit. Our Resource Derived Fuel (RDF) units utilize air to disperse the waste onto the combustion grate which can cause temperature differentials within the combustion zone.

Still other MWC technologies already have combustion conditions roughly analogous to those developed under LN™ conditions, yet do not currently meet the limits the OTC is considering for

recommendation. We believe that there may be opportunities to reduce NOx emissions from these technologies following different approaches. As such, we have already committed to a voluntary effort with the PADEP to conduct an SNCR trial on one of the rotary combustors at our Delaware Valley facility in Chester, PA; however, we do not yet know the NOx concentrations we will be able to achieve in practice.

Given that LN™ has only been proven at two of the MWC technologies we operate, we recommend that the OTC clarify the potential application of LN™ as follows:

"Information indicates that the proprietary Covanta LN™ technology has achieved significant NOx reductions across a wide range of sizes for certain grate and boiler technology combinations. NOx reductions may be possible at other technologies or through other means but have not yet been demonstrated."

OTC Response: The goal of the OTC's MWC workgroup activity was to evaluate existing publicly available information for the purpose of developing recommended presumptive RACT limits for existing MWCs located in the OTR. These presumptive RACT limits were to represent the emission control capability of commercially available control technologies that could be retrofit on the existing MWCs in a cost-effective manner. The report identified a number of commercially available control technologies, both singly and in conjunction with other control technologies, that that have the potential to achieve NOx emission reductions in retrofit installation for a variety of MWC sizes and configurations. It was not the intention of the workgroup to indicate that any individual technology example was capable of meeting the presumptive RACT limits on any given unit, but rather that its effectiveness had been demonstrated in industry.

The report includes a brief discussion of the generic types of MWCs found in the OTR. The report also includes discussion of available and applicable NOx control technologies that may be considered for retrofit application on those generic MWCs. The more detailed discussion of the Covanta trademark LN technology was very helpful to the workgroup and showcases the level of work and commitment by Covanta to control NOx emissions from its MWCs.

The presumptive RACT values proposed in the report represent NOx control capabilities that have been demonstrated to be technically feasible and within a range of cost effectiveness values utilized by some states in their NOx RACT evaluations. The workgroup feels that the proposed presumptive RACT values are technologically and economically feasible across a wide range of existing MWCs and may be helpful to states in their conduct of NOx RACT evaluations for individual MWC units located in their state.

While the workgroup does not feel that the existing language in the report implies that the Covanta trademark LN technology is the only retrofit NOx control technology available to any Covanta MWC, or that its control capabilities would be the same for all individual units, the workgroup does not have any issue with adding text that indicates the Covanta trademark LN is not universally applicable to all Covanta MWCs.

As indicated during the stakeholder meeting in December 2021, the OTC conducted a RACT-type analysis of the various MWC's operating in the region. By rule, RACT analyses are to consider both technical feasibility and cost for each alternative evaluated. Specifically, the Report excerpts cost data from the NOx RACT analysis prepared for the Covanta Fairfax MWC and submitted to the Virginia

Department of Environmental Quality (VADEQ). Please note that estimates contained in the RACT analysis were from 2016 (updated in 2017) and are not fully reflective of current costs. For example, inflationary pressures can be expected to increase the raw material and transportation costs of both ammonia and urea in 2022 and perhaps beyond (if current inflation trends are not transitory). Furthermore, labor and materials pricing have substantially increased since the 2017 update was submitted. In addition, it is important to note that costs are specific to a given facility and therefore can vary significantly, thus materially impacting the projected cost/ton of NOx removed.

OTC Response: The development of the proposed presumptive RACT rate values included the generation of a range of cost effectiveness. The cost effectiveness values were based on documented engineering studies that provided insight into the financial feasibility of the retrofit of some specific control technologies on some specific units. The available information indicated that commercially available control technologies have been shown to demonstrate a cost effectiveness within a range of values previously utilized by some states in the conduct of NOx RACT evaluations. While it is understood that costs change and vary from unit to unit, it is believed that the cost effectiveness values associated with the proposed presumptive RACT limits will be sufficient for individual states to consider the control technologies as they conduct MWC RACT analyses. It is assumed that the states would generate unit specific cost and cost effectiveness information while conducting a specific unit's RACT analysis.

In addition to the specific requirements of RACT analyses, it is important to note the precedent for technology-based standards established by other environmental regulations, including those promulgated under the authority of the Clean Air Act by the U.S. EPA. Specifically, both the federal Maximum Achievable Control Technology (MACT) and Best Available Control Technology (BACT) programs rely on technology considerations for setting pollutant specific emission limits. For example, under the MWC MACT standards for nitrogen oxides (40 CFR 60.33b(d)) and carbon monoxide (40 CFR 60.34b(a)), distinct emission standards (concentration limits and/or averaging periods) have been established for different MWC technologies. These approaches recognize the variable combustion conditions that exist in MWCs for the purposes of setting enforceable emission limits. Although the OTC Report does not directly reference these regulatory approaches, the technology evaluation process of each should be considered when setting NOx emission targets for MWCs.

OTC Response: Thank you for this information. The OTC will consider the MWC MACT standards under 40 CFR 60.33b(d) is it moves forward with its MOU process. It should be noted, however, that Federal standards for MWCs are currently under litigation.

Lastly, the OTC Report references the use of Selective Catalytic Reduction (SCR) for NOx reduction on existing MWCs in the context of RACT. RACT analyses prepared by Trinity Consultants for Covanta's Virginia MWCs concluded that SCR was not RACT for existing MWCs due to both technical feasibility and cost considerations. Additionally, in Pennsylvania's 2021 RACT III rule proposal, the PA Department of Environmental Protection determined that the addition of SCR to existing units would likely not be considered RACT because of its technical infeasibility (RACT III Technical Support Document). Consistent

with these findings, the Report appropriately does not advance SCR as a feasible RACT alternative for existing MWC units.

OTC Response: The report recognizes that SCR is a retrofittable NOx control technology for MWCs but does not present it as a RACT control for the purposes of the report. The workgroup recognizes the difficulty and expense associated with attempting to retrofit SCR on MWCs. However, the report does reference SCR due to it high level of emission control capability and its technical feasibility. While not advocating consideration of SCR as a retrofit control technology, the workgroup does not want to lose sight that such control capability is available for consideration dependent upon and owner/operator and state emissions control needs.

The Report should identify potential byproducts of lower NOx limits and/or greater deployment of LN™ technology.

If deployed more widely, a period of LN™ testing and optimization is crucial to ensure that changes to furnace temperatures, excessive ammonia slip (selective non-catalytic reduction [SNCR] is a component of LN™ control) and/or associated potential PM2.5 condensable emissions do not off-set the gains realized from NOx reductions. Covanta is nearing completion of a testing and optimization program for LN™ installation at Covanta Fairfax and Covanta Alexandria pursuant to our VADEQ RACT permit approval and the lessons from those efforts will be used to inform future LN™ installations.

OTC Response: Although the OTC's mission is focused on ozone, it is very sensitive to possible unforeseen health risks or other environmental impacts as a result of pollution control techniques or technologies. Therefore, OTC appreciates and acknowledges this comment. OTC will keep abreast of the permitting process for the Covanta Fairfax and Alexandria facilities and, to the extent possible, will consider the outcome of the testing and optimization program as the OTC moves forward with its MOU process. The workgroup also considers the optimization of emission controls, through design considerations and testing and tuning, to be an integral part of any acceptable and successful emission control project.

The OTC should consider recommending a flexible mechanism for moving toward lower NOx emissions from MWCs that accounts for technological differences and potential impacts on ammonia slip and PM2.5 emissions.

For MWCs not currently equipped, or unable to be retrofitted, with LN™, meeting the OTC proposed NOx emission limits of 110ppmvd (24-hr avg) and 105ppmvd (rolling 30-day avg) on a consistent basis has not been proven. For those instances where performance has not been proven, we recommend that the OTC consider a collaborative approach with MWC operators to reduce NOx emissions in a manner that can be demonstrated effective without significant increases in other impacts.

For example, despite the uncertainties associated with a wider application of LN™, Covanta continues to explore initiatives designed to reduce NOx emissions at our facilities. As noted above, Covanta has proposed a field demonstration of SNCR technology using ammonia injection on a single unit at our Delaware Valley facility in Chester, PA. As SNCR technology has not been commercially demonstrated on

a rotary combustor like those in operation at the Delaware Valley facility, we are undertaking this test program on a voluntary basis in order to reduce NOx emissions.

OTC Response: The OTC welcomes collaboration with MWC operators and applauds Covanta's voluntary test program at the Delaware Valley facility. The OTC would welcome any information that could be provided from this test program and, to the extent possible, will consider it as the OTC moves forward with its MOU process. The presumptive RACT limits proposed in the report are believed to be representative of values that are achievable among a wide range of units and control strategies. It is believed these proposed presumptive RACT limits, along with any subsequent relevant information, will be helpful to states in the conduct of unit specific RACT analysis.

In summary, we welcome the ongoing efforts of the OTC to assist its regional members in achieving attainment with federal ozone standards. Covanta recognizes that we have a role to play, as evidenced by our voluntary program to test SNCR at our Delaware Valley facility for NOx reduction. As the OTC advances its recommendations to its member states, we recommend that consideration of the various MWC technologies and associated limitations be part of that effort, including the use of schedule flexibility for both installation and testing to ensure that any emission reduction initiative is both achievable and effective over the long term.

17. Win-Waste Comments to MWC Report prepared by the Ozone Transport Commission Stationary and Area Source Committee.

Win-Waste Innovations (formerly Wheelabrator Technologies) is pleased to offer our comments to the OTC Municipal Waste Combustion (MWC) Workgroup Report. The Workgroup report provides a reasonable overview of alternative MWC NOx control technologies from available studies including the *Waste to Energy NOx Feasibility Study*, prepared by Babcock Power Environmental (BPE) for our Baltimore, Maryland Waste to Energy (WTE) Facility. The estimated capital and operating cost information from the BPE report was used to help OTC conclude that installation of ASNCR (and potentially other technologies) could achieve target NOx limits of 110 ppm%/24-hour average and 105 ppm7%/30-day rolling average in a cost (effectiveness) range of $2,900-$6,600 per ton of NOx removed. We believe the cost effectiveness results should be revised considering recent increases in urea pricing and to reflect the actual NOx reductions that would be achieved using more recently reported annual NOx emissions. Additionally, the cost effectiveness for small MWCs in the range of 250-280 tons/day of MSW throughput, while not addressed in the OTC report, will be substantially higher as the ASNCR equipment (instrumentation, controls, pumps, distribution modules) is the same as for large MWC units making capital cost a proportionately higher percentage of annualized costs relative to realized NOx reductions. The summary tables below provide the details on ASNCR costs and revised cost effectiveness results using the costs from the BPE report as the starting point and adjusting for the urea cost increase, NOx reductions achieved and providing cost effectiveness estimate for the 2 x 250 tpd Wheelabrator Gloucester MWC facility.

To achieve 110 ppm/24-hour limit, the revised cost effectiveness is $15,052/ton NOx removed for Wheelabrator Baltimore and $17,981/ton for the smaller Wheelabrator Gloucester facility. The drivers

of the higher cost effectiveness result for Wheelabrator Baltimore are the significant increase in urea cost and adjustment to NOx reductions achieved using year 2020 reported annual NOx emissions. Key points of the revised cost effectiveness calculations below are as follows:

- Urea cost has increased from $1.19 gallon used in the BPE report to $2.60 gallon based on current market conditions. We do not foresee any price reduction in the near term but potential further price increases,
- Cost of urea represents more than 50% of the annualized cost and as such is big driver in cost effectiveness
- Actual annual NOx emissions for Wheelabrator Baltimore were 882 tons/year (2020) at an average CEMS NOx value of 142 ppm verses 1104 tons (at 150 ppm) used in the OTC cost effectiveness calculation. Using the 2020 NOx values resulted in 199 tons of NOx reduction for the 110-ppm limit, not 294 tons used in OTC report
- For the smaller Wheelabrator Gloucester MWC facility cost effectiveness calculations:
  - 50% of the BPE capital cost for Wheelabrator Baltimore was used
  - Wheelabrator Baltimore operating costs were scaled by ratio of total facility MSW throughput, (500 tpd/2250 tpd). This would be a reasonable assumption given that both facilities are equipped with Von Roll combustion grates and B&W single pass furnace Sterling power boilers and would be expected to have similar performance.

OTC Response: The OTC greatly appreciates the detailed updated data provided by Win-Waste in the text above, and in the tables below, and will consider this information as it moves forward with its MOU process. Note that the development of the proposed presumptive RACT rate values included the generation of a range of cost effectiveness. The cost effectiveness values were based on documented engineering studies that provided insight into the financial feasibility of the retrofit of some specific control technologies on some specific units. The available information indicated that commercially available control technologies have been shown to demonstrate a cost effectiveness within a range of values previously utilized by some states in the conduct of NOx RACT evaluations. The information provided by Win-Waste documents the variability in unit operation from year to year and seems to support the use of cost effectiveness evaluations based on permitted operation and potentials to emit at full load operation to account for the potential of high operating capacity factors. While it is understood that costs change and vary from unit to unit, it is believed that the cost effectiveness values associated with the proposed presumptive RACT limits will be sufficient for individual states to consider the control technologies in the conduct of an MWC RACT analysis. It is assumed that the states would generate unit specific cost and cost effectiveness information in the conduct of any specific unit's RACT analysis.

Finally, our other comment pertains to air quality modeling to determine if the estimated NOx reductions achieved by lower NOx limits would have any impact on ozone attainment progress. WTE facilities, play a substantial and important role in the sustainable management of solid waste at the municipal, county, state, and regional level. In addition, WTE facilities achieve substantial greenhouse gas reductions as post recycled MSW being managed at a WTE facility avoids landfilling and the elimination of methane emissions from biodegradation of organic waste. As such, OTC should conduct air modeling to assess if the additional NOx reductions from imposing costly additional NOx controls on WTE facilities have any measurable impact on air quality.

OTC Response: The Stationary and Area Sources Committee of OTC is working with the OTC Modeling Committee to conduct an air quality analysis of additional NOx controls on MWCs. The report itself was developed to evaluate the technical feasibility of the retrofit of cost-effective NOx controls on existing MWCs. Air quality modeling to estimate the impact of these cost-effective NOx controls is the logical next step in measuring the value of those control to the environment. Due to the magnitude of the estimated emissions reduction and the operational characteristics of most MWCs, it is anticipated that there will be an identifiable impact on air quality on high ozone days. It is also anticipated that the modeling information will be useful in the development of an MOU and assist states in the conduct of RACT analysis for MWCs located in their state.

As also noted in an earlier comment, although the OTC's mission is focused on ozone, its member agencies are heavily invested in the climate issue. Therefore, the OTC and its member agencies recognize the important role MWCs can play in addressing climate change and in addressing non-air quality environmental issues such as solid waste disposal.

ASNCR Costs Comparison	3 x 750 tpd MWC Units =2250 tpd		
	Babcock Study	Actual	Comment
SNCR Reagent	50% urea	50% urea	
Base Case NOx (ppm7%O2)	150	142	2020 average NOx
Controlled NOx ppm7%O2	110	110	
Base Case NOx (tons/year)	1,104	882.4	2020 actual emissions
Controlled NOx (tons)	809.6	683.5	
NOx reduction factor	27%	23%	
NOx Reduction (tons)	294	199	
Total Annualized Cost	**$ 1,812,930**	**$ 2,993,194**	Urea cost from $1.19 to $2.60 gal
Cost Effectiveness($/ton)	**$6,159**	**$15,052**	
Capital Cost			
Equipment Cost	$8,665,162	$8,665,162	Included in BPE estimate
Internal Project Cost	$ -	$ -	Not included in BPE estimate
Installation Cost	$ -	$ -	Included in Babcock estimate
Startup Commissioning	$ -	$ -	Included in Babcock estimate
Total Installed Cost	$ 8,665,162	$ 8,665,162	
10% Contingency	$ -	$ -	
Total Capital Cost	**$ 8,665,162**	**$ 8,665,162**	
Interest Rate	7.0%	7.0%	
Period Months	240	240	
Amount Capitalized	$ 8,665,162	$ 8,665,162	
Annualized Capital Cost	**$817,930**	**$817,930**	
Annual Operating Cost			
Operating Days	336	332	2020 actual emissions
Availability	92%	91%	2020 actual
Reagent Usage (gallons/hour	105	105	From Babcock Study
Reagent Cost $/gal	$1.19	$2.60	Current Urea Pricing
Reagent Annual Cost	$ 995,000	$ 2,175,264	Only Babcock Operating Cost
Other Operating Costs			
Electrical Utility Costs	$ -	$ -	Not included in Babcock Estimate
Weekly Maintenance Hours	0	0	Not included in Babcock Estimate
Maintenance Hourly Cost	$ -	$ -	
Annual Maintenance Labor	$ -	$ -	Not included in Babcock Estimate
Annual Equipment Cost	$ -	$ -	Not included in Babcock Estimate
Annual Operating Cost	**$ 995,000**	**$ 2,175,264**	
Total Annualized Cost	**$1,812,930**	**$2,993,194**	

Extreme

ASNCR Costs 2 x 250 tpd MWC units (Gloucester)	Actual	Comment
SNCR Reagent	50% urea	
Base Case NOx (ppm7%O2)	141	2020 Average NOx
Controlled NOx ppm7%O2	110	
Base Case NOx (tons/year)	229.4	2020 actual emissions
Controlled NOx (tons)	179.0	
NOx reduction factor	22%	
NOx Reduction (tons)	50	
Total Annualized Cost	**$ 906,861**	
Cost Effectiveness($/ton)	**$17,981**	
Capital Cost		
Equipment Cost	$4,332,581	1/2 of BPE estimate
Internal Project Cost	$ -	Not included in Babcock estimate
Installation Cost	$ -	Included in Babcock estimate
Startup Commissioning	$ -	Included in Babcock estimate
Total Installed Cost	$ 4,332,581	
10% Contingency	$ -	
Total Capital Cost	**$ 4,332,581**	
Interest Rate	7.0%	
Period Months	240	
Amount Capitalized	$ 4,332,581	
Annualized Capital Cost	**$403,085**	
Annual Operating Cost		
Operating Days	346	2020 actual emissions
Availability	95%	2020 actual
Reagent Usage (gallons/hour	23	Scaled from BPE study
Reagent Cost $/gal	$2.60	Current Urea Pricing
Reagent Annual Cost	$ 503,776	Only Babcock Operating Cost
Other Operating Costs		
Electrical Utility Costs	$ -	Not included in Babcock Estimate
Weekly Maintenance Hours	0	Not included in Babcock Estimate
Maintenance Hourly Cost	$ -	
Annual Maintenance Labor	$ -	Not included in Babcock Estimate
Annual Equipment Cost	$ -	Not included in Babcock Estimate
Annual Operating Cost	**$ 503,776**	
Total Annualized Cost	**$906,861**	

18. Cristina Albunio (CRA)

- Costs associated with additional NOx controls are significant, especially to municipalities that rely on MWCs for necessary local solid waste infrastructure. Consideration for capital, operational and maintenance funding should be given to municipalities, perhaps through local, state, or federal assistant programs, to support the OTC's initiatives.

OTC Response: Sources of funding for such initiatives are beyond the scope of the MWC workgroup's study. Further, the OTC does not have any authority to procure or disperse such funding. Nevertheless, the OTC is sensitive to the costs imposed on the public and the regulated community by the implementation of emissions control programs. The information included in the report are intended to serve as an aid to states conducting RACT analysis for MWCs, and it is believed that the cost and funding considerations you mention are best coordinated at the state or local level. As mentioned in an earlier comment response to Ms. Leah Kelly, the OTC plans to share its MWC work with EPA which could perhaps start a dialogue on the potential for Federal, state, and/or local sources of funding for such an initiative.

- Prioritizing increased NOx controls should be given to lower performing facilities. The Onondaga County Resource Recovery Facility (OCRRF) in central New York is one of the newer and better performing MCWs in the Northeast. Our historical compliance with a strict Title V Air Permit, administered by NYSDEC, is something we are proud of. The OTC should prioritize modifications of facilities with antiquated air emissions controls systems, poor compliance history or no NOx controls.

OTC Response: As mentioned in earlier comments, the OTC recognizes that each individual facility has its own unique circumstances. The OTC applauds the strides made by the OCRRF and acknowledges

that prioritization based on performance may be effective in forwarding the OTC's efforts to further reduce NOx from MWCs. The report provides information useful to the states by identifying potential control measures and presumptive NOx RACT rates that help assess a unit's emissions performance relative to the potential available control technologies. Such information can help guide a state in making a decision about conducting unit specific NOx evaluations for subject units that may prove cost beneficial.

Emissions from other solid waste management techniques (such as transporting solid waste hundreds of miles for it to be landfilled or processed using techniques that have less stringent air quality standards) have the potential to contribute higher greenhouse gas emissions as compared to emissions from MWCs that process locally generated waste. Hopefully OTC is targeting a wide variety of GHG generators that manage solid waste proportionate to their ozone impact, and in consideration of the necessary utility that local solid waste management techniques provide to the public. MWCs are typically easy targets for additional emissions controls because they are solid waste management techniques that employ a heavily controlled engineered system whose performance can be measured. The solid waste management techniques that are harder to measure, and therefore manage, deserve more attention from the OTC.

OTC Response: As mentioned in earlier responses, the OTC's mission is focused on ozone, although its member agencies are heavily invested in the climate issue. The OTC is also sensitive to the energy generation co-benefit of MWCs and the necessary solid waste disposal service that MWCs provide to the communities they serve. **It should be noted that the focus of this particular OTC effort is MWCs, however the OTC is undertaking a longer-term effort to evaluate other sources of NOx emissions for potential further NOx reductions. Control of landfill gas emissions is one example of control strategies that have been undertaken in many areas to reduce the environmental impact of waste landfilling. The commenter is correct that MWCs are systems whose performance can be measured, and as such have been shown to collectively be a significant contributor to atmospheric NOx emissions and the associated negative impact on ambient air quality.**

It's very important that the OTC's recommendations are attainable, both technologically and financially. Covanta's letter to the OTC dated January 28, 2022, suggests the impracticality of some OTC recommendations and inaccurate cost estimates.

OTC Response: As mentioned in earlier comment responses, the OTC is very sensitive to the fact that each individual facility will have its own unique circumstances and challenges. The goal of the OTC's MWC workgroup activity was to evaluate existing publicly available information for the purpose of developing recommended presumptive RACT limits for existing MWCs located in the OTR. These presumptive RACT limits were to represent the emission control capability of commercially available controls technologies that could be retrofit on the existing MWCs in a cost-effective manner. The report identified a number of commercially available control technologies, both singly and in conjunction with other control technologies, that that have the potential to achieve NOx emission reductions in retrofit installation for a variety of MWC size and configuration. It was not the intention of the workgroup to indicate that any individual technology example was capable of meeting the

presumptive RACT limits on any given unit, but rather that the control effectiveness had been demonstrated in industry. The report information is anticipated to be helpful to states as they conduct unit specific NOx RACT evaluations.

The permit limit for the OCRRF in Appendix A is incorrect. Our upper permit limit for NOx emissions is currently 180 ppmvd (corrected to 7%O2) based on a 24-hour average, not 200 ppmvd as noted in Appendix A. This may be the case for other facilities and results in overestimating the calculated reduction impacts. It should be noted that in June 2021 the OCRRF petitioned the NYSDEC for a lower permitted NOx level of 150 ppmvd, so using anything above 150 ppmvd as the basis for OTCs calculation would be an overestimate for the projected NOx reduction. 6 CRR-NY Subpart 219-10 requires a 150 ppmvd NOx limit for MWCs which might be the more accurate benchmark for many, if not all, NY facility permit limits in consideration of the calculation that OTC is attempting to prove for NOx reductions.

OTC Response: Thank you for this correction and information. We will consider this information as we move forward with the MOU process.