Landfill Air Emissions Regulations

Prepared for

The Mid-Atlantic Regional Air Management Association

July 14, 2022

Webinar Overview

- Landfills Air Emissions Regulations
  - Andy Sheppard, John Evans, Mark Turner (EPA/OAQPS/SPPD)
- Common Landfill Compliance and Enforcement Issues
  - Tracy Watson (EPA/Region 4)
- Q&A

Regulatory History

1996	Issued New Source Performance Standard (NSPS) and Emission Guidelines (EG) Final Rule • NSPS for new or modified landfills (40 CFR Part 60, Subpart WWW) • EG for existing landfills (40 CFR Part 62, Subpart Cc)
1999	Issued Federal Plan: Requirements for existing landfills (40 CFR Part 62, Subpart GGG)
2003	Issued National Emission Standard for Hazardous Air Pollutants (NESHAP) Final Rule (40 CFR Part 63, Subpart AAAA)
2016	Issued New Source Performance Standard (NSPS) and Emission Guidelines (EG) Final Rule • NSPS for new or modified landfills (40 CFR Part 60, Subpart XXX) • EG for existing landfills (40 CFR Part 62, Subpart Cf): *Deadline Litigation*
2020	Completed NESHAP risk and technology review (RTR) Final Rule
2021	Issued Final Federal Plan: Requirements for existing landfills • Implements EG and Compliance Times (40 CFR Part 62, Subpart OOO) • Applies to landfills in states and Indian country where state/tribal plans are not in effect

EPA focuses on a new set of regulations: covers existing landfills and new/modified landfills

MSW Landfill Regulations: Summary Table

	New/Modified Landfills	Existing Landfills		
	Part 60 NSPS (new or modified)	Part 60 Emission Guidelines (EG) under State Plan for existing landfills that have not triggered NSPS	Part 62 Federal Plan for states without approved state plans implementing EG	Part 63 NESHAP
1st Generation	WWW (1996)	Cc (1996)	GGG (1999)	AAAA (2003)
2nd Generation	XXX (2016) (commenced construction, reconstruction, or modification **after** July 17, 2014)	Cf (2016) (commenced construction, reconstruction, or modification on or **before** July 17, 2014)	OOO (2021) (commenced construction, reconstruction, or modification on or before July 17, 2014)	AAAA (2020)

Federal Plan (Subpart OOO) Implementation Options

- See discussion in preamble: 86 FR 27756 (May 21, 2021)
- State Plan: State regulations approved by EPA
- Delegation: State requests and EPA delegates the implementation of the federal plan
  - Usually involves Memorandum of Agreement (MOA)
- Title V: Incorporate fed plan requirements into TV permit
  - Not State Plan
  - Not Delegation
  - Landfill still subject to federal plan implemented by EPA
  - Landfill must meet the terms of the TV permit

1996 NSPS: Baseline Program

- Established the size thresholds (2.5 Million Mg or cubic meters)
- Established Gas Collection Control System (GCCS) threshold (50 million Mg NMOC/yr)
- Established Tier 1, 2, and 3 – methods to calculate Non-Methane Organic Compound (NMOC) emissions
- NMOC Reports
- GCCS Design and Operational Standards
  - Collection system with wellhead monitoring
  - Control systems to achieve 98% control or 20 ppmv or less
- Well and Surface Emissions Monitoring

Major Changes to NSPS/EG in the 2016 Rules

- Lowered GCCS trigger NMOC threshold from 50 Mg/yr to 34 Mg/yr
- Added optional Tier 4 before triggering GCCS
- Clarified treated Landfill Gas (LFG) may be used for vehicle fuel, production of high-British thermal unit (Btu) gas for pipeline injection, or use as a raw material in a chemical manufacturing process
- Wellhead monitoring removed operational limits for nitrogen/ oxygen levels at wellheads but must continue to monitor and maintain records of nitrogen/oxygen
- Surface Emissions Monitoring added GPS and monitoring at all cover penetrations

NSPS/EG and NESHAP: Differences

- NESHAP gas collection control system (GCCS) trigger remains 50 Mg/yr
  - Removal of GCCS also at 50 Mg/yr
- NESHAP does not have Tier 4 provision
  - Recall NSPS added Tier 4 for sites with emissions between 34-50 Mg/yr
- Operating requirements

Operating Parameter	Old NSPS	New NSPS	New NESHAP
Temperature	Less than 131°F	Less than 131°F	Less than 145°*
Pressure	Negative	Negative	Negative
Oxygen/Nitrogen	Less than 5%/20%	No Limit – BUT must monitor	No Limit – BUT must monitor

* *Opt-In provisions allow landfills subject to NSPS/EG to demonstrate compliance with major compliance provisions of the NESHAP in lieu of the NSPS/EG analogous provisions; allows the landfill to follow one set of requirements (See 85 FR 17248, March 26, 2020)*

Reporting and Recordkeeping Requirements

- NMOC emissions annually (or 5 years if all 5 years below trigger)
  - No NMOC report required after GCCS is operational
- Revised GCCS design plans
  - 90 days before expanding to area not covered by current plan
  - Prior to installing or expanding in a way not consistent with prior plan
- Annual report for NSPS or Semi-Annual report for NESHAP (including but not limited to)
  - Number of times operational standards (e.g., temperature) were exceeded
  - When GCCS (collection or control) was not operated
  - Location (lat/long) of each exceedance of 500 ppm from surface monitoring
- Closure report
  - Within 30 days of waste acceptance cessation

Implementation: Common Issues

- EPA Implementing Federal Plan (Subpart OOO) in 35+ States
  - NMOC Reporting
  - Design Plans and Alternatives
  - Surface Emissions Monitoring

NMOC Reporting Summary

- NSPS/Federal Plan/State Plans
  - Landfill has a design capacity of at least 2.5 million Mg and 2.5 million cubic meters
  - Landfill has an NMOC emission rate of less than 34 Mg/yr
- Do NOT Have to Submit NMOC Reports
  - Landfill is operating a gas collection and control system (GCCS) and complies with the design, operational, monitoring, recordkeeping and reporting requirements of the NSPS/federal/state plan (or opt-in provisions of NESHAP system)
  - Landfill is permanently closed and has submitted the closure report required by the regulation (NSPS 60.767(e); Fed Plan 62.16724(f))

NMOC Reporting

Initial

- Subpart XXX – Within 90 days of commencing construction or modification
- Subpart OOO – September 19, 2021

Subsequent

- Annually unless closed or 5-year criteria is met
- Every 5 years if:
  - Estimated NMOC emission rate is below the threshold for next consecutive 5 years and
  - Actual annual waste acceptance rates in each of the future 5 years do not exceed the rates used in the model

NMOC Reporting

$$M_{NMOC} = \sum_{i=1}^{n} 2kL_oM_i(e^{-kt_i})(C_{NMOC})(3.6 \times 10^{-9})$$

40 CFR 60.764(a) Equation 1

Tier 1

- Default NMOC concentration = 4,000 ppmv (as hexane)

Tier 2

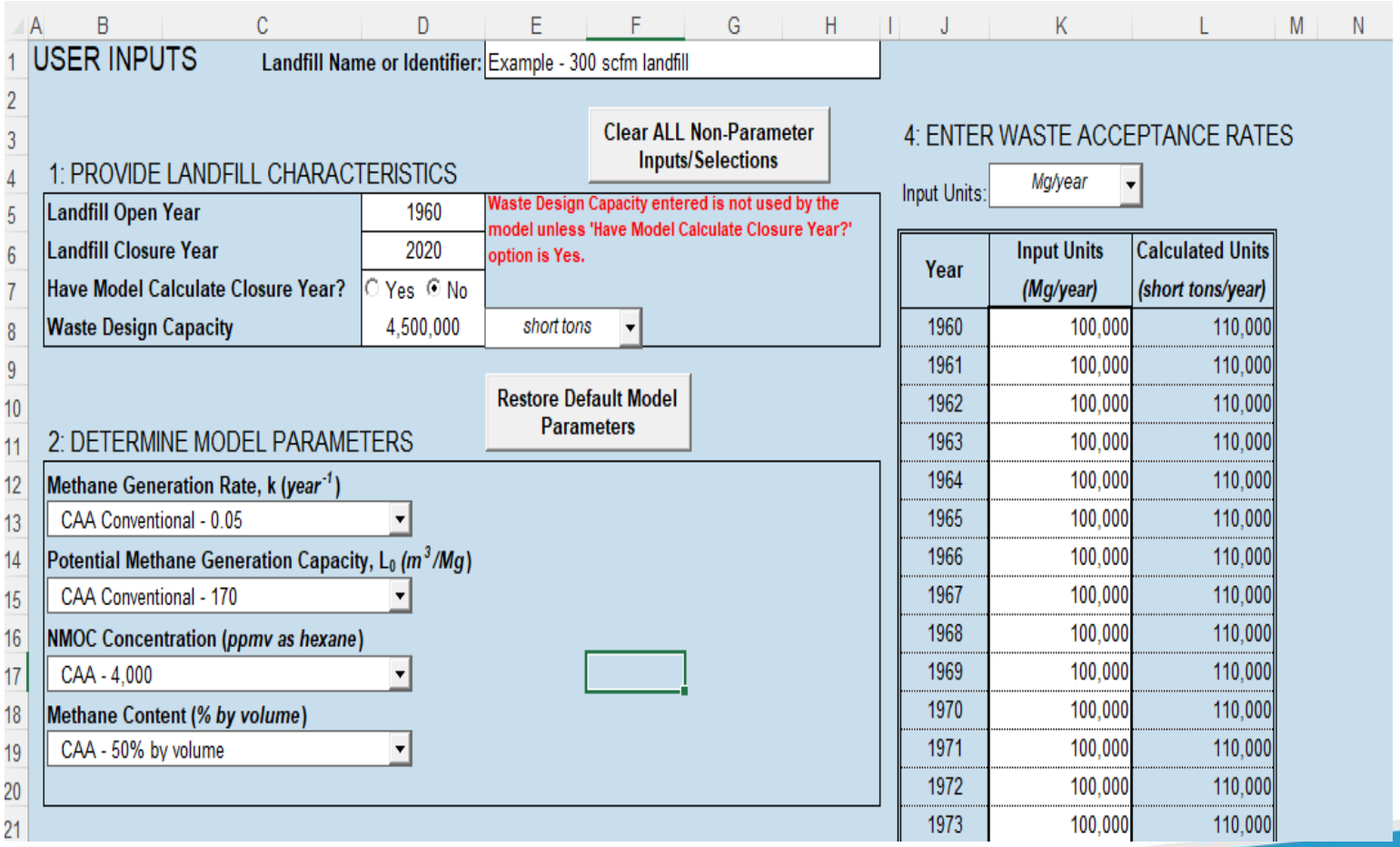
- Site-specific NMOC concentration (C_{NMOC}) based on LFG sampling and analysis via Method 25C

Tier 3

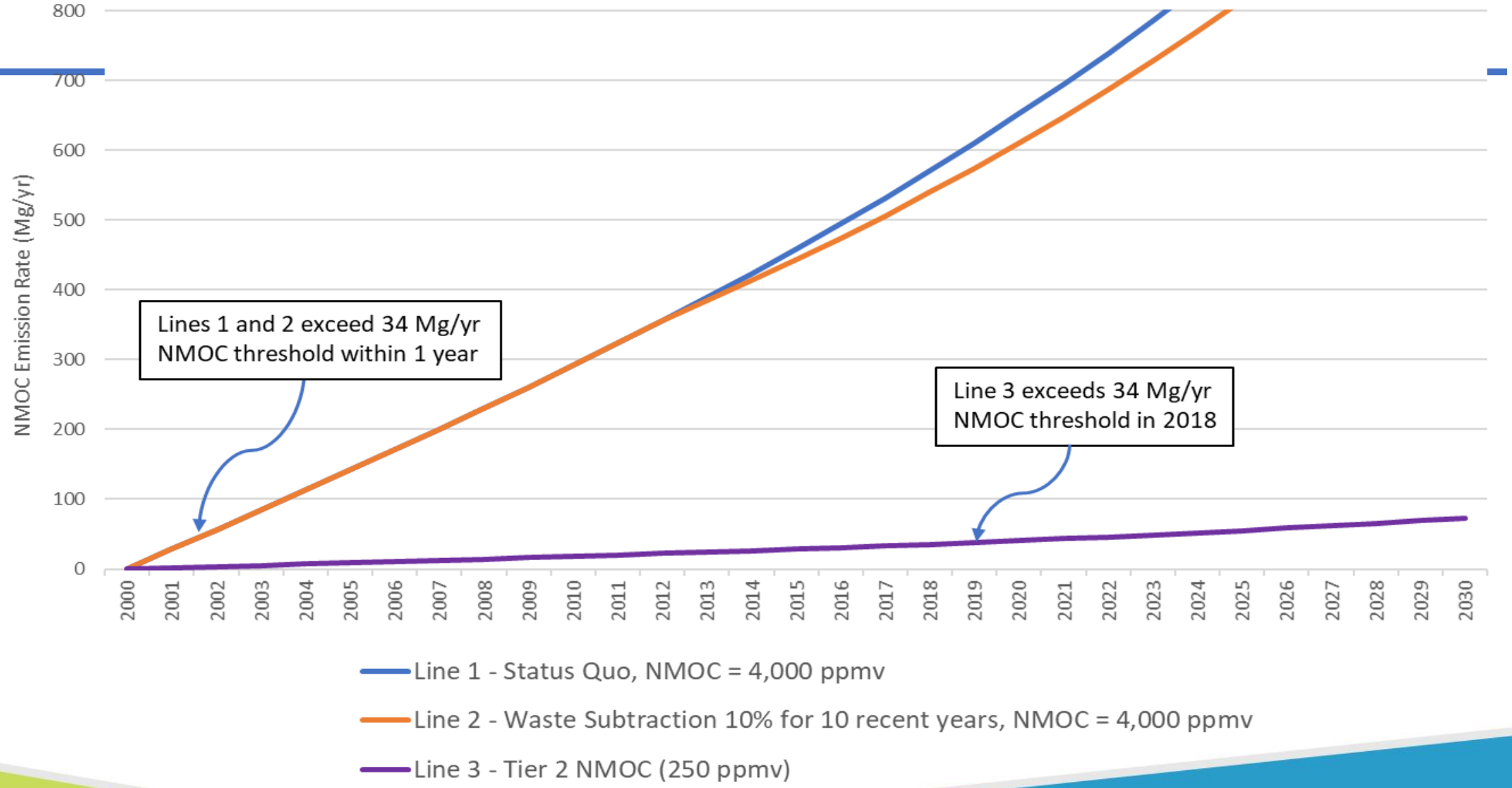
- Site specific NMOC concentration from Tier 2 along with site-specific methane generation rate constant (k) determined by performing EPA Method 2E (rarely used)

LandGEM Model: Calculate NMOC Emissions

- Landfill Operating Data
  - Open and Closure Years
  - Actual annual waste acceptance rates
- Modeling Parameters
  - Methane Generation Rate (k) (Tier 3 Option)
  - Potential Methane Generation Capacity (L_o)
  - NMOC Concentration (Tier 2 Option)
  - Methane Content



How LandGEM Inputs Influence NMOC Emission Rates



GCCS Design Plan: Requirements and Implementation Issues

- Design Plan required for new system, expansion to areas not covered by a plan, or prior to installing equipment inconsistent with the current plan
- Agency review of Design Plans is critical because approval of plan can impact future enforcement
- Design Plans often contain alternatives that should be carefully evaluated - Common alternatives include:
  - Requested exemptions from surface emissions monitoring (*e.g.,* slopes)
  - Requested alternatives to well monitoring (*e.g.,* weather)
  - Requested ability to shut down wells

Surface Emissions Monitoring (SEM)

- Following installation of GCCS operational standard requires monitoring surface emissions for methane
- 30-meter interval, distressed vegetation, and ALL cover penetrations
  - "Areas with steep slopes or other dangerous areas may be excluded from the surface testing"
- Corrective action include
  - Cover maintenance or adjust well vacuum within 10 days
  - Re-monitor within 30 days
  - Repeat exceedance at same location triggers additional actions
- Inconsistency between SEM results: on-site inspection vs records

Future Prospects

- Possibilities depending on technology advancements
  - Surface emissions monitoring (*e.g.,* drones)
  - Landfill emissions measurement (*e.g.,* aerial, satellite)
  - Enhanced real time well monitoring
- Continuing interest in methane emissions from landfills
  - Part 98 GHG reporting emissions vs. regulatory emissions

End Regulatory Overview