November 10th, 2025

Ms. Lauren Sanchez
Chair, California Air Resources Board
1001 I Street, St. 2828
Sacramento, California 95814
RE: California Air Resources Board – Landfill Methane Regulations

Dear Chair Sanchez and California Air Resources Board Members:

Thank you for the opportunity to provide comment on the proposed amendments to the Landfill Methane Regulation. We appreciate CARB's leadership in advancing methane mitigation and recognize the significance of this rulemaking for climate, operational safety, and long-term industry alignment.

Sniffer Robotics is a U.S.-based environmental technology company focused on automated methane detection, verification, and reporting in the solid waste industry. Our SnifferDRONE system is currently deployed on hundreds of active and closed landfills across the United States, as well as in South America and Europe. Our work directly supports operators, regulators, and engineering firms in meeting compliance obligations under federal and state rules, including US EPA ALT-150, which provides precedent for alternative SEM procedures.

Our comments are submitted from the perspective of a technology provider that performs surface emissions monitoring daily, in highly variable real-world conditions, across a wide range of cover types, climates, and operational states. Our comments are intended to:

- Support sensible, durable regulation that reliably reduces methane emissions.
- Enable cost-optimized compliance, particularly through the responsible use of automation and remote monitoring where it is safe and appropriate.
- Avoid regulatory loopholes and method-shopping, ensuring all approved monitoring methods produce high-quality, auditable, and reproducible data.
- Reduce downside risk by tightening certain provisions in the draft rule to maintain alignment with federal SIP requirements and prevent weakening of detection effectiveness over time.

We believe the LMR has the potential to substantially reduce emissions while lowering operator burden through modern monitoring technologies, provided that regulatory guardrails are clearly defined at adoption — not after unintended consequences emerge.

We appreciate the opportunity to contribute to this process and would welcome continued discussion and technical clarification with CARB staff as the rule moves toward adoption.

Sincerely,

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§ 95465(b)(4)(A) - Cover Integrity

Issue:

Without a defined method, this regulation will present CARB and the Air Districts with a patchwork of data in bespoke formats that will be impossible to audit and do not provide transparency.

Recommendation:

Drones are now pervasive and commodity; please consider mandating aerial imagery at 2 inches / pixel ground sampling density, stitched together (photogrammetry). Within that full site aerial image you can then apply the requirements in the original regulation – which can be a) audited by CARB, b) automated with machine vision.

Suggested Regulatory Language:

(Replace § 95465(b)(4)(A) with the following)

"The cover integrity monitoring plan shall include site-wide aerial imagery acquired at a ground sampling distance of no more than 2 inches per pixel, covering the full permitted waste boundary and any areas of intermediate or final cover. Individual images shall be ortho-rectified and stitched to produce a site-wide mosaic for each monitoring event.

The operator shall evaluate the stitched aerial dataset to identify exposed waste, leachate breakouts, erosion gullies, or other cover failures and shall document the location, corrective action taken, and post-repair verification.

All aerial imagery, mosaics, and associated evaluations shall be retained under § 95470 and shall be made publicly available."

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§ 95468 — Alternative Compliance Requests

Issue:

The proposed § 95468 allows owners/operators to request alternative monitoring, test methods, and compliance measures. However, federal law at 40 CFR §63.7(f)(5) prohibits switching back and forth between an approved alternative test method and the originally specified test method without "administrator" approval. As drafted, the LMR is silent on how a facility that has been approved to use an alternative method may later revert to the standard method. Without clarity, this creates regulatory risk for operators and Air Districts and may create conditions where an approved alternative unintentionally prevents an operator from returning to the baseline requirements in §§ 95464, 95469, and 95471.

Recommendation:

Explicitly state that reversion to the standard test method is nominally pre-approved with notification, without additional Executive Officer action, provided the operator meets all underlying monitoring frequency, recordkeeping, meteorology, and performance requirements in the LMR. This aligns California implementation with 40 CFR §63.7(f)(5) and preserves operators' ability to always comply using the default regulatory pathway.

Suggested Regulatory Language:

"§ 95468(f) Approval of an alternative test method, monitoring procedure, or compliance measure under this section shall not preclude the owner or operator from returning to the applicable standard test method or monitoring procedure specified in this subarticle.

Reversion to the standard method is considered pre-approved upon notification to the Executive, provided that the owner or operator conducts the standard method in full accordance with the monitoring frequency, recordkeeping, and performance requirements specified in § 95464, 95469, and 95471."

Question for CARB: In other Cf states, when regulations do not align with the federal plan, customers have monitored per both the state and federal regulation (e.g. customers in WA state continue to do 1 month inspections of exceedance locations per the federal requirements despite not being required in the WA state regulation). For alternative compliance measures, how do sites ensure no federal liability for alternative test methods that are not federally approved but approved in CA

§ 95471(e) — Default Acceptance of U.S. EPA-Approved Alternatives (With Preservation of California's More Stringent Requirements)

Issue:
When the U.S. EPA has already reviewed and approved an alternative monitoring procedure, California gains a high-confidence determination that the detection technology meets the federal equivalency requirement and collects high quality data.

Despite this, the draft regulation does not currently state that U.S. EPA-approved alternatives are default accepted in California. This creates three avoidable risks:

1. Redundant state evaluation burden — CARB will needlessly re-review methods that EPA has already vetted.
2. Inconsistent federal/state determinations — CARB could approve or deny methods differently than EPA, creating regulatory conflict and SIP compliance risk.
3. Delayed adoption of high-performance methods — Operators will face uncertainty when seeking to adopt emerging technologies (e.g., ALT-150).

At the same time, California's monitoring intensity (e.g., 25-foot spacing) is more stringent than the federal standard (30-meter spacing). Therefore, default federal approval must be paired with a provision that the state's operating requirements still apply. For example, OTM-51 includes a provision for site specific spacing; that spacing is tuned to 25 feet per the LMR.

Recommendation:
To ensure consistency with federal determinations while preserving California's stronger monitoring performance requirements:

- Any method already approved by U.S. EPA as an alternative to Method 21 should be default accepted in California.
- BUT the method must be deployed at California's required monitoring spacing, grid coverage, and follow-up requirements.

Proposed Regulatory Language:

(Add as § 95471(e)(6))

*"**(6)** Any surface emissions monitoring procedure that has been formally approved by the U.S. Environmental Protection Agency as an alternative monitoring procedure to Method 21 for landfill surface emissions monitoring shall be deemed approved under this section, provided the owner or operator implements the procedure in accordance with the operational requirements of § 95471(c),*

including but not limited to traverse spacing, probe or sensor height, follow-up inspection, repair requirements, documentation standards, etc.

(A) Upon recognition of such a U.S. EPA-approved procedure, the Executive Officer shall publish the approval and the applicable California-specific implementation conditions on the Landfill Methane Regulation program webpage.

(B) Publication may include clarifying deployment parameters necessary to ensure consistency with the monitoring intensity, follow-up thresholds, and corrective action provisions of this subarticle.

(C) Owners or operators shall apply any published California-specific implementation parameters as enforceable conditions of use."

§ 95469(a) – Definition and Use of "Areas Hazardous to Traverse"

Issue:

The regulation allows operators to exclude "areas that are hazardous to traverse" from standard SEM and instead use alternative monitoring pathways under § 95471(d). However, in practice, the most common basis for deeming an area hazardous is simply that it has been constructed with steep slopes. Slopes are a *design choice*, not an unavoidable condition.

This creates a perverse incentive: landfills can reduce monitoring obligations by designing or maintaining surfaces to be too steep to access.

Recommendation:

Clarify that slope geometry alone is not sufficient grounds for designating an area as hazardous to traverse. If an operator claims an area cannot be monitored by standard SEM, the operator should provide written geotechnical justification demonstrating that a safer, walkable slope is not feasible for reasons of stability—not convenience or airspace maximization. While this is may be best addressed in Title 27 CCR §21090 adjacent the geotechnical slope requirements, it can be addressed in the definition of hazardous slopes in § 95475(a)(40).

Suggested Regulatory Language:

§ 95475(a)(40) "Areas that are hazardous to traverse." Means landfill surface areas that cannot be safely accessed on foot due to temporary unsafe conditions, including active H_2S venting, leachate seeps, erosion repair activity, the active landfilling areas or geotechnically documented slope instability that is under corrective management. Conditions that arise from landfill design or operational choices, including slope steepness, absence of benches or access routes, or routine working face configuration, shall not constitute grounds for designating an area as hazardous to traverse, unless the owner or operator provides engineering justification, satisfactory to the administrator, that no walkable configuration is feasible.

§ 95469(b)(2)(A) – Monitoring Area for Remote Sensing Follow-Up

Issue:
The required 600 ft × 600 ft follow-up monitoring area is not currently constrained to the permitted waste footprint. Surface Emission Monitoring (SEM) is a method for detecting cover failures and GCCS deficiencies on landfill surfaces. Outside of the waste footprint, methane occurrences are governed by 27 CCR §20921 and perimeter probe requirements, not SEM. Requiring SEM outside the waste footprint would not produce actionable repair targets, would confuse enforcement responsibilities, and would create inconsistencies with existing methane migration controls.

Recommendation:
Clarify the remote-sensing follow-up SEM area is limited to the permitted waste footprint, with subsurface methane migration outside that footprint addressed under the existing perimeter monitoring program.

Suggested Regulatory Language:

(modify § 95469(b)(2)(A))

"…centered on the coordinates provided by CARB as the estimated plume origin, limited to the permitted waste footprint."

§ 95471(a) – Update Antiquated Method 21 Response Time

Issue:

Surface emissions monitoring is performed while moving across the landfill surface, walking at about 1.8mph. Instruments with slow response times (T90 > 10 seconds) either smear and dilute the methane signal or respond to signal that is now dozens of meters in the past and therefore not reproducible. Multiple methane detectors and almost all currently deployed in operation are capable of 10 second response times.

Recommendation:

CARB should require all instruments used to determine methane concentrations under § 95471 to have a T90 response time of ≤ 10 seconds.

Engraving this into the regulation closes the loophole of a bad actor procuring a slow response methane detector for the purpose of spatially averaging the methane data to never find an increased meter reading or exceedance. Changing the response rate to 10 seconds compliments the already implemented 1Hz sampling rate data recording.

Proposed Regulatory Language:

Add to § 95471(a)(3):

"(3) "10s" replaces "30s" in EPA Reference Method 21 8.1.3.2"

Replace § 95471(d)(2)(B) with:

"Response Time: The system response time, defined as the time interval from a step change in methane concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout, shall be equal to or less than 10 seconds."

§ 95471(c)(1)(B) – Method 21 Increased Meter Reading vs Maximum Meter Reading

Issue:

§ 95471(c)(1)(B) currently requires the operator to traverse the landfill surface with the probe held within 3 inches of the ground. However, it does not describe the required procedure for identifying the maximum meter reading, which is the basis for determining whether a surface emission exceedance exists under both state and federal law.

Under U.S. EPA Method 21 § 8.3.1, leak detection requires:

1. Sampling until detecting an increased meter reading,
2. Slowing and searching to identify the maximum meter reading, and
3. Holding the probe at the point of maximum reading for a duration equal to 2 × the instrument response time (T90).

Today, many operators conflate the exceedance definition with an increased meter reading – many SEM training instructurs will tell SEM operators: "If you see 499ppm, keep walking". This is not consistent with the spirit, intent or letter of the regulation.

Recommendation:

CARB should explicitly reference Method 21 § 8.3.1 procedures and fix the gap in the federal regulations of not explicitly defining increased meter reading as ≥ 200 ppm. This will ensure consistency and prevent operator discretion from eroding leak detection sensitivity.

Proposed Regulatory Language:

(modification to § 95471(c)(1)(B))

"(B) Testing shall be performed by holding the hydrocarbon detector's probe within 3 inches of the landfill surface while traversing the grid.

When an increased meter reading of ≥ 200 ppm is observed, the operator shall slow and sample the surrounding area to identify the maximum meter reading. The probe shall then be held at the point of maximum meter reading for a duration twice the instrument response time to determine whether the 500 ppm surface emission standard is exceeded."

§ 95471(d)(1) – Surface Emissions Screening Procedures for Unsafe-to-Walk Areas

Issue:
Section 95471(d)(1) provides examples of sensor and platform types for surface emissions screening in unsafe-to-walk areas; however, the current list begins with column-integrated and non-surface-equivalent sensing approaches, and does not include an option that preserves the same near-surface sampling geometry and path spacing of standard SEM conducted under § 95469. Because the 500 ppmv instantaneous standard applies equally in unsafe-to-walk areas, the regulation can teach towards methods that yield data directly comparable to SEM in walkable areas.

Recommendation:
Revise § 95471(d)(1) to add a near-surface air sampling platform (e.g., drone-assisted trailing inlet, rover-guided sample tube, or equivalent) that maintains approximately 0–3 inches sampling height and ≤25-ft traverse spacing, and place this example as the first item in the list. This signals regulatory preference toward measurement equivalency, consistent with the compliance outcome required under § 95469. Drones that sample near to the ground should also be included in this first example.

Suggested Revision:

Insert as the first listed example under § 95471(d)(1):

(A) A drone, rover, robot or vehicle-assisted surface air sampling system that collects air near the landfill surface

Then re-letter the remaining examples:

(B) A handheld instrument that measures methane column concentration…
(C) A drone-mounted instrument that measures methane column concentration…

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§ 95471(d) – Use of Column-Integrated Optical Sensors in Unsafe-to-Walk Areas

Issue:
Section 95471(d) provides default approval of column-integrated optical methane measurements (e.g., open-path TDLAS) in unsafe-to-walk areas. However, column-integrated ("ppm-m") readings are not solely a function of methane concentration. They depend heavily on surface reflectance, absorption characteristics, incident angle, and substrate scattering behavior (and standoff distance and ambient wind conditions). As a result, measurement accuracy is substrate-dependent, not concentration-dependent, and data quality is heterogenous across common landfill cover conditions.

Evidence already exists showing non-performance in realistic landfill conditions.
For example, Firmatek, a leading provider of TDLAS drone methane detection services, presented to the U.S. EPA as recently as 2024 that over snow-covered landfill cover, it is *"reasonable to believe the laser would scatter,"* resulting in unreliable measurements(https://downloads.regulations.gov/EPA-HQ-OAR-2024-0453-0020/content.pdf slide 8, "Operational Limitations"). Snow is a common seasonal cover condition on many California landfills. Bridger Photonics actually studied the issue of surface reflectance and quantified snow cover reflectance at 1651nm in the range of 3% and 20%, dependent on grain size (https://www.epa.gov/system/files/documents/2025-01/bridger-photonics-aerial-survey-alternative-test-method-matm-002_1.pdf).

The problem is not limited to snow.
Reasonable performance concerns extend to many typical landfill substrates, including:

- Black, white, or green geomembranes, which have material-specific and undocumented NIR reflectance values. There is no published performance validation demonstrating that commodity open-path TDLAS systems can reliably return column-integrated methane measurements over these materials. Specifically black is known to absorb open path TDLAS laser light.
- Leachate seeps, saturated clay, and wet cover soils, which create specular and diffuse scattering that induce signal dropout. Many vendors handle dropout using proprietary internal QA filters, which discard data silently. This results in operator- and vendor-specific data deletion rules that are not transparent or auditable.
- Steep slopes and vegetated surfaces, where the optical path intersects the top of the vegetation several feet above the actual surface, returning a diluted atmospheric column rather than a measurement of near-surface emissions. This breaks comparability to the 500 ppmv instantaneous standard, which is defined at the surface.
- The unmitigated approval for TDLAS is not even restricted by fog, smoke or dust that certainly prevents high quality data capture with an open path TDLAS.

These substrate and path dependent limitations mean that column-integrated optical sensing cannot be assumed to produce measurement results equivalent to standard SEM, as required under § 95469 and under U.S. EPA alternative method equivalency principles.

Allowing this method as a default in § 95471(d) is therefore not productive when multiple other technologies are capable of collecting ground level ppm readings via robotics (Drones via ATL-150, quadruped robots, rovers, etc.).

Recommendation:

Column-integrated optical sensing should not be pre-approved as a default screening method in unsafe-to-walk areas. Instead, CARB should evaluate and approve each vendor + sensor + data-QA configuration individually, under the existing process in § 95471(e), to ensure that any such system can:

1. Demonstrate acceptable performance across all common landfill substrates, including but not limited snow, geomembrane (all colors), wet soil, and vegetated cover conditions,
2. Provide transparent data rejection criteria, and
3. Produce measurement outputs that are comparable to SEM under § 95469.

Suggested Revision:

- Strike: § 95471(d)(1)(A) and § 95471(d)(1)(B)
- Replace: § 95471(d)(2) with cross-reference to § 95471(a) (method performance requirements) and strike all subparagraphs of § 95471(d)(2)
- In § 95471(d)(4)(D), strike: “If measuring column concentration, the measurement width or pixel size shall be no larger than 3 meters…”
- In § 95471(d)(5), strike: “or a column concentration 50 ppm-m or greater”

Final Thought on “Unsafe to Walk Surface Areas” – if these areas are such a hazard and are truly unable to be monitored, how then does one actually go to that area for remediation? And how is compliance to a 500ppmv surface limit of 95465(a)(1) (which maps to the federal requirement) enforced by collecting path integrated measurements in ppm*m with no correlation or model (inclusive of hyperlocal ambient wind) back to ppm?

§ 95471(c) – Defining the traversing pattern as a walking pattern for Surface Emission Monitoring

Issue:

Section 95471(c) is a prescriptive method for collecting SEM data per specific requirements that ensure consistency and data quality. The opening line defines the whole section's goal: "The owner or operator shall measure the landfill surface concentration of methane using a hydrocarbon detector meeting the requirements of section 95471(a). " Nowhere in this goal is the deployment modality of the hydrocarbon detector specified. 95471(c)(1) and 95471(c)(1)(B) continue to define a hydrocarbon deployment modality agnostic test method by defining what needs to be inspected "cover penetrations, distressed vegetation, cracks or seeps" and how - "Testing shall be performed by holding the hydrocarbon detector's probe within 3 inches of the landfill surface while traversing the grid"

From this context the grid must be *traversed*. There is no clear requirement that the traversing must be via walking except for defining the pattern to be traversed as a "walking pattern" in several locations in § 95471(c); there is, however, no requirement that the walking pattern must be traversed by walking. There is just a causal definition of the path as a walking path. Multiple technologies (drones towing ground sampling probes, quadruped robots, rovers) are all capable of traversing a walking path while meeting all the strictly defined criteria in § 95471(c), leading to ambiguity in the regulation.

Requiring walking does not define the measurement; it defines only the human burden and safety risk.

Recommendation:

Remove the ambiguity in the regulation by either:

1. Replace "walking pattern" with "traversing pattern" or,
2. Clearly define the hydrocarbon detector must be deployed to the landfill surface via a walking human

Option 1 yields a lower SEM cost and reduced risk of landfill operator injury.

Suggested Regulatory Language:

If option 1: Replace "walking" with "traversing" in in § 95471(c)(1), in § 95471(c)(1)(C), § 95471(c)(1)(C)(1), § 95469(b)(2)(A)(2)

If option 2: Replace § 95471(c) with "Surface Emissions Monitoring Procedures: The owner or operator shall deploy human operators to walk the entire surface of the landfill to measure the landfill surface concentration of methane using a hydrocarbon detector meeting the requirements of section 95471(a). The landfill surface shall be inspected using the following procedures:

§ 95471(e) — CARB Does Not Have the Resources to Evaluate the Alternative Method Requests This Rule Will Generate

Issue:

The proposed LMR allows any vendor or operator to request approval of alternative surface emissions monitoring methods, with very little limitation. This is going to trigger a flood of vendor submissions, each with its own hardware, firmware, QA logic, signal processing, and interpretation model. CARB does not have the staff, technical bandwidth, or review capacity to meaningfully evaluate these submissions at the level required to protect the integrity of the regulation.

Worse, many of the alternative methods to be evaluated rely on indirect measurements, such as column-integrated methane concentration or concentration in the plume. These are not surface-level ppm measurements, and therefore do not directly identify leaks. To be equivalent—legally and scientifically—an indirect method must be converted back to surface-level ppm, because surface ppm is the enforcement trigger under both state and federal law. Even in the two step process of "increased meter reading" to "maximum meter reading" in Method 21 and OTM-51 both meter readings are surface level ppm values.

Once conversion is required, the measurement becomes a modeling exercise. And methane plume behavior depends on interacting environmental and surface conditions, including:

- Surface material (geomembrane color, daily cover, gravel, fines, clay, snow, grass)
- Vegetation structure (bare → sparse → dense → thatch → brush)
- Moisture state (dry → damp → saturated → ponded → frost → snow)
- Solar heating and diurnal thermal stability (morning inversion vs. midday mixing)
- Wind speed, wind direction, turbulence, slope-driven drainage flows
- Barometric pressure trend controlling gas flux
- Sensor viewing angle and slope geometry

These do not vary one at a time. They interact. Which means equivalency must be proven across the combinations.

Even a conservative combinatorial scenario set is thousands of unique scenarios:

6 surface materials
× 5 vegetation / trapping states
× 5 moisture states
× 4 thermal stability regimes
× 4 wind regimes
× 3 pressure states = 7,200 distinct conditions

And that does not include slope orientation, viewing angle, plume intermittency, or leak size variation.

The reality is:

- No vendor will collect validation data across 7,200+ real-world operating conditions.
- No model will generalize correctly without that data.
- And CARB does not have the ability to review the models even if the data existed.

If one weak indirect method is approved—one that appears to find leaks during carefully staged vendor demonstrations (or narrowly defined academic controlled release) but fails under everyday landfill conditions—operators will immediately migrate to that method because it will find fewer leaks, require fewer repairs, and cost less.

This is not hypothetical. This is exactly how method-shopping works in every sector where alternatives are loosely controlled. This is why the US EPA has a very high bar for approving alternatives.

Approving even one inadequate alternative method may take years to unwind and becomes a whack-a-mole problem for the next least effective approved alternative.

Recommendation:

CARB should adopt a strict restraint posture:

1. Do not approve indirect, non-surface level ppm measurement methods unless they verbosely demonstrate and publicly document validated ground-level ppm equivalency across real-world combinations of confounding conditions.
2. Require that localization uncertainty be quantified, validated and incorporated into required follow-up inspection.
3. Recognize that the burden of proof is inherently large, and that CARB should not accept models in compliance data without considering the full number of confounding variables in combination.
4. Pause approval of indirect alternatives until CARB establishes a formal third-party verification program capable of evaluating modeling assumptions, QA logic, and failure modes.

Alternative methods are only safe to approve if they find the same leaks.
Indirect methods can only prove that through massive real-world validation datasets.
Those datasets will not exist, and CARB cannot review them at scale.
Without restraint here, method-shopping will undo the purpose of the regulation.

Suggested Language:

Revise § 95471(e)(3) to include two categories of alternatives – those that collect surface level concentration data and those that collect signal that is then used to infer surface level concentration data

(3) The applicant shall provide information that is sufficient for demonstrating that the proposed alternative surface emissions monitoring procedure achieves methane emission reductions that are at least equivalent to the methane emission reductions that would be achieved by quarterly monitoring complying with the procedures in section 95471(c). Equivalency shall be demonstrated by showing that the alternative procedure reliably identifies the same locations requiring follow-up monitoring and the same surface methane exceedances that would be identified using surface-level methane measurements in accordance with section 95471(c). The following information shall be included in the application:
(A) The following information shall be included in the application for test methods collecting near to surface concentration measurements:
(1.) A description of the alternative work practice per EPA GD-045, including the monitoring technology or technologies, the monitoring procedures, any criteria and restrictions on using the technology or technologies (such as minimum sensor specifications or capabilities, resolution, precision, and any climate, environmental, or topographic limitations), data collection, logging, management, analysis, and data quality indicators and an increased reading definition for required follow-up monitoring per section 95471(e)(1).
Reference: U.S. EPA, Methods Format (EMMC-GD-045), Office of Air Quality Planning and Standards, Emission Measurement Center, August 2020. Available at:
https://www.epa.gov/sites/default/files/2020-08/documents/gd-045.pdf

(2.) Substantive technical support information pursuant to EPA GD-022
Reference: U.S. EPA, Alternative Test Methods for Source Measurement of Air Pollutants (GD-022), Office of Air Quality Planning and Standards, August 2020. Available at:
https://www.epa.gov/sites/default/files/2020-08/documents/gd-022.pdf (3.) Whether the proposed alternative monitoring procedure, or the technology or technologies used in the procedure, has been approved for regulatory use for other emissions monitoring requirements or by other regulatory authorities.

(3.) A discussion of any advantages and disadvantages of alternative technology and procedure (including factors such as ease of use, cost, coverage, objectivity, transparency) and letters of support from at least three representatives of facilities that have utilized or observed the proposed procedure.
(B) The following information shall be included in the application for test methods not collecting near to surface concentration measurements:

(1.) A description of the alternative work practice, including the monitoring technology or technologies, the monitoring procedures, any criteria and restrictions on using the technology or technologies (such as minimum sensor specifications or capabilities, resolution, precision, and any climate, environmental, or

topographic limitations), and the scientific basis and mathematical formulation for converting the measured signal to an equivalent surface-level methane concentration field, and the conditions under which that conversion is valid (all instrument, ambient and surface conditions) for follow-up monitoring as described in section 95471(e)(1).

(2.) The method detection limit and probability of detection of the technology or technologies, and a description of the procedures used to determine the method detection limit and probability of detection with respect to a surface level increased meter reading of 200ppm within definitive region of the landfill with spatial uncertainty (e.g. coordinate with 2 sigma radius confidence interval). The applicant shall collect, verify, and submit field data encompassing all relevant combinations of: (i) surface cover material, (ii) vegetation density, (iii) moisture state, (iv) wind speed and direction, (v) temperature/season, and (vi) barometric pressure trend to support these determinations. The field data shall include direct comparisons to surface-level methane concentration measurements collected at the landfill surface in accordance with section 95471(c),

(3.) Quality assurance and quality control procedures necessary to ensure proper application of the alternative monitoring procedure, including but not limited to any technology calibration or maintenance requirements and any technology or method training requirements. Quality assurance documentation shall include disclosure of all data filtering, culling, signal rejection, and interpolation logic used to generate reported measurements. Removal of any raw data will generally not be allowed, e.g. instrumentation errors and out of specification reflectance/absorption shall either be remeasured or treated as exceedances.

(4.) The frequency of emissions monitoring that will be performed. For continuous monitoring techniques, the frequency of measurements and modeling justification, inclusive of all temporally variable environmental parameters to prove equivalence.

(5.) Data collection, logging, management, analysis, and data quality indicators for the alternative monitoring procedure. Raw measurement data, calibration parameters, uncertainty estimates, and all intermediate outputs used in surface-level concentration conversion shall be retained and made available to the Executive Officer upon request.

(6.) Compliance procedures, including recordkeeping and reporting.

(7.) Whether the proposed alternative monitoring procedure, or the technology or technologies used in the procedure, has been approved for regulatory use for other emissions monitoring requirements or by other regulatory authorities.

(8.) A demonstration (e.g., through field testing or modeling) that the methane emission reductions achieved by the alternative surface emissions monitoring procedure is at least equivalent to the emission reductions that would be achieved by quarterly monitoring complying with the procedures in

section 95471(c). This demonstration shall include quantified localization uncertainty, which must be incorporated into the required follow-up monitoring area.

(9.) A discussion of any advantages and disadvantages of the alternative technology and procedure (including factors such as ease of use, cost, coverage, objectivity, transparency) and letters of support from at least three representatives of facilities that have utilized or observed the proposed procedure. The discussion shall include known limitations tied to environmental or surface conditions where performance may differ from surface-level measurements.

§ 95471(e) — SIP Alternative Approval Conflicts

Issue:

California's landfill methane program operates under §111(d) as a Cf State, meaning the state's implementation must remain at least as effective as the SIP-approved federal baseline. If CARB approves an alternative monitoring procedure that the U.S. EPA has denied or has not approved after submission, the state risks:

- Breaking SIP equivalency,
- Creating regulatory inconsistency,
- Enabling weaker leak detection performance, and
- Incentivizing method-shopping toward the least stringent option.

Recommendation:

CARB should not approve any alternative surface emissions monitoring procedure that has been denied by U.S. EPA, or submitted to U.S. EPA but not yet approved. Conversely, if a CARB approved alternative test method is denied by the US EPA the US EPA decision should take precedence to reduce SIP inconsistencies.

Proposed Regulatory Language:
(Add as new § 95471(e)(4) and (5); renumber remainder)

"(4) CARB shall not approve any alternative surface emissions monitoring procedure, or any procedure that is substantially similar in detection principle, signal interpretation, or data-processing logic, if U.S. EPA has denied approval of the same or similar procedure, or if U.S. EPA has not granted approval after submittal.

(5) If U.S. EPA denies approval of a substantially similar monitoring procedure that CARB has previously approved under this section, the CARB approval shall be automatically suspended upon EPA's denial. The owner or operator shall revert to the monitoring procedures in § 95471(c) or a different approved alternative per § 95471(e)."