October 6, 2022

Submitted electronically to: *https://www.regulations.gov*

Ms. Jennifer Bohman
U.S. Environmental Protection Agency
EPA Docket Center
Air and Radiation Docket
Mail Code 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Comments on Revisions and Confidentiality Determinations for Data Elements Under the Greenhouse Gas Reporting Rule; Docket ID No. EPA-HQ-OAR-2019-0424

Dear Ms. Bohman:

The National Waste & Recycling Association (NWRA) and Solid Waste Association of North America (SWANA) are pleased to submit comments to the Revisions and Confidentiality Determinations for Data Elements Under the Greenhouse Gas Reporting Rule; Docket ID No. EPA-HQ-OAR-2019-0424.

The NWRA and SWANA represent companies, municipalities, and professionals in the solid waste industry. The NWRA is a not-for-profit trade association representing private solid waste and recycling collection, processing, and management companies that operate in all fifty states. SWANA is a not-for-profit professional association in the solid waste management field with more than 10,000 members from both the private and public sectors across North America. Our members strive to deliver collection, composting, recycling, and disposal services that are protective of the environment in a safe, science-based, and technologically advanced manner. It is important that regulatory policy enables us to continue to deliver these essential services.

DOC Values

Facilities reporting to Subpart HH of the GHGRP may use one of three options noted below to characterize their waste streams. EPA has proposed a rule to revise degradable organic carbon (DOC) values for landfills for these options (as shown).

1) Bulk Waste Option– assumes single stream of mixed solid waste
2) Modified Bulk MSW Option– facilities can characterize waste into 3 streams: construction & demolition debris (C&D), inerts, municipal solid waste (MSW) (which excludes the prior 2 streams).
3) Waste Composition Option – facilities can characterize waste into a variety of categories where each category has a specific DOC value assigned based in IPCC recommended values.

As referred to in the proposed rule, EREF published a report on DOC values and estimated values using multiple state-based composition studies. A comparison of the current DOC, proposed DOC, and EREF values for the Bulk and Modified Bulk MSW options are shown below.

Comparison of Current/Proposed EPA and EREF DOC Values

Option	Current EPA	Proposed EPA	EREF
Bulk Waste	0.20	0.17	0.161 *(Range: 0.118 - 0.180)*
Modified Bulk MSW	0.31	0.27	0.184 *(Range: 0.142 - 0.209)*

As shown above, the proposed bulk waste DOC value of 0.17 falls within the range of values computed by EREF, suggesting that independent research using a different approach supports EPA's multivariate analysis. For the modified bulk method, EPA's proposed DOC value for MSW has been reduced by approximately 10% from 0.31 to 0.27. However, the proposed value is approximately 47% higher than EREF's estimate of 0.18. Further, the proposed value is outside the range of EREF's values, suggesting that there is a discrepancy between the approaches used by the EPA and EREF to compute these values.

A memorandum[1] dated June 18, 2019 (that only recently was shared) stated the discrepancy lies in the interpretation of the "inerts" waste stream. EREF's approach considers the waste accepted at a facility in three discrete streams:

- Bulk MSW, which contains inerts such as plastic bottles, metal and glass (aligning to the standard MSW definition used by EPA's *Advancing Sustainable Materials Management: Facts and Figures* reports);
- Bulk C&D, which may contain inerts such as concrete and tile; and
- Inerts (e.g., inert special wastes).

While EREF's approach excluded inerts from C&D and special waste (as these are not considered to be MSW), it does not exclude inerts from MSW waste itself. As such, EREF's approach estimated the composition-based DOC values for bulk MSW (i.e., DOC as a percent of total MSW) consistently with the accepted approach for bulk C&D (i.e., DOC as a fraction of total C&D).[2] This approach is also consistent with the realities of landfill operations, as inerts from C&D and special wastes (aka non-MSW inerts) can be easily distinguished by landfill personnel via visual inspection of loads at the scale house. Thus, this definition of inerts aligns with industry practice and the types of data collected and tracked on site at the majority of landfills in the U.S.

However, as highlighted in the referenced memorandum,[1] EPA's definition of inerts would include all inerts in the waste stream, including MSW inerts such as plastic, metal and glass. Incoming MSW to a landfill is generally counted by the truckload without further segregation making any estimates of the fraction of MSW inerts impractical. The only way to reliably estimate inerts is through a waste audit. Thus, to comply with this definition would require a landfill owner to conduct a waste characterization study so that the fraction of inerts can be estimated. This effectively renders the Modified Bulk MSW option useless since a waste characterization study (required to adjust bulk MSW for MSW inerts) would instead allow a landfill owner to use the Waste Composition approach to compute DOC.

[1] Memorandum from Jeff Coburn, RTI International, to Rachel Schmeltz, EPA, *Modified Bulk MSW Option Update, June 18, 2019*, available in the docket for this rulemaking, Docket Id. No. EPA–HQ–OAR–2019–0424.

[2] This bulk MSW approach is consistent with the approach used by both EREF and RTI International to estimate the DOC for C&D waste—that is the DOC for C&D waste is inclusive of C&D inerts and exclusive of any other inerts (e.g., MSW, special waste). The justification for EPA's incongruous methods for MSW vs C&D is not provided in the memorandum.

To better understand how landfill owners interpret the Modified Bulk MSW option, two evaluations were performed examining the reported fraction of the three waste types reported under the method: MSW, C&D, and inerts. Specifically, this evaluation looked at how often facilities are reporting 100% bulk MSW (and thus no inerts/other materials) and the reported fraction of inerts for those using Modified Bulk MSW option.

Analysis of the publicly available Subpart HH reporting data indicates that nearly one-quarter of facilities using the Modified Bulk MSW option report no inerts (i.e., report 100% bulk MSW) and 85% of facilities reporting inerts in addition to bulk MSW are reporting very low levels (<5% inerts). Given that the average fraction of inerts in MSW 37.7% (based on EREF analysis) and 37-38% based on the data presented in the memorandum,[1] this strongly suggests that:

- EPA is receiving information inconsistent with the assumption that the MSW stream in the Modified Bulk MSW option reflects only organic MSW, and
- It is inappropriate to apply a DOC value of 0.31 (or the proposed 0.27) to the bulk MSW data reported under the Modified Bulk MSW option.

Therefore, continued use of a DOC value for bulk MSW that is exclusive of MSW inerts does not align with landfill operational limitations and the perceived intent of establishing a Modified Bulk MSW option in the first place: achieving a more accurate estimate of GHG emissions (relative to the Bulk Waste option) by allowing owners to report site-specific conditions without the substantial cost and time of implementing the Waste Composition option. Instead, the Modified Bulk MSW approach should allow the MSW Landfill to use the same Bulk MSW DOC of 0.17 as the Bulk MSW approach.

k values

EPA proposes to revise the default k values under Subpart HH in response to public comments received for previous Inventory reports. The RTI International (RTI) memorandum dated June 11, 2019 presents the derivation of the proposed new k values for Bulk MSW and Modified Bulk MSW. The memorandum states that EPA is considering changes to the existing k values due to public comments about U.S. k values being lower than k values used in other Annex I countries in similar climates. Given that with few exceptions, the k values reported by other countries relied almost exclusively on the IPCC model, comparisons should not include those countries. The assumption that the 2006 IPCC model provides more realistic estimates of landfill (LFG) generation from U.S. landfills is not justified for a number of reasons:

1. The IPCC model has been available since 2006, so the fact that IPCC has higher k values is not new information which justifies a review.
2. IPCC is an international model not designed for U.S. waste composition and site conditions, but for a range of very different countries, including less developed nations that produce a much higher percentage of food waste than the U.S., and therefore should have much higher bulk waste k values.
3. Material-specific k values listed in IPCC are highly uncertain and have inconsistent ratios between material types when the ratios are compared across different climate zones.
4. IPCC reports higher k values for “tropical” climates than for temperate climates in the same moisture category (wet or dry). The tropical climate zone is not applicable for the vast majority of U.S. sites, but more importantly, it is inappropriate for sanitary landfills that produce their own heat and are largely independent of ambient temperature to have k values that are higher in hotter climates. If anything, higher ambient temperatures may produce lower k values at a given precipitation level due to higher

evaporation rates that dry out the waste. IPCC's higher k values for warmer climates conflicts with their own assertion that evaporation should be considered when evaluating moisture levels in landfills.

RTI suggests that the European Union's more aggressive goals of waste diversion "may be a driver as to why, when compared to the U.S., the k values applied by these countries are higher." We suggest that the EPA assign regulatory k values that reflect data that the industry has been collecting for decades rather than basing it on a motivation to promote waste diversion. We also note that EPA's proposed k values are actually significantly higher than IPCC's k values.

In both the June 11 and June 18 memoranda, RTI suggested that its research provided the basis for the existing k values (0.02, 0.038, and 0.057), and cites only RTI 2003 and 2004 studies as references. However, RTI did not develop these k values. They were developed by SCS Engineers under contract to EPA for their Landfill Methane Outreach Program (LMOP). In 2004, EPA's LMOP requested SCS to provide a set of k values for U.S. landfills in different climate zones that reflected the average of values being applied by SCS in LFG models they had been preparing over several years to assist LMOP with their LFG-to-energy outreach work.

SCS modeled landfill gas generation using field data from sites with gas collection and control systems (GCCS). The modeled numbers were empirically calibrated using historical LFG flow data and an independent estimate of collection efficiency. The average of k values derived from the calibrated models were then used to assign the "default" k values provided to LMOP. This was later replicated in Table HH-1 of the GHG Reporting Rule. The existing k values have now been used for 12 years of GHG emissions reporting and has consistently resulted in reasonable estimates for U.S. landfills.

We strongly disagree that we need to turn to other countries for guidance. Because of its greater reliance on landfills than European countries, the U.S. has the most advanced LFG collection and control infrastructure in the world and the most robust LFG-to-energy industry, which has led to the U.S. developing expertise in LFG modeling that is unmatched in other countries.

Once EPA decided to update the k values, they proceeded to apply a questionable methodology for updating the values. EPA/RTI performed a multivariate analysis to minimize the difference between the reported values from Equations HH-7 and HH-1. EPA's analysis optimized k and DOC simultaneously to adjust the results from HH-1 to more closely align with the "observed" HH-7. This approach is concerning as follows:

A. The "observed" value of HH-7 is an estimate that is approximate and is not an "observation". Adjusting the k and DOC values to minimize the difference between HH-1 and HH-7 values will produce error to the extent that the HH-7 estimates do not reflect actual collection efficiency (CE).
B. Optimizing k and DOC values simultaneously can lead to extreme and unrealistic values because an error in one value causes an offsetting error in the other to yield the same LFG generation estimate. The extremely wide observed range of "optimized" k values (e.g., 0.001 to 0.400 for dry climates) produce so much uncertainty in the estimated average value as to render it practically meaningless.
C. The changes to estimated LFG generation from proposed new k and DOC values listed in Table 6 of the June 11, 2019 RTI memo are extremely large, particularly for open dry sites. These large increases in emissions estimates for open sites imply that prior estimates were underreporting emissions to such a large extent that the underestimates should be easily demonstrated. However, EPA has not presented evidence that LFG generation has been underestimated at any specific sites, much less across the country at many sites so as to indicate a consistent pattern of underestimation.

In sum, the overall approach used by RTI to develop revised k values for the EPA is deeply flawed and will produce unrealistic estimates of LFG generation when applied to individual sites. Each of these points are discussed further below.

A. HH-7 is not an observed result.

Collection efficiency (CE) calculated using HH-7 is subject to significant errors because the presence of wells and cover type alone do not fully account for CE variations. Because EPA elected not to allow the range of CE values for a particular cover type recommended by SWICS, there is no adjustment to produce more realistic estimates reflecting site specific factors such as well density and operational efficiency. Some sites with HH-7 calculated CE estimates of approximately 60% but have field measured LFG collection rates and emissions monitoring indicating that CE is likely closer to 90%. Other sites reporting CE estimates over 80% with low LFG recovery rates indicate that they were likely collecting less than 60% due to operational problems that restricted LFG recovery. If errors in CE estimates calculated using HH-7 can commonly reach 50% (+ or -), then model k and DOC values calibrated based on the reported collection efficiencies can be similarly biased.

B. Extreme ranges for k and DOC produces unrealistic k values.

The analysis allowed both k and DOC to vary across extreme and unrealistic ranges producing unrealistic results. Because the k and DOC values were not constrained to realistic values, the results ranged widely. The range of k values observed in the RTI study (e.g., 0.001 to 0.400 for dry sites) demonstrates that this method produces extreme values and is unreliable. The average of k values that vary across a 400-fold range is not a statistically meaningful number and cannot be the basis for regulating U.S. landfills.

We do not share EPA's faith in RTI's method of using multivariate analysis to solve for k. A much more reliable method for solving for k would be to do so on a site by site basis, by first assigning realistic Lo values reflecting waste composition, and using independent collection efficiency estimates that reflect more site-specific information than the simplistic method used in HH-7 similar to how SCS Engineers developed the k values for LMOP in 2004 that were later adopted by the EPA.

EPA's proposed new k values were never demonstrated by RTI to produce realistic LFG generation estimates for individual sites. On the other hand, thousands of U.S. landfills have been reporting GHG emissions for the past 12 years using the existing k values, while the only criticism offered by the EPA to justify changes are public comments that the U.S. had lower k values than the IPCC and other countries.

Further, EPA's multivariate analysis utilized an eligibility criteria that eliminated any facilities that did not report for all years 2011-2017. Landfill gas emissions are most variable at the beginning and end of operations when reporting is just beginning or ending. These landfills are more likely to have been eliminated by the eligibility criteria that was utilized. Therefore, the results may not be a true reflection of what occurs at landfills. Only 27% of landfills reporting to the GHGRP met the eligibility criteria.

EPA took this smaller cohort of landfills and further reduced it by removing outliers that were outside the acceptable range, removing another 56 landfills which accounted for over 25% of the moderate precipitation facilities. Even with the reduced number of landfills, the observed range for the optimized decay value varied by over two orders of magnitude.

C. Combined with the minor changes to DOC, the proposed new k values produce estimates of LFG generation that are up to 130% higher than before.

The large increases in calculated LFG generation listed in Table 6 of the June 11, 2019 RTI memo are unacceptable considering the lack of evidence of problems with historical estimates and the lack of prior indication that such impactful changes to the methodology would be forthcoming. Note that the lower percent changes in the estimates listed in Table 7 are blended values with offsetting changes that are less representative of the impacts that individual landfills will experience when reporting GHG emissions using the new k values in HH-1 and HH-6.

We are especially concerned with the effects these changes will have on arid climate landfills. Using the proposed k and DOC values for arid climate site will substantially increase the methane emission estimates under Equation HH-6 and create a huge discrepancy between HH-6 and HH-8. Based on our review of the proposed values for a series of arid climate landfills, the resulting methane emissions under HH-6 would be well outside of the range of likelihood for these landfills, especially when landfill gas recovery rates and surface emissions monitoring data are reviewed. The difference between HH-6 and HH-8 values will increase for most landfills using the proposed k and DOC value, more pronounced for the arid and moderate precipitation sites, and we are very concerned how that will be used in future regulatory or policy decisions regarding landfills as well as how landfill opponents will try capitalize on the discrepancy.

Last, while EPA cites that the k values can be a factor of 2 or 3 from the average recommended by IPCC as part of the reason for reconsidering k values, the observed range in EPA's report varied by a factor of 400. This suggests that these revised numbers are not supported by this analysis.

EPA suggests that "[t]he nationwide impact of these changes will likely be limited…because…[a]bout 71 percent of subpart HH facilities in RY2020 used equation HH-8 to estimate their methane emissions and the proposed revisions would not impact the emissions reported for these facilities. Thus, the proposed revisions would impact only the emissions from landfills without GCS and landfills with GCS that elect to report emissions using equation HH-6, which is a smaller fraction (about 35 to 40 percent) of the total methane emissions reported subpart HH." While the total impact on the reported greenhouse gas emissions may not be significant, this change could result in significant changes to individual landfills. Therefore, we believe it is important to utilize a method that is supported by data and science.

Further, EPA appears to have relied solely on the report by RTI to propose the revised k-values disregarding more recent analysis developed by EPA itself. In 2021, EPA's Office of Research and Development published an article in PLOS ONE[3] suggesting ranges for k values for each precipitation class that fall below the proposed changes. Like the RTI study, this study utilized data from the GHGRP but used a different methodology. This study focused on closed landfills, by assuming that collection approximated generation. However, even this methodology has flaws. The assumption that k values are static over the life of the landfill ignores the potential for reduced values that would likely occur when a landfill is capped and drying out. Further, if emissions were in fact generated from those closed sites, this would equate to higher generation rates. Higher generation rates for closed landfills suggests that the k values should be even lower than this study proposes.

[3] Jain P, Wally J, Townsend TG, Krause M, Tolaymat T (2021) Greenhouse gas reporting data improves understanding of regional climate impact on landfill methane production and collection. PLoS ONE 16(2): e0246334. https://doi.org/10.1371/journal.pone.0246334

Given all the problems outlined in the forgoing, the proposed changes to k values cannot be supported by EPA's analysis. Therefore, we strongly encourage EPA to maintain the current k values.

Reporting requirements

EPA is also proposing "to require MSW landfills to report data on the landfill CH_4 emissions that are destroyed versus sent to landfill gas energy projects." Further, we understand that this will be done by reporting the relative percentage of gas sent to energy projects versus being, "destroyed." With the availability of data collected by the Landfill Methane Outreach Program (LMOP), we see this request as not only duplicative, but capable of providing data with less reliability than data already collected by the EPA. Further, we are uncertain of the definition of "landfill gas to energy projects," as there are multiple beneficial use projects that destroy landfill gas to produce power as well as other beneficial uses (transportation fuels, leachate evaporation, boilers, etc.). We recommend that rather than requiring new reporting requirements that EPA instead rely on LMOP data.

Retroactive years

The proposed rule will have a significant impact to all landfills, and it is not transparent on how previous years reporting will be impacted. Industry needs the opportunity to review EPA's strategy on how these revisions will impact previous year's submittals before any rule changes are finalized as revising previous reports places an unnecessary workload burden on the EPA and the regulated community. In addition to the burden of recalculating prior years emissions, retroactive revisions will create a great deal of confusion for stakeholders that rely on the GHG reports and raise questions about the validity of prior reporting efforts.

Furthermore, the emissions from the GHG Reporting Rule are used for other programs such as the US GHG Inventory and it is unclear in the proposal how EPA will implement such changes to align with different programs.

Therefore, we recommend EPA apply rule changes prospectively and not retroactively to prior year's reporting.

Costs

EPA calculated a burden of only $3297 for MSW landfills. We believe these costs are low for the changes proposed. Significant effort is required to reconfigure recordkeeping processes and xml coding for reporting. There may also be cases where new measurement locations must be installed to collect data for proposed new reporting elements.

Table 7—Total Incremental Burden by Subpart				
Subpart	**Labor costs**	**Initial year**	**Subsequent years**	**Capital and O&M**
HH—Municipal Solid Waste Landfills	3,297	3,297		

Conclusion

We appreciate the opportunity to provide this feedback. To summarize, we recommend the following:

- EPA should change the DOC values for Bulk MSW as proposed.

- EPA should change the DOC values for Modified Bulk MSW to 0.17
- EPA should maintain the existing k values
- EPA should not include new reporting requirements
- EPA should apply any final rule changes prospectively (after effective date of final rulemaking)

Thank you for your consideration of our request, and we look forward to continuing to partner with the EPA to ensure the safe and effective management of waste streams containing PFAS. Should you have any questions about this letter, please contact Anne Germain, COO & SVP of Regulatory Affairs for NWRA, at agermain@wasterecycling.org. You may also contact Jesse Maxwell, Senior Manager, Advocacy & Safety for SWANA, at jmaxwell@swana.org.

Very truly yours,

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