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Subject: Carbon Mapper comments on Proposed Amendments to the Regulation on Methane Emissions from Municipal Solid Waste Landfills

Introduction

On behalf of Carbon Mapper, thank you for the opportunity to offer comments on CARB's proposed amendments to the state's Landfill Methane Regulation. Carbon Mapper is a nonprofit organization with a mission to deliver actionable and transparent facility-scale methane and CO_2 emissions data that can be used to inform and accelerate emissions mitigation.

The utility and interpretation of methane remote sensing data can differ based on the emitting source. Landfill methane emissions are complex with multiple potential sources including the working face, intermediate cover, and gas collection infrastructure. In some cases, landfill emissions are from identifiable pieces of equipment, but in other cases landfill emissions may be more diffuse from a wider-region of the site, and in many cases there is a mixture of both point and diffuse sources. Thus detection programs need to account for the unique nature of these sources and the most beneficial way that data can be used to support mitigation.

With these variable and complex emission sources, monitoring data is both useful in the 'find-and-fix' paradigm but also as a vehicle for collecting needed information to contextualize emissions, improve gas collection, and guide best practices. In service of these goals, Carbon Mapper is writing to offer the following suggestions-

- Provide more specific guidance and reporting requirements for operators responding to remote methane monitoring notifications in order to further contextualize emissions and maximize the value of this data.
- Provide more guidance for technology providers seeking CARB approval.
- Enhance data transparency by publicly sharing data and follow-up actions through a more centralized, user-friendly platform.

These changes are intended to further strengthen the Rule's implementation and ensure the state takes full advantage of a suite of greenhouse monitoring technologies and ensures compliance, public awareness, scientific rigor, and data-informed best practices.

Third Party Technology Approvals

We appreciate the CARB's inclusion of more specific considerations they will take into account when approving third party remote sensing technologies. Data validation is essential to ensure scientific rigor and avoid false detections, however we do have some concerns around the language included in § 95469.

We recommend amending the language to allow for additional forms of validation beyond the current prescribed criteria. While the listed requirements for remote monitoring technology—spatial resolution, data availability, and visualization of plumes—are all important, we recommend that the validation requirements be expanded to better balance both rigor and flexibility. Given the evolving nature of emissions detection technologies and validation methodologies, it is critical that approvals also focus on whether a technology has demonstrated sufficient validation and capability to detect and attribute methane emissions under this rule.

For example, inter-comparison with methodologically different monitoring technologies, and demonstrated previous use in a tiered approach where follow-up investigation was able to verify emissions detected by point source imagers can be another valuable validation tool. For airborne monitoring, Carbon Mapper compared hyperspectral imaging to other methods and for satellites, we utilized aircraft under flights using the same instrument but at a lower elevation. Both of these were provided as evidence of validation in applications to EPA's Super Emitter Program, and are well suited to demonstrating validation for the purposes of this regulation[1][2].

That being said, these are just a couple of ways one can approach data validation and it is important not to limit validation avenues to a prescribed set of approaches. Given the ever-changing nature of emissions detection technologies and data validation methods, the goal should not be to issue standards for approval, but rather outline opportunities to demonstrate that validation has occurred and that the technology is capable of fulfilling its intended purpose under this specific rule.

Requesting Information Operators When Responding To Methane Plume Detection

Based on our experience in the field, providing landfill operators with clear, actionable data - and requesting contextual information in return - is essential to effectively interpret and follow up on landfill methane emissions events. Unlike acute infrastructure leaks like those seen in the oil and gas sector, landfills can have complex and multi-source emissions which can change in time, so additional information about site activities at the time of observation help contextualize monitoring data.

[1] https://methane.app.cloud.gov/review/58
[2] https://methane.app.cloud.gov/review/88

To improve interpretation and foster collaboration with landfill operators, we recommend CARB amend § 95469 to specifically collect the following information from landfill operators when responding to a detected plume -

- In order to assess if potential sources detected by remote monitoring were also found in the most recent regulatory required monitoring survey, we recommend the operator report whether or not the SEM survey path previously covered the detect location, within a distance specified by CARB that accounts for geolocation accuracy of the instrument, and if so, report the methane concentrations found.
- We also recommend that the operator should note if wind speed and direction were similar (within uncertainties of wind measurement) or different between the day of the remote monitoring detect and the last regulatory required monitoring survey. If the operator has wind speed data available for the day of the remote detect, they should provide this information per the existing language.
- The current language requests that operators provide "a brief description of any activities that may have contributed to the plume" without any additional guidance on how close an activity has to be to be considered the cause of an emissions event. We recommend CARB clarify this reporting requirement, specifying guidelines for when to consider an activity to have contributed to a plume (e.g., how far away from the detect can the activity be).
- We recommend collection of data on the historical context of a plume detection when available. This would include any monitoring that detected leaks or methane emissions in the area previously, and if so, when those emissions occurred and what was the believed cause at the time. This would also include contextual information on operations in the area of the detection like new waste placement, construction or maintenance, or challenges with gas collection in the area. If the identified operations are temporary events, the expected end date of the event should be shared.
- Additional operational data that may assist in determining the cause of emissions (such as equipment maintenance schedules, wellhead pressure trends or gas flow rates, etc)

Collecting ample operational information will help CARB and facility operators in connecting emissions to cause. Creating inroads for operators to contribute valuable, site-specific information ensures that emissions detections lead to more productive discussions, clarify whether an emissions event constitutes a meaningful exceedance, and inform targeted mitigation and best practices.

Data Transparency & Public Access

Remote sensing instruments and other monitoring technologies offer ample opportunities for timely mitigation and policy relevant insights, so we encourage CARB to coordinate and share landfill methane and operational data publicly and with other agencies of jurisdiction

to ensure observational data are delivered to operators in a timely manner and to foster greater data transparency.

Sharing methane data both publicly and across agencies would maximize the environmental and community benefits of the regulation. While CARB does provide much of this data online, it is not especially user friendly for many stakeholders.

Methane detections—whether from operator-submitted surface emission monitoring, remote sensing data, or third-party observations—should be made publicly available in a more timely and accessible format. This could include a state-hosted dashboard, periodic reports, or other vehicles for the public to request landfill-specific data, timelines for corrective action, and updates on recurring issues as well as any environmental measurements or operational data that may contextualize emissions detections. This level of data transparency can foster greater collaboration between stakeholders, trust in the regulatory process, context for emissions events, and continued improvements in landfill methane management practices.