Response to April 6, 2023, Comments by Solid Waste Association of North America (SWANA), New Jersey Chapter, on Municipal Solid Waste Landfills SOTA Manual

SWANA Comment Number: 1

Comment: *The title of this Draft SOTA Manual, as well as verbiage in Section 3.18.1 – Scope, refers to "venting" of MSW landfills. The term "venting" is inconsistent with the purpose of this Draft SOTA Manual, as well as the equipment which the Draft SOTA Manual requires to be installed and operated at subject MSW landfills, which are designed to minimize venting (to atmosphere) of landfill gas (LFG) from MSW landfills. SWANA-NJ requests that NJDEP review usages of the term "vent" or "venting" throughout the Draft SOTA Manual and instead consider rewording to "collection of LFG" or some appropriate variant.*

Response: Removed "Equipment Used to Vent" from title and reworded instances of "vent" in the SOTA Manual to note that the Manual applies to equipment used to collect, treat, and vent landfill gas.

SWANA Comment Number: 2a & 6a

Comment: *2.a. The definition and source of the term, "Integrated Surface Monitoring" is unclear and there is no specific methodology or equipment associated with the term. SWANA-NJ recommends that the definition of integrated surface emissions monitoring be deleted, or at minimum, further clarified. For further comments regarding Integrated Surface Monitoring, see 6.a below.*

6.a. In paragraph A.1, the surface methane concentration threshold for integrated surface emissions monitoring is indicated as 25 ppmv, whereas it is 500 ppmv for instantaneous readings. It is unclear what source NJDEP used for developing this lower threshold, though it is assumed that California rules were used. Industry experience in California has demonstrated that integrated sampling costs as much as six times the cost of standard surface emissions monitoring. So, for a typical NJ landfill where surface emission monitoring currently costs $4,000/quarter, the proposed requirement would increase these costs to as much as $24,000/quarter. No quantifiable reduction of greenhouse gas (GHG) emissions is suggested in the proposed SOTA to justify this cost increase. Further, only California and Oregon currently require integrated monitoring (Washington and Maryland may soon also require this). SWANA-NJ recommends that integrated surface emissions monitoring be excluded from the proposed SOTA.

Response: Removed integrated surface monitoring definition and emissions limit.

Comment Number: 2b

Comment: *2.b. The definition for MSW Landfill indicates that it is "an entire disposal facility in a contiguous geographical space where household waste is placed in or on land". The definition further indicates that a MSW may receive other types of waste. Still, this definition infers that MSW is all household waste, which is untrue. In this definition, NJDEP should refer to the placement of MSW in MSW landfills and separately define MSW in accordance with a definition utilized by the United States Environmental Protection Agency (USEPA), such as that utilized under Subtitle D of the Resource Conservation and Recovery Act (RCRA).*

Further, the MSW Landfill definition indicates that "[a]n MSW landfill may be a new MSW landfill, an existing MSW landfill, or a lateral expansion". It is unclear why NJDEP includes expansions in the definition, as any expansion should not change whether or not a facility is a MSW landfill. SWANA-NJ recommends that expansions be excluded from the definition of MSW Landfills, or if inclusion of expansion in the definition is necessary, then it should not only include lateral expansions, but also vertical expansions.

Response: The definition of MSW landfill utilized is from 40 CFR §60.761. The definition was modified to refer to RCRA Subtitle D and 40 CFR §257.2. Although vertical expansion was not included in the EPA

definition, the MSW definition in the SOTA Manual was revised to include this term, in response to the comment.

Comment Number: 3

Comment: *Under Section 3.18.2 - SOTA Performance Levels, the Draft SOTA Manual includes details regarding regulations under 40 CFR Part 62, Subpart OOO (Subpart OOO) and 40 CFR Part 60: New Source Performance Standards (NSPS), Subpart XXX. However, the section only mentions the Maximum Achievable Control Technology (MACT) for MSW landfills as 40 CFR Part 63: National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart AAAA and includes applicability criteria. Given that MSW landfills may be simultaneously subject to NESHAP Subpart AAAA and either Subpart OOO or NSPS Subpart XXX, and that the requirements under NESHAP Subpart AAAA are very similar to, but not the same as, both Subpart OOO and NSPS Subpart XXX, SWANA-NJ recommends that the Draft SOTA Manual should clarify discrepancies between each of these sections where they apply to landfills constructed/modified or reconstructed since July 18, 2014.*

Response: It will be the responsibility of the permit writer to include the relevant requirements of 40 CFR 62, Subpart OOO, 40 CFR 60, Subpart XXX, and/or 40 CFR 63, Subpart AAAA when the SOTA Manual is used to draft/develop applicable permit requirements. The SOTA Manuals do not address differences between regulations; however, the following clarifying language was added: "In the event multiple Federal/state requirements apply to a source included in this manual, the most stringent requirements shall apply."

Comment Number: 4a & 5a

Comment: *4.a. The Draft SOTA Manual does not accurately indicate the Subpart OOO applicability criteria requiring MSW landfills to be subject to the installation and operation of a LFG collection and control system (GCCS). SWANA-NJ recommends that these applicability criteria should read as follows, "The regulations include emissions limits and control requirements for MSW landfills that meet the following applicability requirements:*

i. MSW landfill with a design capacity of 2.5 million Mg (2.75 million tons); AND,
ii. MSW landfill with a design capacity of 2.5 million cubic meters (3.26 million cubic yards); AND,
iii. Non-methane organic compounds (NMOC) emission rate ≥ 34 Mg/year (as demonstrated via Tier 1, 2 or 3 tests); AND,
iv. Methane surface emissions ≥500 ppmv (as demonstrated via surface emissions monitoring under Tier 4 test). Use of this applicability criterion is optional, and a MSW landfill may only utilize this criterion to demonstrate non-applicability of Subpart OOO GCCS installation/operation requirements if NMOC emission rate < 50 Mg/year (as demonstrated via Tier 1, 2 or 3 tests)."

5.a. The included GCCS installation/operation applicability criteria are similarly inaccurate as discussed under 4.a. above and SWANA-NJ recommends that they should be revised accordingly.

Response: Revised the applicability criteria to match 40 CFR, Part 62, Subpart OOO, and 40 CFR, Part 60, Subpart XXX, and removed the previously summarized criteria.

Comment Number: 4b

Comment: *4.b. Section 3.18.2.2 indicates that, "MSW landfills subject to 40 CFR, Part 62, Subpart OOO must install an active or passive LFG collection and control system that routes all collected LFG to a control system…". In fact, all MSW landfills that meet the following criteria are subject to Subpart OOO:*

i. Commenced construction, reconstruction, or modification on or before July 17, 2014.
ii. Accepted waste at any time since November 8, 1987, or the landfill has additional capacity for future waste deposition.

As such, SWANA-NJ recommends that the quotation above should be reworded to indicate that, "MSW landfills meeting the corresponding applicability criteria of 40 CFR, Part 62, Subpart OOO must install an active or passive LFG collection and control system that routes all collected LFG to a control system…"

Response: Clarified the language to note that MSW landfills meeting the applicability criteria of 40 CFR, Part 62, Subpart OOO or 40 CFR, Part 60, Subpart XXX must install an active or passive LFG collection and control system.

Comment Number: 4c

Comment: *Section 3.18.2.2 requires that, "The treatment system for collected LFG is the responsibility of and must remain in control of the landfill owner or operator." There are several cases within New Jersey where the landfill owner/operator and the LFG treatment system owner/operator are different entities. Often, the landfill owner/operator will maintain direct control of the GCCS, which typically includes one or more LFG flares for the combustion of collected LFG. A third-party energy developer typically has direct control of the LFG treatment system used in conjunction with LFG-fired engine, turbine or renewable natural gas processing plants. The text in the Draft SOTA Manual that requires the landfill owner/operator to have responsibility for and remain in control of the treatment system should be deleted because SOTA guidelines are meant to address technical aspects of LFG control equipment; the ownership/control of the equipment is outside the scope and jurisdiction of SOTA requirements.*

Response: Existing SOTA Manual language was retained. Third-party operation of LFG treatment systems does not abrogate the responsibility of the landfill owner or operator to ensure LFG treatment is conducted. If a third-party LFG treatment system operator is not complying with applicable requirements for LFG treatment, it remains the responsibility of the landfill owner or operator to ensure that the LFG it is generating is being treated appropriately. The landfill owner or operator can utilize alternative compliance options, including temporary or emergency control measures specified in the SOTA Manual, to treat the LFG until the third-party operator can resume treatment of the LFG, after demonstrating compliance with applicable requirements.

Comment Number: 5b

Comment: *5.b. Section 3.18.2.3 indicates that, "[t]he requirements for MSW landfills subject to [NSPS Subpart XXX] are the same as the requirements listed in [Subpart OOO], included in 3.18.2.2." This statement implies that Subpart OOO and NSPS Subpart XXX are identical, which is not true, as there are discrepancies between the two regulations. However, the selection of Subpart OOO requirements included under Section 3.18.2.2 is the same between the two regulations. SWANA-NJ recommends that this quotation should be reworded to read, "[t]he requirements for MSW landfills from 40 CFR Part 62, Subpart OOO, as included under Section 3.18.2.2, also apply to MSW landfills subject to 40 CFR Part 60, Subpart XXX."*

Response: The statement was removed, as either 40 CFR, Part 60, Subpart XXX or 40 CFR, Part 62, Subpart OOO will apply to a landfill, and the applicability criteria for each rule is included in the respective sections of the SOTA Manual.

Comment Number: 6b

Comment: *In paragraph A.1.a, the Draft SOTA Manual would require that enclosed combustors or enclosed flares demonstrate a NMOC destruction efficiency of ≥99%. The federal requirements under Subpart OOO, NESHAP Subpart AAAA and NSPS Subpart XXX require that such combustors/flares demonstrate NMOC destruction efficiency of only 98%. It is unclear why NJDEP requires this increased destruction efficiency, which may require significant additional capital expenditures for little gain in emissions control. SWANA-NJ recommends that minimum required NMOC destruction efficiency for enclosed combustors/flares be set at 98%.*

Response: Existing SOTA Manual language was retained. Except for HAPs, SOTA is established independent of federal standards. Within New Jersey and in other states, landfills have demonstrated operation of enclosed combustors or flares with a destruction efficiency of ≥99%; this is sufficient justification for establishment as SOTA.

Comment Number: 6c

Comment: *In paragraph A.1.b, the Draft SOTA Manual requires demonstration for methane destruction efficiency. There is currently no requirement for demonstration of methane destruction efficiency, though NMOC destruction efficiency generally serves as a surrogate measurement for methane destruction efficiency. Further, it is generally expected that methane destruction efficiency is higher than NMOC destruction efficiency. It is unclear why NJDEP seeks to require demonstration of methane destruction efficiency, which will likely only add costs for stack testing without providing any emission reduction benefit. SWANA-NJ recommends that demonstration of methane destruction efficiency for enclosed combustors/flares be excluded.*

Response: Existing SOTA Manual language was retained. Air emissions testing will be addressed by the permit writer when drafting a permit; the SOTA Manual is only used as a guide for establishing SOTA requirements within a permit. For LFG testing, a U.S. EPA Reference Method 25c is used to establish non-methane organic compound (NMOC) emissions from a landfill. Samples of LFG are analyzed in a gas chromatograph and flame ionization detector (GC / FID). Methane, carbon dioxide, and carbon monoxide are chemically removed from the LFG sample via the GC. The remaining organic compounds are oxidized (to form carbon dioxide), then converted to methane, for analysis in the FID to determine the content (emissions rate). A U.S. EPA Reference Method 3c can be conducted on the collected LFG to determine methane concentration (emissions rate) without interfering with the U.S. EPA Reference Method 25c. While this may increase costs for the LFG analysis, it will not increase the costs for LFG sample collection. Additionally, NJ DEP or the landfill owner or operator may use the information regarding the methane concentration of the LFG to assist in determining future policies, regulations, or beneficial uses.

Comment Number: 6d

Comment: *6.d. In paragraph B.1, the Draft SOTA Manual requires that, for instances where collected LFG has a hydrogen sulfide (H2S) concentration > 10,000 ppmv, a H2S removal system with minimum 98% removal must be implemented upstream of LFG combustion. This may not be practically achievable, currently available equipment for such high H2S concentrations can typically only demonstrate 90-95% removal. SWANA-NJ recommends that, instead of regulating control effectiveness, sulfur emissions should be based on post-combustion sulfur dioxide (SO2) and H2S emissions (based on estimated or demonstrated combustion H2S to SO2 conversion efficiency) as is currently achieved through the Title V permitting program (including ambient air dispersion modeling), allowing the landfill owner/operator to tailor their equipment and operations to meet regulatory requirements.*

Response: The H_2S removal efficiency was lowered to 97%. While LFG concentrations are normally below 200 ppm, landfills that accept sewage sludge and construction and demolition debris (C & DD) generate elevated levels of H_2S, that can range from 1,000 ppm to almost 20,000 ppm (Waste 360). It is not unreasonable to assume that a NJ MSW landfill that accepts C & DD could have elevated levels of H_2S, potentially over 10,000 ppmv. Best Available Control Technology (BACT) has been established as 98% control in a permit issued to the Sunny Farms Landfill in Ohio and 300 ppmv for the Columbia Ridge Landfill. Additional states have issued H_2S restrictions to flare inlets or for LFG used as a fuel (combustion): 150 ppmv (California), 200 ppm (Massachusetts), or 500 ppm (Pennsylvania). The following table divides the combustion inlet concentration to determine the required control efficiency for each state:

State	LFG H_2S Concentration	Combustion Inlet Concentration	Required Control Efficiency
California	10,000 ppmv	150 ppmv	98.5%
Massachusetts	10,000 ppmv	200 ppmv	98.0%
Oregon (Columbia Ridge)	10,000 ppmv	300 ppmv	97.0%
Pennsylvania	10,000 ppmv	500 ppmv	95.0%
Ohio (Sunny Farms)	N/A	N/A	98%
Average			**97.3%**
State	**LFG H_2S Concentration**	**Combustion Inlet Concentration**	**Required Control Efficiency**
California	15,000 ppmv	150 ppmv	99.0%
Massachusetts	15,000 ppmv	200 ppmv	98.7%
Oregon (Columbia Ridge)	15,000 ppmv	300 ppmv	98.0%
Pennsylvania	15,000 ppmv	500 ppmv	96.7%
Ohio (Sunny Farms)	N/A	N/A	98%
Average			**98.1%**

As an average, the existing state requirements would require an H_2S control efficiency of 97.3% (at 10,000 ppmv) and 98.1% (at 15,000 ppmv). While most MSW landfills should not generate 10,000 ppmv of H_2S unless accepting C & DD wastes, a 97% removal (not destruction) efficiency is justified as the average required control efficiency to meet H_2S combustion restrictions in multiple states (based on inlet H_2S concentration) and a 98% removal efficiency is cited as BACT in one permit.

Comment Number: 6e

Comment: *In paragraph B.2, the Draft SOTA Manual requires that, for instances where collected LFG has a hydrogen sulfide (H2S) concentration ≤ 10,000 ppmv, post-combustion emissions shall have a SO2 concentration of ≤ 200 ppmv, which is to be demonstrated via monitoring of H2S in inlet LFG at ≤ 200 ppmv. This presumes that the H2S concentration in inlet LFG is the same as SO2 concentration in post-combustion emissions. While there is one mole of sulfur (S) in both H2S and SO2, this assumption does not consider that significant volumes of air are added to support combustion and to cool exhaust gases in enclosed combustors/flares. As such, the S concentration in post-combustion emissions is generally much lower than in inlet LFG. Therefore, to result in 200 ppmv SO2 in post-combustion emissions, the H2S concentration in inlet LFG would be much higher than 200 ppmv, depending on the amount of air needed for combustion and cooling of exhaust gases.*

Moreover, the exhaust gas concentration limit of 200 ppmv SO2 is quite low. H2S treatment is costly and a requirement to achieve an arbitrary exhaust gas SO2 concentration (independent of mass emission rates)

puts an undue cost burden on landfill owners. Note that a similar exhaust gas concentration limit in Pennsylvania is 500 ppmv SO2.

As in 6.d above, SWANA-NJ recommends that sulfur emissions should be based on estimated post-combustion sulfur dioxide (SO2) and H2S emissions (based on estimated or demonstrated H2S to SO2 combustion conversion efficiency) as is currently achieved through the Title V permitting program (including ambient air dispersion modeling), allowing the landfill owner/operator to tailor their equipment and operations to meet regulatory requirements.

Response: The SOTA Manual was modified to specify the 200 ppmv limit applies to H_2S as the inlet concentration (prior to combustion). The Sunny Farms Landfill is a MSW and C & DD landfill in Ohio with a PSD permit citing a 200 ppmv outlet concentration for an inlet concentration of ≤10,000 ppmv. Massachusetts DEP has a restriction of H_2S inlet concentration from LFG to a flare of 200 ppmv (same as the Ohio permit for Sunny Farms Landfill). SO_2 emissions limits were removed entirely, as SO_2 would be generated by H_2S combustion or from siloxane combustion (included separately in the SOTA Manual). No NJ DEP permits reviewed included a combustion conversion efficiency for H_2S to SO_2 referenced in the comment; however, the permit writer would establish the monitoring required for determining compliance with the H_2S emissions limit within the SOTA Manual, so the instantaneous H_2S monitoring requirement was removed.

Comment Number: 6f

Comment: *6.f. Paragraph D includes various Criteria Air Pollutant emission limits for enclosed combustors/flares, including 0.010 pounds per million British Thermal Units (lb/MMBtu) for carbon monoxide (CO) and 0.05 lb/MMBtu for nitrogen oxides (NOx). The currently available standard LFG enclosed flares, designed for 0.02 lb/MMBtu CO and 0.06 lb/MMBtu NOx, would not meet these emission limits and would require the installation of ultra-low emissions (ULE) flares instead. These ULE flares are significantly more expensive to purchase and operate than standard enclosed flares. Further, they consume significantly more electrical energy (to operate combustion air blowers), which results in additional utility-based GHG emissions. These additional costs and GHG emissions would be required to support only marginal reductions in CO and NOx emissions and resulting environmental improvements and would place additional burdens on MSW landfill owners. SWANA-NJ recommends that NJDEP revise the CO and NOx emission limits to match those of currently-manufactured standard LFG enclosed flares.*

Response: Existing SOTA Manual language retained. Within New Jersey and in other states, landfills have demonstrated operation of enclosed combustors or ULE flares with a destruction efficiency of ≥99%; this is sufficient justification for establishment as SOTA.

Comment Number: 6g

Comment: *6.g. Paragraph F includes various Criteria Air Pollutant emission limits for open/candlestick LFG flares. Emissions testing on open/candlestick flares cannot be performed due to the nature of these combustors, as such, the intent to include emission limits on these flares is unclear. Typical CO and NOx emission factors for open/candlestick flares are included in US EPA AP-42, Section 13.5 and NMOC, volatile organic compound (VOC) and particulate matter (PM) emission factors are included in AP-42, Section 2.4. SWANA-NJ recommends that NJDEP eliminate emission limits for open/candlestick flares, or refer to existing emission factors (not limits) under AP-42.*

Response: Existing SOTA Manual language retained. Air emissions testing would be addressed by the permit writer. NJ DEP air permits (and air permits in other states) have routinely established air emissions limitations with compliance options that do not include air emissions testing.

Comment Number: 6h

Comment: *6.h. Paragraph H requires "landfills not subject to the applicability requirements of [NSPS Subpart XXX] or [Subpart OOO] [to] conduct a case-by-case SOTA analysis …". It is unclear whether by "not subject to the applicability requirements", the Draft SOTA Manual refers to:*

i. MSW landfills not required to install/operate a GCCS;
ii. MSW landfills which accepted waste only before November 8, 1987 and have no additional capacity for future waste deposition; or,
iii. Non-MSW landfills.

SWANA-NJ recommends that NJDEP clarify the wording in Paragraph H regarding applicability and ensure that the revised wording does not require MSW landfills which accepted waste only before November 8, 1987, and have no additional capacity for future waste deposition, or non-MSW landfills, to perform case-by-case SOTA analyses.

Response: Clarified the language within the SOTA Manual to note that any landfill that does not meet the requirements of 40 CFR, Part 60, Subpart XXX, or 40 CFR, Part 62, Subpart OOO, is not subject to this SOTA Manual. A case-by-case SOTA must be conducted for these landfills, if they are subject to SOTA requirements in N.J.A.C. 7:27-8.12(f), or N.J.A.C. 7:27-22.35(c)5.