ENVIRONMENTAL INTEGRITY PROJECT

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Via e-mail
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RE: Public Stakeholder Comments on June 23, 2021 Discussion Concepts, Maryland Regulation for Controlling MSW Landfill Methane Emissions

Dear Mr. DuRant:

The Environmental Integrity Project ("EIP") respectfully submits the comments below on the concepts presented for discussion in the Maryland Department of the Environment's ("MDE's") June 23, 2021 PowerPoint Presentation.[1] We appreciate the time that MDE's staff has taken to hold public stakeholder meetings on the development of this regulation and to compile the information shared via the presentations at the June 23 meeting. We also appreciate the opportunity to submit these comments.

In general, we strongly support MDE's overall approach to the discussion concepts, which aligns with landfill methane regulations in effect in the State of California as well as draft regulations being developed by the State of Oregon. However, we believe that there are a few important points where MDE has strong technical support for improving upon the concepts presented for discussion and issuing standards that are even more protective of the environment. Those matters are addressed in the first four sections below. In the fifth section, we offer further comments on a few additional issues presented by MDE's discussion concepts in the order that they were presented at the June 23 meeting.

[1] MDE PowerPoint Presentation, Updating Maryland's Municipal Solid Waste (MSW) Landfill Regulations, Stakeholder Meeting #2 – June 23, 2021 (hereinafter "Discussion Concepts PowerPoint") at https://mde maryland.gov/programs/Regulations/air/Documents/SHMeetings/Control%20of%20Methane%20from%20MSW%20Landfills%20-%20June%2021-2021.pdf.

I. Waste-in-Place, Heat Input, and Surface Methane Concentration Thresholds for the Installation of a Gas Collection and Control System

While EIP supports the waste-in-place ("WIP") and heat input thresholds presented as triggers for the installation of a gas collection and control system ("GCCS") at a landfill,[2] there is ample technical support for setting even lower thresholds. MDE should consider setting lower thresholds, which would require installation of a GCCS at more landfills. In addition, it is not entirely clear whether MDE was presenting for discussion the concept of treating surface methane measurements below 200 parts per million by volume ("ppmv") as a basis for avoiding GCCS installation, and we request clarification of this matter.

All state and federal regulations in the U.S. for the control of landfill emissions operate primarily by requiring the installation of a GCCS at any landfill that meets or exceeds certain thresholds. These "applicability thresholds" triggering the obligation to install a system are a critical piece of any regulatory approach. As stated in our last set of comments dated October 15, 2020, the type of thresholds used by the State of California, based on the amount of WIP and the heat input of the gas generated by a landfill, are superior to the types of thresholds used by the U.S. EPA, which are based on a landfill's design capacity (measured based on mass and volume) and emissions rate for non-methane organic compounds ("NMOC"). In addition, both EPA's and California's rules allow a landfill operator to avoid installing a GCCS when the facility meets or exceeds the relevant applicability thresholds if measurements show that the concentration of methane at the surface of the landfill are below certain levels (500 ppmv for EPA and 200 ppmv for CARB).

A. Waste-in-Place and Heat Input Thresholds

MDE has presented for discussion the concept of using the same 450,000-ton WIP and 3.0 MMBtu/hr heat input applicability thresholds as California. EIP is generally supportive of this proposal because WIP and heat input thresholds are more meaningfully tied to a landfill's ability to operate an emissions control system to destroy the methane in landfill gas (based on flare technology) than the NMOC and design capacity thresholds used by EPA. In addition, we believe that using California's thresholds would require operation of a regulated GCCS at far more Maryland landfills than the number (four) that would be required to operate such systems if EPA's thresholds were used.

However, there is also ample support for MDE to set even lower WIP and heat input thresholds. As noted in our October 15, 2020 comments, California developed its thresholds in 2010 based on the amount of gas necessary to operate a flare, but EIP's staff engineer has identified current flares that can meet California's regulatory requirements (enclosure for most flares and 99% methane destruction efficiency) at a lower heat input without supplemental fuel.

[2] While there are different types of landfills in Maryland, we use the term "landfill" in these comments to denote municipal solid waste landfills specifically.

Based on our engineer's report, EIP recommended applicability thresholds of 150,000 tons of WIP and 1.0 MMBtu/hr of heat input in our October 15, 2020 comments.[3]

In addition, the State of Oregon appears poised to issue a rule that will set a 200,000-ton WIP threshold, paired with a mass methane generation threshold and a surface methane concentration threshold. Landfills will be required to install a GCCS if they meet one of the following sets of conditions:

(1) have 200,000 tons or more of WIP, generate between 664 metric tons (732 tons) and 7,755 metric tons (8,548 tons) of methane per year, and have a surface concentration of methane of 200 ppmv or greater; or

(2) have 200,000 tons or more of WIP, and generate 7,744 metric tons (8,548 tons) of methane or more per year.[4]

The Oregon Department of Environmental Quality ("Oregon DEQ" or "DEQ") addresses the basis for its 200,000-ton WIP threshold in a set of discussion responses posted on its website, stating "[t]he worst case scenario for methane generation from a new landfill would be a large amount deposited the first year in the western part of Oregon (due to the higher precipitation amounts)."[5] DEQ calculated the WIP values associated with different precipitation amounts "to see how large the waste mass would need to be to results [sic] in the methane generation rate of 664 tons/year,"[6] which is a methane generation rate based on a conversion of California's heat input threshold of 3.0 MMBtu/hr.[7] DEQ also considered the number of in-state landfills that would be subject to the lower WIP threshold, but the primary basis for the threshold appears to be enhanced methane generation resulting from the intrusion of moisture caused by precipitation into landfills.

In essence, DEQ apparently set a lower WIP threshold to account for the higher precipitation in the western part of the state. The agency's equation is based on inches per year of precipitation plus leachate recirculation at a landfill, so EIP was not able to recreate this exactly using Maryland data.[8] However, it is clear that Maryland's precipitation is more similar to that of the western part of Oregon than to California, which provides support for Maryland setting a WIP threshold closer to Oregon's threshold. Table 1 below presents annual precipitation totals and a 6-year average from the years 2015-2020 for Maryland (statewide average); California

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[3] Letter from Leah Kelly and Ryan Maher, EIP, to Eddie DuRant, MDE, on Public Stakeholder Process for Setting New Air Quality Regulations for the Control of Methane Emissions from Municipal Solid Waste Landfills (October 15, 2021) (hereinafter "EIP October 15, 2020 Comments") pp. 9-10.

[4] Proposed OAR 340-239-0105(5)(b)(A); OAR 340-239-0105(6), Oregon DEQ Draft Rules Landfill Gas Emissions 2021 Rulemaking Advisory Committee Meeting #3 (hereinafter "OR Draft Rule") pp. 6-7 at https://www.oregon.gov/deq/Regulations/rulemaking/RuleDocuments/lfg2021ac3RulesD.pdf

[5] Oregon DEQ, Discussion Responses Landfill Gas Emissions 2021 Rulemaking Advisory Committee Meeting #3 (hereinafter "OR Discussion Responses") p. 2 at https://www.oregon.gov/deq/Regulations/rulemaking/RuleDocuments/lfg2021ac3DR.pdf.

[6] *Id*.

[7] Oregon DEQ, Landfill Gas Emissions Rulemaking 2021 Discussion Questions, p. 2 at https://www.oregon.gov/deq/Regulations/rulemaking/RuleDocuments/LFG2021ac2DP.pdf.

[8] Table 2, OR Discussion Responses p. 2 at https://www.oregon.gov/deq/Regulations/rulemaking/RuleDocuments/lfg2021ac3DR.pdf.

(statewide average); and western Oregon (multi-station average with 20 specific stations identified in footnote) using data from the National Oceanic and Atmospheric Administration ("NOAA").[9] Both Maryland and western Oregon had 6-year average annual precipitation amounts that were more than twice California's. In addition, Maryland's 6-year average was only 13% lower than western Oregon's.

Table 1: Average Annual Precipitation in Western OR, CA, and MD (in inches)			
Year	**Western Oregon**	**California**	**Maryland**
2015	54.75	15.04	46.86
2016	70.81	25.73	41.66
2017	62.53	28.17	41.21
2018	44.74	18.09	64.62
2019	45.90	29.12	42.70
2020	56.26	12.08	52.84
2015-2020 Average	**55.83168**	**21.37167**	**48.315**

While the multi-station average precipitation value shown in Table 1 above for western Oregon does mask much higher precipitation amounts at individual NOAA stations in western Oregon – for example a 91.93 inch 6-year average at the Alsea FH, Fall Creek station and a 78.56 inch 6-year average at the Seaside station – it is still notable that DEQ established a lower threshold applicable to the entire state and not just the areas surrounding these individual stations. In addition, it appears that DEQ's 200,000-ton WIP threshold was based on precipitation in the amount of over 40 inches per year and leachate recirculation at a landfill.[10] Maryland's average statewide precipitation is well over 40 inches a year and MDE would be justified in setting a lower WIP than California's based on Maryland's annual precipitation.

Thus, while we believe that the WIP and heat input thresholds that MDE presented for discussion are good and represent a significant improvement over those in EPA's rule, there is ample support for Maryland to set lower thresholds.

[9] Data from CA and MD are from NOAA National Centers for Environmental information, Climate at a Glance: Statewide Time Series, published July 2021, retrieved on July 12, 2021 from https://www.ncdc noaa.gov/cag/. Data for western OR are from NOAA National Centers for Environmental information, Climate Data Online, published July 2021, retrieved on July 12, 2021 from https://www ncdc.noaa.gov/cdo-web/." The 20 NOAA stations used to calculate western OR totals are: ALSEA FH FALL CREEK, ASHLAND 0.7 SSE, ASTORIA AIRPORT PORT OF, CLATSKANIE 8.8 SW, EUGENE MAHLON SWEET FIELD, HOLLEY, LEBANON 1.4 SSW, MAPLETON, NEWBERG, NORTH BEND SOUTHWEST OREGON REGIONAL AIRPORT, OREGON CITY 5.5 ESE, OREGON CITY, ROSEBURG, SEASIDE, SEINE CREEK, SHERIDAN 2.1 NNW, SILVER CREEK FALLS, SPRINGFIELD 2.1 WNW, SPRINGFIELD 2.9 W, TOLEDO 0.2 W. Not all of the stations had data for all 6 years.

[10] Table 2, OR Discussion Responses p. 2 at https://www.oregon.gov/deq/Regulations/rulemaking/RuleDocuments/lfg2021ac3DR.pdf.

B. Surface Methane Concentration

In addition, it is not entirely clear whether MDE is proposing to allow a landfill operator whose facility meets or exceeds the WIP and heat input thresholds to avoid the obligation to install a GCCS based on repeated measurement of surface methane concentrations that are below a certain value. Both EPA's and California's rules include this kind of provision, with EPA setting a 500 ppmv threshold[11] and California setting a 200 ppmv threshold for this.[12] Oregon's most recent draft rule also allows landfill operators who would otherwise have to install a GCCS to avoid this requirement based on repeated methane concentration measurements under 200 ppmv, but only at certain landfills, specifically those that emit between 664 and 7,755 metric tons of methane per year and are not bioreactor landfills.[13] Bioreactor landfills and landfills emitting over 7,755 metric tons of methane per year may not avoid installing a GCCS based on surface methane measurements.[14]

It appears that MDE may be presenting for discussion the concept of following California's approach. Specifically, MDE's PowerPoint presentation states: "[o]ptional surface demonstration test can be used if landfill gas heat input capacity ≥ 3.0 MMBtu/hr (for uncontrolled landfills only). This test is used for determining when a GCCS is required to be installed and is based on surface methane emissions being < 200 ppmv for 4 consecutive quarters (regardless if the landfill is closed, active, or inactive)[.]"[15] However, it is not entirely clear and we respectfully request that MDE clarify this.

If MDE is proposing to follow California's approach, EIP is generally supportive because measurement of surface methane is one of the few ways in which either California's or EPA's rules incentivize landfill operators to divert organic waste away from landfills. For this reason, we would strongly object to any proposal to increase the referenced surface methane concentration above 200 ppmv.

In addition, Oregon's approach appears to be even better than California's. We encourage MDE to consider establishing a methane generation rate threshold in tons per year over which surface methane monitoring may not be used to avoid the obligation to install a GCCS. Regarding bioreactor landfills, these facilities should be prohibited in Maryland. However, if they are not, they should also have to install a GCCS before initiating the addition of liquids other than leachate, regardless of surface methane concentrations. MDE should also consider following Oregon's approach of requiring landfill operators to record and report all instantaneous surface readings of 100 ppmv or greater.[16]

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[11] 40 C.F.R. §§ 60.33f(e)(2), 60.35f(a)(6).
[12] 17 C.C.R. § 95463(b)(2)(B).
[13] *Compare* Proposed OAR 340-239-0105(5)(a)-(b) (landfills emitting 664-7,755 metric tons of methane) *with* Proposed OAR 340-239-0105(6)(7) (landfills emitting over 7,755 metric tons of methane and bioreactor landfills); OR Draft Rule pp. 6-8.
[14] Proposed OAR 340-239-0105(6)(7), OR Draft Rule pp. 6-8.
[15] Discussion Concepts PowerPoint pdf p. 42.
[16] Proposed OAR 340-239-0800(3)(b)(A), OR Draft Rule p. 38; Proposed OAR 340-239-0700(3)(C)(A), OR Draft Rule p. 29.

II. MDE Should Allow for the Possibility of Using Improved Methane Measurement Technology as the State of California Has Done

MDE should ensure that its landfill methane regulation is flexible enough to accommodate the implementation of new techniques and technologies for measuring landfill emissions. New technologies involving ground-level sensors, drones, aircraft, and satellites are already being used to measure landfill emissions and the concentration of methane at the surface of landfills. EPA hosted a workshop at the beginning of this year that put these new technologies in the spotlight and showed their imminent relevance.[17] As these technologies continue to develop, they will likely improve the accuracy and reduce the cost of estimating landfill emissions. A forward-looking regulation must allow for the introduction and use of improved testing methods.

California's regulation contains a provision that allows for alternative approaches to "the compliance measures, monitoring requirements, [and] test methods and procedures" in the regulation.[18] Alternative approaches must be approved by the Executive Director of the California Air Resource Board.[19] California's regulation requires the Executive Director to deny any alternatives that do not provide "equivalent levels of enforceability or methane emission control," so this provision cannot be used to weaken the requirements of the regulation.[20] The most recent draft Oregon rule includes a very similar provision, though California's is stronger in terms of ensuring the rejection of alternatives that are not equally effective.[21]

In MDE's proposed regulation, surface emissions monitoring plays a crucial role in ensuring that regulatorily mandated gas collection and control systems function with some degree of effectiveness. It also appears that landfill operators can avoid triggering the requirement that they install a GCCS if they show that methane surface concentrations are below 200 ppmv using surface emissions monitoring.[22] MDE's proposed regulation—like California's and EPA's regulations—requires operators to use instruments that meet the criteria of EPA Reference Method 21[23] to measure the concentration of methane at the landfill surface.[24] However, California's regulation makes clear that alternatives to this test method can be introduced, provided they are approved by the Executive Director of the California Air Resources Board.[25]

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[17] EPA, Municipal Solid Waste Landfills: New Source Performance Standards (NSPS), Emission Guidelines (EG) and Compliance Times, Additional Resources (May 24, 2021) at https://www.epa.gov/stationary-sources-air-pollution/municipal-solid-waste-landfills-new-source-performance-standards.
[18] 17 C.C.R. § 95468(a).
[19] *Id.*
[20] 17 C.C.R. § 95468(c)(2).
[21] Proposed OAR -239-0500, OR Draft Rule pp. 18-19.
[22] Discussion Concepts PowerPoint p. 42
[23] 40 C.F.R. Pt. 60, App. A ("Determination of Volatile Organic Compound Leaks").
[24] Discussion Concepts PowerPoint p. 40.
[25] 17 C.C.R. § 95471(h) ("Alternative test methods may be used provided that they are approved in writing by the Executive Officer.")

EPA's landfill regulations allow for alternative measurement approaches. Landfill operators can propose other methods for measuring the concentration of NMOC in the landfill gas, as well as the site-specific methane generation rate constant, which are two important values that are used to determine whether the landfill needs to install a GCCS under the regulation.[26] However, EPA's regulations do not contain the same flexibility when it comes to using EPA Reference Method 21 for measuring the concentration of methane at the surface of the landfill, so MDE should go beyond the federal requirements in this regard.

MDE's regulation should include provisions modeled on California's to allow for the future use of new measurement technologies. MDE should also ensure that these types of provisions cannot be used to relax the standards of its regulation by including a clear requirement that alternatives must provide at least an equivalent level of enforceability and methane emissions control.

III. MDE Should Require Landfill Operators to Report the Amount and Composition of Waste-in-Place in Annual Reports

Although MDE's June 23 PowerPoint presentation did not address reporting requirements yet, EIP recommends that MDE include a provision that the Oregon DEQ included in its recent draft rule relating to reporting of the amount of waste at a landfill. For landfills that exceed Oregon's WIP threshold of 200,000 tons, operators must submit as part of annual reporting a Waste-in-Place Report that includes the following information:

> (A) Landfill name, owner and operator, address, and the permit number as issued according to division 216 or 218;
>
> (B) The landfill's status (active, closed, or inactive) and the estimated waste-in-place, as of December 31 of the prior year, in tons;
>
> (C) A description of the known and assumed waste composition in the landfill; [and]
>
> (D) The most recent topographic map of the site showing the areas with final cover and a geomembrane and the areas with final cover without a geomembrane with a calculation of the corresponding percentage geomembrane coverage over the landfill surface.[27]

Given that organic waste is the source of methane at landfills, attempting to track the composition of waste at a given landfill is a particularly important part of reporting. We recommend that MDE adopt a similar requirement to that proposed in Oregon.

[26] 40 C.F.R. §§ 60.35f(a)(5) (for existing landfills), 60.764 (for new or modified landfills).
[27] Proposed OAR-329-0700(3)(e), OR Draft Rule pp. 31-32.

IV. MDE Should Consider Creating/Allowing a Program for Emissions Reduction Credits for Organic Waste Diversion Projects as the Country of Australia Has Done

EIP greatly appreciates all of the information presented at MDE's June 23, 2021 stakeholder meeting. However, we were disappointed that it appears MDE is not planning to undertake any new initiatives on organics diversion that are not already mandated by recently passed legislation. As we stated in our October 15, 2020 comments, we continue to believe that organics diversion is a critical component of an effective approach to landfill methane control. Since submitting our October 15 comments, EIP has continued to conduct research on this topic and we now believe that incentivizing the development of new organics diversion facilities, focusing on composting facilities, is likely the most effective approach to organics diversion. While we do not believe that MDE necessarily must establish additional organics diversion programs as part of *this* air quality rulemaking, we also do not believe that current programs are sufficient to address this issue.

We have discovered that Australia has an existing program in which composting and other organics diversion projects are eligible for emissions reduction credits for methane emissions avoided by these projects.[28] The Australian government operates a voluntary program under which projects that reduce greenhouse gases can be awarded emissions reduction credits called Australian carbon credit units (ACCUs). An ACCU can then "be sold to generate income, either to the government through a carbon abatement contract, or in [a] secondary market."[29] As part of this program, Australia has developed methodology for calculating the emissions avoided by organics diversion projects that receive credits.[30]

We are aware that the United States does not presently have a national program that is comparable to Australia's and that Maryland is unlikely to create its own program without other states. However, we urge MDE to discuss the possibility of incentivizing organics diversion through emissions reduction credits with the other states participating in the U.S. Climate Alliance as well as the other states participating in the Regional Greenhouse Gas Initiative ("RGGI").

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[28] Australian Government, Clean Energy Regulator, Source separated organic waste projects, http://www.cleanenergyregulator.gov.au/csf/how-it-works/explore-project-types/Pages/Source-separated-organic-waste-projects.aspx; *see* Clean Energy Regulator, Factsheet: Source separated organic waste projects, http://www.cleanenergyregulator.gov.au/DocumentAssets/Documents/Factsheet%20-%20Source%20separated%20organic%20waste%20projects.pdf.

[29] Australian Clean Energy Regulator, About the Emissions Reductions Fund, http://cleanenergyregulator.gov.au/ERF/About-the-Emissions-Reduction-Fund.

[30] Australian Government, Federal Register of Legislation, Carbon Credits (Carbon Farming Initiative – Source Separated Organic Waste) Methodology Determination 2016, a*vailable at* https://www.legislation.gov.au/Details/F2016L00098 ; *see also* Australian Clean Energy Regulator, Emissions Reduction Fund, Source Separated Organic Waste http://www.cleanenergyregulator.gov.au/ERF/Choosing-a-project-type/Opportunities-for-industry/landfill-and-alternative-waste-treatment-methods/source-separated-organic-waste.

V. Additional Issues in Order of Presentation in MDE's June 23, 2021 Discussion Concepts PowerPoint

A. Applicability Thresholds – Exemptions

MDE's discussion concepts PowerPoint includes a list of types of exempt landfills, and it appears that MDE is proposing exempt these kinds of landfills from all requirements of the rule.[31] This list does not include "landfills that receive only . . . non-decomposable wastes" which is a category of landfill that is exempted from California's regulations. [32] This exemption promotes diversion of decomposable organic material away from landfills. EIP recommends that MDE include this as an exemption to Maryland's rule with a slight textual revision. This should not apply to a landfill that already contains large amounts of organic waste whose operator institutes a new policy discontinuing acceptance of organics, particularly if this occurs toward the end of the landfill's life. Therefore, we recommend that MDE include an exemption for "landfills containing only non-decomposable waste."

B. Disposal Areas Requiring GCCS

EIP supports MDE's discussion concept requiring a GCCS in any area where waste is buried rather than the more limited EPA requirements.[33]

C. Types of GCCS allowed and Annul Source Testing for GCCS

We support MDE's discussion concept of disallowing use of carbon adsorption and passive gas collection systems.[34] As explained in our October 15, 2020 comments, the California Air Resources Board found that these systems are insufficiently effective at controlling methane.

We also generally support MDE's discussion concept of limiting the use of open flares. However, MDE's concept states that open flares are allowed under "specific conditions"[35] and we need more information about what those conditions are. California allowed open flares to operate until a certain date in 2018 based on grandfathering.[36] After that 2018 date, open flares may operate only on a temporary basis during certain conditions, like during maintenance or repairs, or if the owner or operator can demonstrate "that the landfill gas heat input capacity is less than 3.0 MMBtu/hr . . . and is insufficient to support the continuous operation of an enclosed flare or other gas control device."[37]

[31] Discussion Concepts PowerPoint p. 31.
[32] 17 C.C.R. § 95462.
[33] Discussion Concepts PowerPoint p. 34.
[34] *Id.*
[35] *Id.*
[36] 17 C.C.R. § 95464(b)(2)(B)(1).
[37] 17 C.C.R. § 95464(b)(2)(B)(2)-(3).

In addition, we support MDE's discussion concept of requiring annual source testing for certain systems, and look forward to discussing additional details regarding the systems and test.[38]

D. Wellheads

With respect to MDE's discussion concepts for wellheads, EIP restates and incorporates by reference into these comments Section I.C.(iii), titled "Wellhead Standards and Monitoring Requirements" of our October 15, 2020 comments. [39]

E. Component Leak Test – GCCS

MDE has presented for discussion the concept of requiring component leak testing at landfills that are required to install a GCCS, though it did not address the instruments or methodology that might be allowed for this purpose.[40] EIP strongly supports the concept of requiring leak testing for the reasons explained in our October 15, 2020 comments[41] and we appreciate that MDE's PowerPoint addresses the key provisions of leak detection included in California's rule. We also recommend that MDE allow landfill operators to use Optical Gas Imaging ("OGI") for leak detection, rather than just relying on EPA Method 21 monitoring, the method required by the California regulation. Generally speaking, OGI is a faster, cheaper, and more effective way to detect leaks than traditional Method 21 monitoring because OGI allows landfill operators to scan for leaks visually, over an area, instead of requiring component-by-component testing.[42] EPA stated that it believes OGI "provides equal, or better, environmental protection than that provided by [Method 21]" when approving OGI as an alternative to Method 21.[43] MDE itself recently finalized a regulation to limit methane emissions from the natural gas industry that allows use of OGI or Method 21 to detect methane leaks.[44]

A number of studies have compared OGI to Method 21. Typically these studies involve oil and natural gas infrastructure, but the lessons are transferrable to the landfills context. One pair of studies found that operators using Method 21 were only able to screen between 500 and 700 equipment components per day, while OGI increased that rate to 2,100 equipment

[38] Discussion Concepts PowerPoint p. 35.
[39] EIP October 15, 2020 Comments pp. 12-13.
[40]Discussion Concepts PowerPoint p. 36.
[41] EIP October 15, 2020 Comments p 11.
[42] Eastern Research Group, *Technical Support Document, Optical Gas Imaging Protocol* (40 CFR Part 60, Appendix K), Revision No. 5, at 10 (Aug. 11, 2015); Stephen Whitfield, *Is Optical Gas Imaging the New Solution for Methane Detection?* Journal of Petroleum Technology (July 28, 2019) at *https://jpt.spe.org/optical-gas-imaging-new-solution-methane-detection*; Hazem Abdel-Moati, et al., *New Optical Gas Imaging Technology for Quantifying Fugitive Emission Rates*, International Petroleum Technology Conference, Abstract (Dec. 2015).
[43] EPA, *Alternative Work Practice to Detect Leaks from Equipment*, Proposed Rule, 71 Fed. Reg. 17,401 (Apr. 6, 2006). The EPA rule approving OGI as an alternative to Method 21 was finalized on December 22, 2008. *See* EPA, *Alternative Work Practice to Detect Leaks from Equipment*, 73 Fed. Reg. 78,199 (Dec. 22, 2008) (codified at 40 C.F.R. § 60.18(g)–(i)).
[44] COMAR 26.11.41.01B(13); COMAR 26.11.41.03A(1).

components per hour.[45] The anticipated cost savings with OGI were substantial.[46] Similarly, another study found that OGI increased the screening speed nearly ten-fold relative to Method 21, and also found that OGI detected more of the most significant leaks than Method 21.[47] A third study determined that lower whole-facility emissions can result from the use of OGI due to the greater likelihood that OGI will detect larger leaks.[48] EPA consulted these studies when developing its regulatory methodology for OGI.[49]

OGI likely presents advantages for monitoring landfill GCCS specifically. Studies show that OGI is particularly useful for detecting leaks from components that are difficult to see or reach, like those components of a GCCS that may be partially or entirely below ground.[50] OGI could also be used to scan the surface of the landfill to identify leaks from the cover layer or from exposed components of the system, like wellheads.

While OGI offers some clear advantages relative to Method 21, a hybrid approach to leak detection that makes use of both OGI and Method 21 can secure the leak-detection benefits of both methods. Of the available approaches to leak detection we have reviewed, EPA's alternative work practice for leak detection, referenced above,[51] appears to be the best for detecting leaks from landfill GCCS. Under the requirements of EPA's alternative work practice, operators that rely on OGI to detect leaks instead of Method 21 must still use Method 21 for one leak screening per year, in lieu of OGI.[52] The hybrid approach of EPA's alternative work practice would be advantageous in the landfills context for three primary reasons. First, this is an established, EPA-approved approach that has been put to the test in the field. Second, while OGI is a faster method of leak detection that typically catches the most significant leaks, as well as leaks that are difficult to access, it is not necessarily the best method for detecting smaller leaks.[53] Requiring component-by-component testing through Method 21 once per year would ensure that landfill operators detect small leaks that still exceed the 500 ppmv limit, some of which OGI alone might miss. Finally, any given landfill GCCS in Maryland will likely have far fewer components than a

[45] D.R. Robinson, et al., *Refinery Evaluation of Optical Imaging to Locate Fugitive Emissions*, 57 Journal of the Air and Waste Management Association 7, at 803-810 (2007); D.R. Robinson, et al., *Identifying Fugitive Emissions with Optical Imaging*, Proceedings of the 10th Annual International Petroleum Environmental Conference (IPEC), Houston, TX (Nov. 11-14, 2003).

[46] *Id*.; *see also* Chandler Kemp and Arvind Ravikumar, *New Technologies can Cost-effectively Reduce Oil and Gas Methane Emissions, but Policies will Require Careful Design to Establish Mitigation Equivalence*, Earth ArXiv, at 14 (Jan. 22, 2021), at https://eartharxiv.org/repository/view/2008/.

[47] Eastern Research Group, *supra* note 42, at 35-38 (citing D. Picard, et al., *Directed Inspection and Maintenance Leak Survey at a Gas Fractionation Plant Using Traditional Methods and Optical Gas Imaging*, Air and Waste Management Association 99th Annual Conference, 06-A-119-AWMA (2006)).

[48] *Id*. (citing D. Reese, et al., *Smart LDAR: Pipe Dream or Potential Reality?* Exxon Mobile Corporation (2007).

[49] *Id*. This regulatory methodology is still under development and has not yet been finalized. Fugitive Emissions Journal, *Coming Soon? A New Optical Gas Imaging Protocol for Refineries*,

[50] *Id.* at 35; Teledyne FLIR, *10 Tips for Getting the Most Out of an Optical Gas Imaging (OGI) Camera* (accessed July 14, 2021), at https://www flir.com/discover/instruments/gas-detection/10-tips-for-getting-the-most-out-of-an--optical-gas-imaging-ogi-camera/.

[51] EPA, *supra* note 43.

[52] 40 C.F.R. § 60.18(h)(7).

[53] American Petroleum Institute, *API Field Measurement Study: Equipment Leak Detection and Quantification*, EPA Stakeholder Workshop on Oil and Gas (Nov. 7, 2019) at https://www.epa.gov/sites/production/files/2020-12/documents/detection_limits_of_ogi.pdf.

natural gas facility, so requiring the use of Method 21 once per year will be far less of a burden for landfills than for other industries.

MDE should take advantage of the cost, efficiency, and detection-related benefits of OGI and include OGI in a robust leak detection and repair provision modeled on the hybrid approach of EPA's alternative work practice for leak detection. It appears that this is the most effective approach to leak detection that could be used at landfills and is set forth in existing regulations.

F. Surface Emissions Monitoring

We support MDE's discussion concepts for surface emissions monitoring, which align with California's regulations.[54] However, with respect to the equipment and methodology used for measurement, we reiterate our comments in Section II above regarding allowing for the use of advancements in monitoring technology. In addition, we expect that we may submit additional comments in the future on details not addressed in MDE's PowerPoint, such as the "specific timeframe" over which spacing intervals could be modified from the 25-foot spacing interval, when those details are presented.[55]

Thank you for your consideration of these comments.

Respectfully submitted,

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[54] Discussion Concepts PowerPoint pp. 37-38.
[55] *See* Discussion Concepts PowerPoint p. 40.