Sniffer Robotics

Please see attached comment letter.

July 21, 2023

Ms. Laura Watson
Director, Department of Ecology
State of Washington
300 Desmond Drive SE
Lacey, WA 98503

Dear Director Watson:

Thank you for the opportunity to comment on proposed rulemaking for Chapter 173-408 WAC concerning landfill emissions. Sniffer Robotics has extensive experience across the United States (including in the State of Washington) as a full-service provider to the municipal solid waste industry, with a focus on providing 3rd party Surface Emission Monitoring (SEM) services both via technicians walking landfills and our automated monitoring device referred to as the SnifferDRONE™. In December of 2022 the US EPA authorized the SnifferDRONE to perform SEM per OTM-51 and ALT-150 as an approved alternative to a host of federal regulations, detailed in Table 1.

Table 1: Sections of 40 CFR Parts 60, 62 and 63 containing applicable regulations.

WWW (NSPS)	XXX (NSPS)	Cf (EG)	AAAA (NESHAP)	OOO (Federal Plan)
40 CFR §60.753(d)	40 CFR §60.763(d)	40 CFR §60.34f(d)	40 CFR §63.1958(d)	40 CFR §62.16716(d)
40 CFR §60.755(c) - (e)	40 CFR §60.765(c) - (d)	40 CFR §60.36f(c) - (e)	40 CFR §63.1960(c) - (d)	40 CFR §62.16720

The SnifferDRONE is a UAS (Unmanned Aerial System) with an onboard methane detector which gathers ground level air samples, via a hose drug on the ground, for onboard analysis of methane concentration. Performing SEM from the SnifferDRONE per OTM-51 provides robust methane detection and includes robust datalogging for a host of other variables. Sniffer Robotics has flown over 4000 SnifferDRONE flights to date on nearly 150 landfills among 35 states, with data collected from these flights and extensive supporting manual field operations, we provide the following data-driven comments to the proposed WAC 173-408:

WAC 173-408-120 – Alternatives

Verbiage from WAC 173-408-090(1)(b) "Other approved EPA test methods with concurrent local authority approval." should be duplicated in WAC 173-408-120. The US EPA performs thorough vetting and publishes the technical data package used to justify any approved alternative test methods – Washington State should leverage this review and reduce barriers to new technology introduction. More specifically, OTM-51 implemented via ALT-150 is a data backed alternative to the existing federal regulations which is proven efficacious at locating emissions and as such should be specifically referenced in this proposed rulemaking.

Sniffer Robotics recommends altering the language of WAC 173-408-120(1) to the following:

"The owner or operator of a MSW landfill may request alternatives to the compliance measures, monitoring requirements, and test methods and procedures set forth in WAC 173-408-070, WAC 173-408-080, and WAC 173-408-090. Any alternatives requested by the owner or operator must be submitted in writing to the local authority. Other approved EPA test methods, where operations can conform to provisions of this WAC 173-408, are hereby adopted, including OTM-51 and ALT-150.

WAC 173-408-090(3)(a)(iii) – Wind Speed

The SnifferDRONE flies at a laser enforced altitude of 6 meters above ground level and the UAS control system responds to implied wind on the UAS to maintain its altitude, heading and velocity. The control system's response to the wind results in noticeable and recordable changes to the pose of the UAS, measured by the Inertial Measurement Unit (IMU). Peer reviewed literature provides algorithms for calculating the wind velocities based on the recorded IMU data. In Sniffer Robotics' experience, wind velocities at 6 meters above the landfill surface are significantly different than wind velocities reported by NOAA's HRRR and on-site anemometers due to the inherent topography of landfills, which in some locations accelerates the wind over the landfill, but in others provides relative minima with significantly lower wind velocities than nominal.

Sniffer Robotics does not anticipate the wind data from "an on-site anemometer with a continuous recorder" is relevant to the actual wind velocities present on the landfill surface. As an anecdote, Sniffer Robotics flew a landfill in Washington in May of 2023 under OTM-51. The data in Table 2 illustrates the local wind value at the UAS (both average and peak) and the local weather station reported average. Note the flights that would have been permitted by the local station were actually above threshold, while the flights impermissible by the local station were more likely to be below threshold at the actual location of methane collection.

Table 2: Wind Velocities measured by the SnifferDRONE and local weather station at a Washington landfill.

	Average Wind Speed (mph) Drone Derived	Maximum Wind Speed (mph) Drone Derived	Weather Station Reported Average (mph)
May 23rd 4:11PM	7	7.9	5
May 23rd 3:38PM	4.9	11.6	5
May 23rd 3:08PM	5.4	8.6	5
May 23rd 1:40PM	3.8	11.4	5.6
May 23rd 1:12PM	4	10.1	6.8
May 23rd 12:20PM	3.3	9.7	6.8
May 23rd 11:54AM	3.7	11.9	6.8
May 23rd 11:34AM	3.5	8.6	6.8
May 23rd 11:08AM	3.8	9.2	6.8
May 23rd 10:51AM	4.6	9.9	6.2

Sniffer Robotics expects the proposed termination of SEM operations for the given wind thresholds to significantly increase the cost of SEM due to idled workers or rework. In the month of May, Sniffer Robotics performed aerial inspections with the SnifferDRONE on 15 days of the month, several days were unallowable due to weather (rain). In those 15 days (at 12 unique landfills), Sniffer Robotics flew 145 flights; using the SnifferDRONE reported average and maximum wind velocities 102 of the 145 flights reported wind values in excess of either average or gust velocity thresholds defined in the proposed rulemaking. More specifically, the data indicate the proposed wind

termination language will generally preclude afternoon surface inspections due to the risk of diurnal winds; when coupled with WAC 173-408-090(3)(a)(iv) the total number of allowed hours for surface inspection on a monthly basis will be extremely limited and will thus drive significant price increases. Furthermore, as written in the proposed rulemaking the on-site anemometer must not only record data, but practically the data must be broadcast to the field operators to cease operations. Without a broadcast function, which implies a significant level of communication infrastructure or manual monitoring, technicians will undoubtedly sample at inappropriate wind speeds and will thus be forced to repeat full grids – implying inordinate cost to the operation based on data that is immaterial to the actual wind speed at the emission locations.

Based on Sniffer Robotics' extensive experience in methane landfill leak detection, Sniffer Robotics strongly believes this requirement may prove SEM technically and economically infeasible for operations, resulting in poor compliance to the regulation and potentially negating the benefits the state is attempting to realize in reducing landfill emissions. Sniffer Robotics kindly requests data justifying the proposed wind velocity limits significantly increase the quantity of located emissions above the 200 ppmv threshold defined in WAC 173-408-090(3)(b)(i).

Sniffer Robotics strongly recommends striking WAC 173-408-090(3)(a)(iii) in its entirety.

If not struck, Sniffer Robotics strongly recommends an allowance for co-located wind and methane measurements instead of a site anemometer with no correlation to wind values at the actual emission location. Sniffer Robotics data indicate 200ppm can be effectively found in less limiting wind conditions (see ALT-150). To satisfy the intent of the proposed rule and balance cost, Sniffer Robotics strongly recommends altering the language of WAC 173-408-090(3)(a)(iii) to:

"Surface testing must be terminated when the average wind speed exceeds five miles per hour, or the instantaneous wind speed exceeds 10 miles per hour. The local authority may approve alternatives to this wind speed surface testing termination for MSW landfills consistently having measured winds in excess of these specified limits. Average wind speed must be determined on a 15-minute average using an on-site anemometer with a continuous recorder for the entire duration of the monitoring event.

Alternatively, any instantaneous surface readings of methane 200 ppmv or greater shall include a measurement of the wind taken within 1 meter and 1 minute of the peak methane emission concentration. "

<u>WAC 173-408-090(3)(a)</u> – Penetrations

Sniffer Robotics did not find specific mention of monitoring for methane emissions at "penetrations" (gas wells and other infrastructure that penetrates through the landfill cover system within the waste boundary) as detailed in 40 CFR Part 60, Subpart XXX, Subpart Cf, NESHAP AAAA and Subpart OOO (Federal Plan). Sniffer Robotics data obtained in work across the United States indicate an average of 10-20% of all penetrations measured are recorded as exceedances above the 500 ppmv limit.

Therefore, in keeping with Washington State's efforts to reduce methane emissions, Sniffer Robotics suggests Ecology add verbiage to WAC 173-408-090(3)(a) or WAC 173-408-090(3)(b)(i) to specifically require cover penetration monitoring for landfills as per the CFR indicated.

WAC 173-408-090(3)(a)(ii) – Spacing

In Sniffer Robotics experience, path spacing implemented manually by walking landfills provides for more variability than expected by regulatory authorities, but tightening path spacing has diminishing return for the stated purpose of reducing methane emissions. As with all human-based labor intense operations such as SEM, burdening a technician by walking, maintaining 25' spacing and monitoring for methane, makes a laborious, monotonous, and exhausting job even more so. At a 100-acre landfill, with current regulations requiring a technician to inspect at 30 meter spacing, the technician may walk upwards of 20 miles in hazardous conditions. Requiring 25' spacing increases the technicians' walking distance by a factor of 4, to nearly 100 miles.

Sniffer Robotics kindly requests Ecology provide data justifying how 25' path spacing was selected and data indicating 25' spacing furthers the goal of reducing methane emissions, as compared to 30 meter spacing, when path spacing is strictly enforced.

General Comments

OTM-51 / ALT-150, as recently approved for quarterly landfill emissions monitoring, has been demonstrated to be highly effective at reducing emissions. Based on work now being performed according to this method and as compared to the historical results of methane emissions monitoring for the sites, Sniffer Robotics has data to show the automated drone augmented by "boots on the ground" provides the industry's most effective means for detecting landfill methane emissions. Further, OTM-51 / ALT-150 does not push impractical costs or add operational complexities on the industry, rather it provides a highly effective and cost-effective means for the industry to detect emissions that allow for industry costs to be better spent on remediation. Sniffer Robotics urges you to consider the data provided to and published by the US EPA, and the results of the work already performed in the state under current regulation.

Sniffer Robotics believes the State of Washington would miss a considerable opportunity to reduce emissions if OTM-51/ALT-150 were not pre-approved as an acceptable alternative to this proposed regulation. Sniffer Robotics therefore requests Ecology to consider broad-based and immediate approval of OTM-51 / ALT-150 as similarly approved by the US EPA as part of this proposed rulemaking.

Sincerely,

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