



March 11, 2024

U.S. Environmental Protection Agency  
EPA Docket Center  
Docket ID No. EPA-HQ-OAR-2017-0015  
Mail Code 28221 T  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460.

(Submitted electronically at <http://www.regulations.gov>)

**RE: Comments of the National Lime Association on: Supplemental Notice of Proposed Rulemaking: National Emission Standards for Hazardous Air Pollutants: Lime Manufacturing Plants Amendments, Docket ID No. EPA-HQ-OAR-2017-0015, RIN 2060-AV59**

Dear Sir or Madam:

The National Lime Association (NLA) appreciates the opportunity to comment on EPA's Supplemental Notice of Proposed Rulemaking: National Emission Standards for Hazardous Air Pollutants: Lime Manufacturing Plants Amendments ("Proposed Rule"), 89 Fed. Reg. 9088 (Feb. 9, 2024). NLA is the trade association for manufacturers of high calcium quicklime, dolomitic quicklime, dead-burned dolomitic lime, and hydrated lime, collectively referred to as "lime." Lime provides cost-effective solutions to many of society's manufacturing and environmental needs. Lime is a chemical without substitute, providing solutions to many of society's environmental problems. Lime is an important ingredient in many other manufacturing processes and industries. It is used in the steel manufacturing process, road building, and the creation of other building products like mortar and plaster. Lime is also a critical component in environmental compliance for many industries, as it is used to purify water and scrub air pollutants from stack emissions.

NLA acknowledges the efforts that EPA has made to improve the Proposed Rule from the prior proposal (the "January 2023 Proposed Rule"), and these improvements will be discussed in detail in the comments below. NLA continues to believe, however, that the proposal is unnecessary and flawed in significant underlying ways. These comments reflect NLA's major

concerns, as well as more technical issues and corrections.<sup>1</sup> Major concerns include the following:

1. The Clean Air Act does not require EPA to regulate additional hazardous air pollutants in this proceeding, and EPA should have determined that such a regulation is unnecessary.
2. EPA's Proposed Rule will impose billions of dollars in economic costs on the lime industry with minimal benefits. In addition, not only will the Proposed Rule impose tremendous costs, but it will also cause more environmental harm than good.
3. EPA should not have sought to set MACT floors for any of the HAPs addressed in the Proposed Rule, because no lime industry source is controlling for any of these HAPs, and thus there are no true "best performers" in terms of emissions.
4. Any standard for HCl should be a health-based standard pursuant to Clean Air Act section 112(d)(4). NLA commends EPA for seeking comment on this approach but believes it should have been the proposed approach.
5. NLA commends EPA for proposing an intra-quarry variability factor (IQV) for mercury emissions but believes that the data compels a higher IQV factor.
6. NLA commends EPA for proposing an aggregated organic HAP standard, but believes the proposed standard requires correction.
7. EPA should withdraw its proposed dioxins/furans (D/F) standard and either collect additional data on D/F emissions in the lime industry before proceeding with a new emissions standard or provide the work practice or alternative compliance method previously requested by NLA.

These and other concerns are addressed in detail below.

## PROCEDURAL BACKGROUND

EPA promulgated the *National Emission Standards for Hazardous Air Pollutants for Lime Manufacturing Plants Final Rule* two decades ago. 40 CFR §§ 63.7080-7083. In doing so, EPA noted that: "the purpose of the final NESHAP is to protect public health by reducing emissions of HAP from lime manufacturing plants." 69 Fed. Reg. 394, 395 (Jan. 5, 2004). EPA carefully evaluated the lime manufacturing sector, and regulated HAP emissions by establishing a particulate matter (PM) standard as a surrogate for non-volatile and semi-volatile metal HAPs. EPA fulfilled its obligations under the Regulatory Flexibility Act and the Small Business Regulatory Enforcement Fairness Act (SBREFA) by reaching out to small lime companies, performing extensive economic analysis on the impacts of the rule, and convening a small business panel with the Small Business Administration (SBA) to identify less burdensome

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<sup>1</sup> Some of the comments herein mirror comments included in NLA's comments on the January 2023 Proposed Rule, dated Feb. 21, 2023 (EPA-HQ-OAR-2017-0015-0166). NLA incorporates those comments and their appendices herein by reference, but some of the points are repeated here for ease of review.

alternatives that would still accomplish EPA's regulatory objectives. EPA also provided a 60-day comment period.

EPA's focus was on protecting public health by reducing HAP emissions with controls, but only if such controls were "necessary." EPA considered, but expressly rejected, regulating other HAPs, including the ones at issue in this rulemaking. For example, EPA determined that:

We are not regulating HCl emissions from lime kilns in the final NESHAP. Under the authority of section 112(d)(4) of the CAA, we have determined that no further control is necessary because HCl is a "health threshold pollutant" and HCl levels emitted from lime kilns are below the threshold value within an ample margin of safety.

69 Fed. Reg. at 397.

EPA's 2004 rule was successful in balancing its obligations under the CAA to protect public health while only imposing controls that were "necessary." This is evidenced by the fact that the rule was not challenged by the lime industry nor by any environmental groups.

Likewise, in 2020, EPA issued a final rule to fulfill its obligations under CAA § 112(d)(6) and (f)(2), a.k.a. the "risk and technology review" (RTR). Here EPA found that: "risks are acceptable and that the current NESHAP provides an ample margin of safety to protect public health." *National Emission Standards for Hazardous Air Pollutants: Lime Manufacturing Plants Residual Risk and Technology Review*, 85 Fed. Reg. 44960 (July 24, 2020). EPA further determined that: "There are no developments in practices, processes, or control technologies that necessitate revisions to the standards." *Id.*

EPA took a completely different approach in the January 2023 Proposed Rule, and largely continues this approach in the current Proposed Rule. In the January 2023 Proposed Rule, EPA proposed extremely stringent requirements that would have imposed enormous costs on the lime industry. After this was pointed out in comments by NLA and its members, and by the Small Business Administration (SBA), EPA agreed that it needed to perform a more detailed analysis of the cost impacts of the rule on small businesses. EPA and SBA convened a review panel under the Small Business Regulatory Fairness Enforcement Act (SBREFA), which was held on August 3, 2023. After the panel procedure, EPA proceeded to issue the current Proposed Rule, which incorporates many of the recommendations made through the panel process.

NLA commends EPA for participating in the SBREFA review and for responding to concerns raised during the process. NLA also notes that EPA's estimate of the costs of the new Proposed Rule are more realistic and much higher than those estimated for the January 2023 Proposed Rule. These high costs, coupled with EPA's repeated determinations that the existing rule presents acceptable risk with an ample margin of safety, even with no new standards, are what has led NLA, as well as the Small Business Panel, to urge EPA to identify as many ways to minimize the impact of the Proposed Rule on the lime industry as possible.

EPA is not pursuing this rulemaking process because of risks to the public or the environment, but because of court decisions that are imposing unnecessary deadlines and

substantive requirements that are nowhere found in § 112(d)(6) of the Clean Air Act.<sup>2</sup> Despite the fact that EPA has consistently determined for over two decades that risks from lime plant emissions are acceptable with an ample margin of safety, and thus that additional MACT regulations for the lime industry sector are *unnecessary*, EPA is pushing to complete this rulemaking as soon as possible because of a court-ordered deadline of June 30, 2024, for the promulgation of a final rule to regulate four additional pollutants whether EPA believes new standards are necessary or not.

## TECHNICAL BACKGROUND

The Proposed Rule continues to reflect a lack of technical understanding of the lime industry in several important respects. Below is a discussion providing technical background on how lime kilns and their HAP emissions interact. Specifically, the discussion below relates to the four additional HAPs addressed in the Proposed Rule: HCl (hydrogen chloride), Hg (mercury), oHAP (organic Hazardous Air Pollutants), and D/F (dioxins and furans).

Lime kilns differ substantially from traditional fuel combustion sources and kilns from other industrial sectors in how HAPs are emitted and controlled. For example, fossil fuel-fired boilers and heaters and tunnel kilns used to manufacture brick or ceramics exhibit significantly different emissions formation phenomenon and emissions gas stream characteristics from those found in lime kilns, and thus basing assumptions on performance of these devices, as EPA appears to have done, has led to errors in analysis, and the failure to consider important factors that will affect cost and performance of air pollution control devices in lime plants.<sup>3</sup> The operation of these non-lime sources differ substantially from the operation of lime plants, in particular with respect to the temperatures necessary to achieve calcination in a lime kiln and the long-life requirements of lime plant design and operation near a quarry. These non-lime sources are further not involved in continuously operating processes in a lime plant that have many tons per hour of a circulating product load. These operational realities, formation mechanisms, and exhaust gas stream characteristics are very different for a lime kiln than for a typical combustion device or tunnel kiln. Comparison with cement kilns can also lead to erroneous conclusions, because cement kilns differ substantially from lime kilns due to the variety of feedstocks and fuels, and the differences in processes. Below is a brief discussion for each newly regulated HAP.

- Hydrochloric Acid (HCl). The formation of HCl is incidental to the lime production process and is a function of the temperatures required to make lime, the fuels used for their energy value, and constituents found in the raw material input (limestone) to the

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<sup>2</sup> Despite meeting its obligations of CAA § 112(d)(6) and (f)(2) by issuing a final RTR rule in 2020, EPA takes the position that it must issue a new rule following the decision in *Louisiana Environmental Action Network v. EPA*, 955 F.3d 1088 (D.C. Cir. 2020) (“*LEAN*”). As set forth in these comments, EPA misinterprets *LEAN* to require a revised standard here despite EPA’s RTR findings of no residual risks or available new technologies. Further, even if EPA’s interpretation of *LEAN* was correct, NLA asserts that the *LEAN* case was wrongly decided and should be revisited and reversed by the D.C. Circuit or the Supreme Court.

<sup>3</sup> NLA recognizes that EPA in the Supplemental Proposed Rule has substantially revised its costs estimates to better align with industry’s cost estimates. Nevertheless, there remain substantial technical uncertainties as to whether any of the candidate MACT technologies will achieve the proposed limits and therefore even EPA’s increased cost estimates incorporate significant economic uncertainty.

kilns. Given that the lime kiln process is alkaline in nature, its environment already offers an inherent reduction of acid gas emissions, including HCl, without any additional controls. The proposed MACT standard starts from a floor that is based on the few lowest emitting sources and then proceeds to require the installation of expensive controls to attempt to reduce very low levels to even lower levels without conclusive data on the feasibility of those controls.

- Mercury. Emissions of mercury are low from lime kilns. Mercury can be emitted in either its elemental or ionic (oxidized) form at ratios that will require extensive study and design controls for lime kilns subject to the rule. Unlike typical combustion systems, where emitted mercury is solely a function of levels in fuels, a lime kiln also can see contributions to emissions from trace levels of mercury that naturally occur in limestone. The large quarries at lime plants have natural variability in such trace compounds. Given the requirement that large volumes of stone are necessary to make lime and the long-term capital investment needed to build and operate a lime plant, most lime plants are located near their limestone source with decades-long operational and mining plans. NLA produced and provided to EPA significant volumes of data on mercury, and demonstrated how EPA should apply an intra-quarry variability (IQV) factor to account for variability of mercury in stone feedstocks.
- Organic HAPs. Emissions of organic HAPs from lime kilns are very low in quantity and in the number of individual HAPs. These organic HAPs can be formed incidentally during combustion in the kiln and can also be formed by miniscule amounts of naturally occurring organics contained in limestone that decompose at lower temperatures and randomly form organic HAPs. To address these very small amounts of organic HAPs, EPA previously proposed to set a MACT floor for total hydrocarbons (THC) as a surrogate. EPA has now proposed a superior aggregated oHAP approach, although, as detailed below, it requires some important corrections.
- Dioxins and Furans. Dioxins and furans (D/F) are emitted in extremely low quantities from lime kilns, and in some cases are not detectable at all. Many lime kilns affected by this rule may not have detectable levels of D/F and yet will be subject to burdensome testing in perpetuity. The formation of D/F is incidental in a lime kiln where organics and chlorides are available to form barely detectable levels of D/F (in the parts per billion range) in some kilns. Despite EPA's own studies and documentation in the prior Lime MACT and RTR rulemakings confirming the extremely low levels of D/F from lime kilns, EPA has proposed the most stringent limit available.

## GENERAL ISSUES

### I. THE CLEAN AIR ACT DOES NOT REQUIRE EPA TO REGULATE ADDITIONAL HAZARDOUS AIR POLLUTANTS IN THIS PROCEEDING

There are two key reasons why EPA should not be engaged in this rulemaking. First, any lawsuits or petitions demanding revisions to the underlying lime MACT standard are time-barred, and thus EPA is under no legal obligation to engage in this rulemaking. Second, even if not time-barred, it is not “necessary” in this residual risk and technology (RTR) proceeding to issue four new MACT standards.

#### A. EPA Should Not Have Undertaken to Rewrite the Lime Manufacturing MACT Standard Because All Parties Are Time-Barred from Challenging That Standard

EPA is undertaking this revision to the existing lime MACT standard in this RTR proceeding because environmental petitioners requested that it do so following the DC Circuit’s opinion in *Louisiana Environmental Action Network v. EPA*, 955 F.3d 1088 (D.C. Cir. 2020) (“*LEAN*”). However, environmental petitioners are time-barred from challenging the underlying lime MACT standard because they failed to do so within 60 days following promulgation of the original MACT standard in 2004, and thus there is no legal obligation for EPA to undertake this rulemaking.

Section 307(b) of the Clean Air Act requires any party to initiate a challenge for EPA’s failure to set hazardous air pollutant (HAP) standards within 60 days from promulgation of the original MACT standard. 42 U.S.C. § 7601(b)(1). This requirement is jurisdictional, and a court cannot waive or lengthen it. *Med. Waste Inst. & Energy Recovery Council v. EPA*, 645 F.3d 420, 427 (D.C. Cir. 2011); *NRDC v. EPA*, 571 F.3d 1245, 1265 (D.C. Cir. 2009). The *LEAN* court acknowledged the argument but **did not address it or rule on its merits**. This limitation on judicial review of EPA actions serves an “important reason: to enforce repose so that the rulemaking process is not crippled by surprise challenges to matters that were rightfully presumed settled . . .” *EME Homer City Generation, L.P. v. EPA*, 696 F.3d 7, 38 (D.C. Cir. 2012), *rev’d on other grounds*, 572 U.S. 489 (2014) (Rogers, J., dissenting). Further, this jurisdictional timeline protects the regulated industry by allowing industry to plan for compliance obligations. *Cf. Lead Indus. Ass’n, Inc. v. EPA*, 647 F.2d 1184, 1186 (D.C. Cir. 1980) (observing that the CAA’s strict deadlines for completing the steps to promulgate ambient air quality standards, and the limitation on stays pending petitions for reconsideration in CAA section 307(d)(7)(B), are evidence of “a strong congressional desire that the procedure for establishing air quality standards be completed expeditiously and with considerable finality”).

Here, the underlying lime MACT standard was promulgated in 2004, 69 Fed. Reg. 394 (Jan. 5, 2004). The challenge to EPA’s RTR rule (challenging EPA’s decision not to regulate additional HAPs in the original MACT rule) was not filed until September 22, 2020, over 16 years beyond the 60-day judicial review period established by Congress. Accordingly, any

challenge to the existing MACT standard would be time-barred, and thus EPA is under no legal obligation to initiate this rulemaking.<sup>4</sup>

Furthermore, the time bar argument is stronger in the context of the lime MACT standard than it was in the *LEAN* case, because all the pollutants addressed in this new rulemaking were explicitly addressed in the original lime MACT rulemaking in 2004. This is not a case in which HAPs were ignored or inadvertently omitted, but rather a case in which EPA specifically decided that regulation was not necessary, a decision that was not challenged at the time.

Thus, for HCl, in the 2004 MACT rule, EPA *explicitly* performed a review under CAA section 112(d)(4). Below is what EPA stated in the final rule preamble:

We are not regulating HCl emissions from lime kilns in the final NESHAP. Under the authority of section 112(d)(4) of the CAA, we have determined that no further control is necessary because HCl is a “health threshold pollutant,” and HCl levels emitted from lime kilns are below the threshold value within an ample margin of safety. *See generally*, 67 FR 78054–057. As explained there, the risk analysis sought to assure that emissions from every source in the category result in exposures less than the threshold level even for an individual exposed at the upper end of the exposure distribution. The upper end of the exposure distribution is calculated using the “high end exposure estimate,” defined as a plausible estimate of individual exposure for those persons at the upper end of the exposure distribution, conceptually above the 90th percentile, but not higher than the individual in the population who has the highest exposure. We believe that assuring protection to persons at the upper end of the exposure distribution is consistent with the “ample margin of safety” requirement in section 112(d)(4). In the proposed rule, we published the results of the risk analysis on which we based this decision. More information on the risk analysis may be found in the published proposed rule (67 FR 78054–78057) and in the docket. We received only one comment on our risk analysis.

69 Fed. Reg. 398.<sup>5</sup>

EPA explicitly stated that it was making this determination under the authority of section 112(d)(4)—it is not a matter of EPA simply deciding that it did not need to regulate HCl because of low risk. Because EPA explicitly found in 2004 that HCl was a threshold pollutant, and that the criteria of section 112(d)(4) were satisfied—and no one challenged the rule—any legal challenge to that determination is now time-barred.

EPA also addressed mercury in the 2004 rule preamble, choosing not to issue a mercury standard because: “The only control technique would reflect control of the raw materials and/or fossil fuels. This control is not duplicable or replicable. We also determined that an emissions

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<sup>4</sup> To the extent that the *LEAN* court could be deemed to have ruled against the time bar argument, NLA respectfully submits that the case was wrongly decided, for the reasons stated in these comments. The decision was not appealed by any party. NLA was not a party, but rather an *amicus* in that case, and thus was not able to appeal the decision.

<sup>5</sup> *See* docket items EPA-HQ-OAR-2002-0052-0767 and EPA-HQ-OAR-2002-0052-0768 for more information on the extensive risk assessment performed for HCl in the original lime MACT rule. NLA incorporates those documents into these comments by reference.

limit for mercury based on a beyond-the-MACT-floor option is not justified after consideration of the cost, energy, and non-environmental impacts.” 69 Fed. Reg. 398. EPA received no adverse comments on this approach and the final rule was not challenged.

For organics and dioxins/furans, EPA’s technical contractor explained the decision not to issue standards in a memorandum in the docket. EPA’s contractor stated that there was essentially no data suggesting organics were emitted. The contractor stated that after a review of emissions test data, “[o]nly one test reported any emissions of organic HAPs from lime manufacturing...” Docket No. A-95-41, Item No. II-B-121 at 1. For dioxins and furans, the contractor stated: “Emissions of dioxin and furan congeners are well-documented, but are shown to be emitted in extremely small quantities; therefore, dioxin and furan data were not collected in this search.” *Id.*

Thus, EPA addressed all these HAPs in the 2004 MACT rulemaking, and its determinations were unchallenged until this effort to bootstrap such challenges into the RTR rulemaking. EPA should rely on its prior reasonable decisions, should withdraw the Proposed Rule and should reject any effort to bring challenges as legally time-barred.

**B. EPA Should Not Revise the MACT Standard for Lime Manufacturing Because it is Not “Necessary” to Do So, Given EPA’s RTR Findings of No Residual Risks or Available New Technologies**

The *LEAN* court held that “...because the Act necessitates section 112 compliant emission standards for each source category, and section 112(d)(6) requires EPA at least every eight years to review and revise emissions standards ‘as necessary,’ EPA’s section 112(d)(6) review of a source category’s emission standard must address all listed air toxics the source category emits.” *LEAN*, 955 F.3d at 1091. Under that decision, EPA must “address” whether any further regulation of listed air toxics is “necessary,” in its discretion. For lime manufacturing, EPA already “addressed” this in 2004, and found, in promulgating the lime RTR standard, that there were no residual risks and no technological advances of note, and therefore no reason to revise the MACT standard for the source category. 85 Fed. Reg. at 44965-66. EPA’s own scientific assessment confirmed this determination in 2020 when it found lime emissions are acceptable with an ample margin of safety. Hence, EPA in its discretion may, and in NLA’s opinion, must reasonably conclude that it is not “necessary” to revise the MACT standard any further, consistent with *LEAN*.<sup>6</sup>

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<sup>6</sup> Notwithstanding *LEAN*, the plain language of section 112(d)(6) requires only technology review. Therefore, section 112(d)(6) cannot be used to address unregulated HAPs from a MACT standard – other provisions of the statute (sections 112(d)(2) and (3)) fulfill that purpose. Section 112(d)(6) is meant to be a review only of any technological advances in the eight years after promulgation of a MACT standard, and nothing more. Courts have agreed with this reading of the Clean Air Act and have found that the focus of the section 112(d)(6) periodic review is on new developments in pollution control or prevention technologies since the prior promulgation. *See, e.g., Nat’l Ass’n for Surface Finishing v. EPA*, 795 F.3d 1, 5 (D.C. Cir. 2015) (holding that section 112(d)(6) provides for a “recurring technology review” to determine “whether standards should be tightened in view of developments in technologies and practices since the standard’s promulgation or last revision, and, in particular, the cost and feasibility of developments and corresponding emissions savings”); *Blue Ridge Envtl. Def. League v. Pruitt*, 261 F. Supp.3d 53, 56 (D.D.C. 2017) (“Specifically, the Amendments required the EPA to promulgate emission standards



**1. EPA Should Consider Factors Including Cost and Acceptable Risk to Determine that the Proposed Rule Is Not “Necessary.”**

NLA believes that, consistent with Clean Air Act Section 112(d)(2), 42 U.S.C. Section 7412(d)(2), EPA has substantial discretion to consider all relevant factors to determine whether standards for unregulated HAPs are “necessary” in an RTR rulemaking, including but not limited to: what proportion of the affected sources are actually known to emit the HAP; how close to a detection limit the concentrations are; whether the concentrations are likely to be reduced significantly by imposing an additional technology-based limitation; whether the technology that is in effect for HAPs already regulated will also control the “missing HAP”; and how cost effective additional controls would be (since section 112(d)(6) allows costs to be taken into account).

The costs of this rule are significant. EPA’s own cost analysis states that this rule will impose costs on 34 major sources of between \$2.01 billion and \$2.43 billion. This includes capital costs of \$1.04 billion in year one, plus an additional annual cost of \$174 million thereafter. These impacts are monumental for an industry that the U.S. Geological Service estimates receives \$2.3 billion in annual revenues.

EPA says that this rule “is expected to increase the price of lime and reduce lime production and consumption from baseline levels.” EPA states that under the rule, the price of lime will increase by 5.9%, domestic production is estimated to decline by 1.5%, imports are estimated to increase by 12.3%, and exports are expected to decline by 6.7%. NLA believes that these impacts are understated, because lime plants will also need to allocate a significant portion of their own lime production for use in dry sorbent injection systems to control HCl emissions. Rather than causing a 1.5% reduction in lime produced, if the lime allocated for HCl control is counted in that figure, reductions in lime production could be several times that amount nationwide. There is evidence in the record that lime plants may need to use as much as 8% of their own hydrated lime product to meet the HCl standard. *See Greer Lime Company Comments*, Feb. 21, 2023, at p. 5. EPA-HQ-OAR-2017-0015-0167.

EPA attempts to justify these costs by asserting that:

This industry is regulated by EPA because pollutants emitted from lime manufacturing facilities are considered to cause or contribute significantly to air pollution that may reasonably be anticipated to endanger public health... The proposed requirements are being considered to address unacceptable health risks linked to emissions from lime manufacturing facilities and to provide an ample margin of safety to protect public health.

*See Regulatory Impact Analysis for the Supplemental Proposed Amendments to the National Emission Standards for Hazardous Air Pollutants: Lime Manufacturing Plants* (Dec. 14, 2023) at p. 45. EPA-HQ-OAR-2017-0015-0208.

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for each source category, and to revise these standards every eight years in light of improvements in pollution control technology. *See* 42 U.S.C. § 7412(d)(6).”). The approach to HAP regulation that Congress established does not provide for a constant ratcheting-down of MACT standards via section 112(d)(6). *See Surface Finishing*, 795 F.3d at 8-9; *Ass’n of Battery Recyclers v. EPA*, 716 F.3d 667, 673-74 (D.C. Cir. 2013).

These statements are demonstrably false, and directly contradict EPA's own repeated findings that emissions from the lime industry are already acceptable with an ample margin of safety. Lime industry emissions are not endangering public health, nor are those emissions levels causing unacceptable health risks to the public. EPA must acknowledge this error and correct it in the final rule.

The costs of the rule cited by EPA are understated because they analyze the pollutants one at a time and do not consider them as a group. For some pollutants, high temperatures are required to reduce emissions. For other pollutants, controls will not be effective above a certain temperature range. Lime plants that need to control multiple pollutants will need to spend significant resources on both heating and cooling at the same operation. These costs are not adequately reflected in EPA's analysis.

The benefits of the rule are minimal, and in fact are so negligible that EPA does not even attempt to quantify them: "The EPA did not monetize the benefits from the estimated emission reductions of HAP associated with this final action. The EPA currently does not have sufficient methods to monetize benefits associated with HAP, HAP reductions and risk reductions for this rulemaking." 89 Fed. Reg. 9,099 (Feb. 9, 2024).

In addition, 97.7% of HAP emission reductions claimed by EPA come from HCl controls amounting to reductions of 884 tons per year (out of 905 tons per year total for all four HAPs). But EPA has already determined that even with no HCl controls: "The results of the exposure assessment showed that exposure levels to baseline HCl emissions from lime production facilities are well below the health threshold value \*\*\* Furthermore, no significant or widespread adverse environmental effects from HCl is anticipated." 67 Fed. Reg. 78,057 (December 10, 2002). That is why EPA found, twice, that risks from lime manufacturing emissions are "acceptable with an ample margin of safety," and thus additional controls would not yield significant benefits.

Reductions of other HAPs are even less significant. EPA's own analysis demonstrates that the Proposed Rule, if implemented, would decrease organic HAPs by only 20 tons/year in total. Mercury would be reduced by only a fraction of a ton (0.32 tons/year). Dioxins and furans reductions are almost too small to measure at 0.000000047 tons/year. The HAP reductions are so small that EPA said that: "there is no value reported in this table for monetized benefits and the net benefits of this rule are unclear." Although EPA claims that "the proposed changes will have beneficial effects on air quality and public health for populations exposed to emissions from lime manufacturing facilities," this claim of public health benefits is contradicted by EPA's own risk assessment which found that risks are acceptable with an ample margin of safety.

## **2. Because The Rule Will Cause More Environmental Harm than Benefit, It Is Not "Necessary," And Lacks a Rational Basis**

The Proposed Rule will, on a net basis, do more environmental harm than good. While the rule may result in some minimal reduction in HAPs that EPA has already determined are well within acceptable levels, the rule will cause a significant and unnecessary: (1) increase in

greenhouse gas emissions and other air emissions; (2) waste of lime products that could be used to address other environmental problems; (3) addition of waste streams for landfills; and (4) waste of water and energy resources to run unnecessary pollution control devices.

To meet the requirements of reducing organics emissions by as few as 20 tons per year, EPA predicts that several lime plants will need to install expensive and unnecessary regenerative thermal oxidizers (RTOs) to control such emissions. RTOs run on natural gas, which is a fossil fuel, the combustion of which generates greenhouse gases. The direct result of this new regulation will be that tens of thousands of tons of CO<sub>2</sub> will be unnecessarily released into the atmosphere, contributing to climate change. This is the equivalent of adding thousands of passenger vehicles on America's roads, but without any passengers. In addition, any natural gas unnecessarily consumed in this process would be another wasted resource that could have been used for another beneficial purpose such as heating homes, producing cleaner electricity, or storage for future use. In addition to carbon dioxide, combustion of fuel in RTOs will result in the emission of other pollutants such as NO<sub>x</sub> and carbon monoxide.

Lime is a valuable resource that can be used for many environmentally beneficial purposes. But EPA's rule would force lime companies to use significant amounts of their own product to reduce HCl emissions that EPA has twice found to pose acceptable risk with an ample margin of safety. Dry sorbent injection requires lime to reduce HCl emissions. Instead of using that lime for unneeded HCl emissions reductions, that same lime could be used to make other much more significant environmental improvements. For example, two tons of lime used for flue gas desulfurization could reduce SO<sub>2</sub> emissions by one ton. SO<sub>2</sub> is a criteria air pollutant, and EPA describes its effects as follows:

Short-term exposures to SO<sub>2</sub> can harm the human respiratory system and make breathing difficult. People with asthma, particularly children, are sensitive to these effects of SO<sub>2</sub>.

SO<sub>2</sub> emissions that lead to high concentrations of SO<sub>2</sub> in the air generally also lead to the formation of other sulfur oxides (SO<sub>x</sub>). SO<sub>x</sub> can react with other compounds in the atmosphere to form small particles. These particles contribute to particulate matter (PM) pollution. Small particles may penetrate deeply into the lungs and in sufficient quantity can contribute to health problems.

#### [Sulfur Dioxide Basics | Sulfur Dioxide \(SO<sub>2</sub>\) Pollution | US EPA](#)

Lime is also used by municipal and other water treatment plants across the United States to treat drinking water for the public. In this context, one ton of lime can soften over 450,000 gallons of drinking water. Likewise, lime is instrumental in treating acid mine drainage from historic mining operations. Lime neutralizes toxic acid mine drainage by raising its pH levels. Used in this context, one ton of lime can treat over 5 million gallons of water that will ultimately be discharged into streams and other water bodies.

Imposing unnecessary regulations that waste valuable lime resources in this way will have unintended and detrimental environmental and economic consequences. These include making lime less available in the supply chain for environmentally beneficial uses, increasing the

cost of lime for all users, and causing more lime to be produced than is currently necessary. Increasing lime production will result in an inefficient use of finite natural resources, including wasting limestone quarries and the fuel used to produce the lime, as well as even more increased and unnecessary air emissions.

EPA's rule requiring reductions of HAPs by using activated carbon injection (ACI) will potentially create a significant new waste stream that will need to be landfilled in the environment. A lime plant that must install ACI may produce tons of additional waste annually. EPA policy should be to minimize waste streams into the environment--not to increase them, particularly where EPA has already determined that existing air emissions from lime plants are currently acceptable with an ample margin of safety, even without new standards.

Finally, EPA's own analysis acknowledges that the imposition of new emissions standards will result in secondary impacts from projected controls required for compliance with the proposed standards. EPA expects lime plants to use 1.12 million additional gallons of water per year to address HCl controls with wet packed tower gas absorbers (WPTGAs). EPA predicts that solid waste from WPTGAs, Dry Sorbent Injection, and Activated Carbon Injection will increase solid waste by 13,400 tons per year. And finally, EPA states that all types of pollution controls installed under this rule (including WPTGAs, Dry Sorbent Injection; Regenerative Thermal Oxidizers; Activated Carbon Injection; and Heat Exchangers) will collectively use an additional 696 *billion* Btu's of energy annually. According to the U.S. Department of Energy's Energy Information Agency, the average ton of coal in the U.S. contains about 20.1 million Btus of energy. This means it would take over 34,000 tons of coal annually to produce that many Btus of energy. See [EIA Frequently Asked Questions](#).

The rule will reduce HAP emissions slightly, but in quantities so small that EPA was unable to quantify the benefits of such reductions. In addition, EPA's own best available science shows that HAPs do not need to be further reduced to protect public health and the environment. But the rule will also lead inevitably to significantly increased greenhouse gas emissions, wasting of valuable lime products that could be better used to solve other environmental challenges, wasting of water and energy resources, and a significant and unnecessary increase in solid waste streams. For all these reasons, EPA's Proposed Rule is unnecessary and lacks a rational basis because it will cause more environmental harm than good, and any interpretation of the statute that suggests that EPA is required to promulgate a regulation that causes more environmental harm than benefit also lacks a rational basis. Promulgating the rule as proposed, without adequately considering costs and environmental impacts, would be arbitrary and capricious.

### **3. The Proposed Rule Is Not "Necessary" Because Its Benefits Are *De Minimis***

*LEAN* did not overrule the seminal D.C. Circuit decision of *Alabama Power v. Costle*, 636 F.2d 323, 360 (D.C. Cir. 1979), which held, in the context of the Clean Air Act's PSD regulations, that every rule inherently contains a *de minimis* criterion. So, if regulation of additional HAPs in this potential revised lime RTR proceeding would only have *de minimis* environmental benefits given the lack of residual risk or technology improvements, it is not

necessary for EPA to impose additional controls to “address” such HAPs. Although EPA has taken the position that section 112(d)(6) does not allow for a *de minimis* exception<sup>7</sup>, the U.S. Supreme Court has held that the *de minimis* doctrine is a legal principle that forms part of the established background against which **all statutes** are enacted. *Wisc. Dep’t of Rev. v. William Wrigley, Jr., Co.*, 505 U.S. 214, 231 (1992), and this has been subsequently reiterated by the D.C. Circuit. *New York v. EPA*, 443 F.3d 880, 888 (D.C. Cir. 2006) (“*de minimis* requirements serve to alleviate severe administrative and economic burdens by lifting requirements on ‘minuscule’ emission increases”) (internal quotations omitted). In this case the benefits of the rule as proposed are truly *de minimis*, as compared to the negative environmental impacts and the economic costs, and the standards set are extremely low (in several cases based on levels of non-detection). EPA should decline to impose these requirements.

#### **4. The Proposed Rule Is Not “Necessary” Because the HAPs in the Rule Were Addressed in the 2004 Rulemaking**

Another reason that it is not “necessary” for EPA to set standards for additional HAPs through the rulemaking here is because, as noted above, all the relevant HAPs were addressed in the 2004 MACT rulemaking, and EPA expressed clear reasons for its decision not to set standards for them, reasons that went unchallenged. In this case, it is not necessary to “fix” any problem with the original MACT rule, because there is no such problem. This is further confirmed by the conclusion of EPA’s risk assessment, which addressed all these HAPs and found no need to impose additional standards on any of them.

Congress amended the Clean Air Act in 1990 by adding sections 112(d)(2) and (d)(3) which require EPA to establish MACT floor standards for existing sources based on the average of the best performing 12% of each industry sector. Congress took this step because it believed that EPA was too slow in assessing risks and adopting air emission standards. But unlike the situation where risks from industry emissions are unknown, in this case there are two risk assessments and EPA findings that emissions from the lime industry are acceptable with an ample margin of safety. Under such circumstances, it is not only “unnecessary” for EPA to issue MACT floor standards, but irrational and contrary to the intent of the Act. Issuing standards that EPA knows to be unnecessary to protect the public health and the environment is arbitrary and capricious and cannot be consistent with what Congress intended in the Clean Air Act.

Congress clearly expressed its view in Clean Air Act § 112(f)(2) that additional regulation in the absence of risk is unnecessary. That section addresses the situation where risks are known (as in this rulemaking) following an appropriate scientific risk assessment by EPA. It instructs EPA to promulgate additional standards only if required to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect:

\*\*\* the Administrator shall, within 8 years after promulgation of standards for each category or subcategory of sources pursuant to subsection (d), promulgate standards for such category or subcategory if promulgation of such standards is required in order to provide an ample margin of safety to protect public health in accordance with this section

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<sup>7</sup> See e.g., EPA Response to Comments for Portland Cement Industry NESHAP, 64 Fed. Reg. 31898, 31911 (June 14, 1999).

\*\*\* or to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect.

42 U.S.C. § 7412(f)(2).

Yet EPA found as recently as 2020 that risks from emissions of the lime manufacturing industry are acceptable with an ample margin of safety:

In this action, we are finalizing our proposed determination that risks from the source category are acceptable, the standards provide an ample margin of safety to protect public health, and more stringent standards are not necessary to prevent an adverse environmental effect.

85 Fed. Reg. 44,963 (July 24, 2020).

Accordingly, since EPA’s own scientific findings demonstrate that promulgating new standards is not “required” to provide an ample margin of safety to protect public health, there is no statutory requirement for EPA to revise the lime manufacturing sector’s MACT standards by adding these four additional HAPs. This view is also shared by many Members of Congress, including several on the House Energy and Commerce Committee, who stated that:

Since EPA has already found that such standards are not required to provide an ample margin of safety, new regulations are not “necessary.” EPA should withdraw the proposed rule and reiterate that new regulations are not necessary in this instance to comply with the *LEAN v. EPA* decision and §112 of the Clean Air Act.

Congressional Letter to EPA Administrator Regan, Dec. 8, 2023, at pp. 2-3.

Finally, the *LEAN* decision must be read in the context of the Supreme Court’s recent opinion in *West Virginia v. EPA*, which was decided post-*LEAN*. In that case, the Supreme Court held that for “major questions” – like the scope of EPA’s authority to issue greenhouse gas regulations for existing power plants under section 111(d) of the Clean Air Act – EPA must demonstrate that Congress gave it specific authority for its regulatory action. *West Virginia v. EPA*, 142 S. Ct. 2587 (2022). Surely, the question of whether EPA can reach back decades in an RTR proceeding (under sections 112(f) and 112(d)(6)) and find that a provision of the Clean Air Act that was designed to require review for technological advances somehow compels EPA to reopen a MACT standard (issued under sections 112(d)(2) and (3)) is a major one. Congress did not give EPA that authority. Accordingly, EPA’s Proposed Rule is unlawful.

## **II. EPA COULD NOT LEGALLY ESTABLISH MACT FLOORS FOR ANY OF THE POLLUTANTS ADDRESSED IN THIS RULEMAKING**

EPA states that: “These MACT standards are based on emissions levels that are already being achieved by the best-controlled and lowest-emitting sources in an industry.” *Regulatory Impact Analysis for the Supplemental Proposed Amendments to the National Emissions*

*Standards for Hazardous Air Pollutants: Lime Manufacturing Plants* (Dec. 14, 2023) at p. 46. EPA-HQ-OAR-2017-0015-0208.

To the contrary, *none* of the sources in the lime industry are controlled for these HAPs, and therefore none of them can fairly be considered the “best controlled.” The sources cited by EPA are the “lowest emitting sources.” But the Clean Air Act does not say “lowest emitting;” instead it says “best performing.” See 42 U.S.C. § 7412(d)(3)(A). As noted above, NLA does not believe that it is “necessary” for EPA to set any new emissions standards for the lime industry in this rulemaking. However, if EPA decides to set standards for additional HAPs, NLA believes that EPA may not establish MACT floors for HAPs when there are no current controls in place at any source. Rather, EPA must consider costs and other factors in setting standards.

No lime plants currently use any add-on control technology to control emissions of any of the four HAPs involved in this rulemaking. Differences in emissions are not the result of controls, but rather result from differences in feedstocks (stone and fuel), and operation of lime plant equipment. NLA believes that it is anomalous, and contrary to what was intended when the Clean Air Act air toxics provisions were written, to suggest that a source with lower concentrations of a HAP in stone in its quarry (for example) is somehow the “best performer” in terms of controlling emissions of that HAP. Thus, NLA believes that it is improper to set a MACT floor based on such emissions data. NLA is aware that EPA takes a contrary view, but the facts of this case—in which stringent standards are being imposed even with a finding of acceptable risk with an ample margin of safety for HAPs that are not being controlled by any source—justify a reconsideration of EPA’s position.

Instead of setting MACT floors, EPA should have approached all four HAPs using the standard stated in 42 U.S.C. Section 7412(d)(2), which provides:

Emissions standards promulgated under this subsection and applicable to new or existing sources of hazardous air pollutants shall require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources in the category or subcategory to which such emission standard applies...

NLA does not believe that this point is inconsistent with *National Lime Ass’n v. E.P.A.*, 233 F.3d 625 (D.C. Cir. 2000), or *Sierra Club v. E.P.A.*, 479 F.3d 875 (D.C. Cir. 2007). In those cases, EPA set a “floor” of no control where no technology controls were in place. The court held that the statute requires an emissions standard for each HAP, even where no technology controls are in place. However, in neither case did the court rule that EPA must set a MACT floor to set the standard, nor did it give guidance to EPA on how to do so. In *Sierra Club v. EPA*, No. 15-1487 (D.C. Cir. July 6, 2018), industry petitioners argued that EPA’s rule would require raw material substitution. The Court noted again that the statute requires standards for all HAPs, even if emissions differences are due to differences in feedstocks, but goes on to state that it was

not necessary to rule on those grounds, because EPA's standard did not require raw material substitution in the first place.

NLA believes that EPA should consider the “cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements” in setting standards when there are no technology controls in place. Indeed, the concept of the MACT floor is that a percentage of the source category can achieve a certain level of control, typically with the use of already-installed air pollution control technology. This is why the statute refers to such sources as “best performers.” The idea was that it was fair to require additional sources to apply the same controls as the “best performers” because the “best performers” were presumably able to bear the costs of those controls. Differences in the makeup of onsite quarries is not “performance,” it is pure chance.

As explained above, the costs of the Proposed Rule are extremely high, and the environmental benefits are extremely low, and even negative when energy use, additional carbon dioxide emissions, and generation of additional wastes are considered. EPA should withdraw the Proposed Rule and abandon its MACT floor approach to the lime industry, and instead should set standards that are protective of human health and the environment, without imposing unnecessary costs on the lime industry, including its small businesses.

### **III. EPA'S PROPOSED RULE VIOLATES CLEAN AIR ACT SECTION 307**

#### **A. EPA Violated the Clean Air Act by Not Publishing the Proposed Rule Language in the *Federal Register***

EPA proposed this rule—as it also did with the January 2023 Proposed Rule—without publishing any proposed rule language in the *Federal Register*. Rather than setting forth proposed language, EPA instead included a redline version of the current regulations in the docket, to indicate what the proposed revisions would be. This docket entry is not a lawful substitute for publishing actual rule language – it is a rule that the lime industry must comply with, not the preamble, and not a document tucked away in the record for the rulemaking. Failing to publish such language means that commenters do not have a meaningful opportunity to submit comments on the Proposed Rule. Failure to publish the rule language in the *Federal Register* also violates section 307(d)(3) of the Clean Air Act which requires:

...any rule to which this subsection applies, notice of proposed rulemaking shall be published in the Federal Register...

42 U.S.C. § 7607(d)(3).

When proposing a rule, EPA must properly publish proposed rule language in the *Federal Register*. The comment period for a Proposed Rule cannot begin until the actual proposed rule language is published in the *Federal Register*.



**B. EPA Violated the Statement of Basis and Purpose Requirement by Failing to Include a Summary of the Major Legal Interpretations and Policy Considerations Underlying the Proposed Rule**

The 2024 Proposed Rule reverses important determinations made in the original lime MACT standard issued in 2004 without mention, comment, or explanation by EPA. Although it solicits comment on the concept of adopting a health-based emission limit (HBEL) for HCl, it still proposes to implement a MACT floor standard for HCl without providing details and an explanation of why EPA is reversing its 2004 determinations that HCl is a threshold pollutant and that a health-based standard is appropriate, and that no HCl standard is needed at all. This is a reversal of EPA's longstanding twenty-year finding established in the 2004 MACT standard and was not addressed in either the 2023 or the 2024 Proposed Rules.<sup>8</sup>

In the preamble of the 2023 Proposed Rule, EPA states that: "In response to the 2017 questionnaire, we received HCL emissions data that EPA did not have when we developed the 2004 NESHAP. Therefore, we are proposing a standard pursuant to CAA section 112(d)(2) and (d)(3), as described further in section IV.A.1 of this preamble." 88 Fed. Reg. 809. While these two sentences are each factually true, taken together without explanation, they are misleading. That is because they imply cause and effect—*i.e.*, that the reason EPA is now promulgating MACT floor standards for HCl is because it obtained new emissions information that justified such regulation that was not available in 2004. This is simply not the case. EPA had ample HCl information for its initial MACT rulemaking when it determined that:

The results of the exposure assessment showed that exposure levels to baseline HCl emissions from lime production facilities are well below the health threshold value. Additionally, the threshold values, for which the RfC and AEGL values were determined to be appropriate values, were not exceeded when considering conservative estimates of exposure resulting from lime kiln emissions as well as considering background exposures to HCl and therefore, represent an ample margin of safety. Furthermore, no significant or widespread adverse environmental effects from HCl is anticipated. Therefore, under authority of section 112(d)(4), we have determined that further control of HCl emissions from lime manufacturing plants is not necessary.

67 Fed. Reg. 78,057 (December 10, 2002).

EPA has not identified any new data from the 2017 ICR that is so fundamentally different to justify regulation of HCl from lime manufacturing plants. To the contrary, EPA affirmed the acceptability of risks from all HAPs, including HCl, as recently as 2020 and found, in fact, that risks are much lower than it originally believed. 85 Fed. Reg. 44,960 (July 24, 2020) ("We are finalizing our proposed determination that the risks are acceptable and that the current NESHAP [which excludes HCl controls] provides an ample margin of safety.") (parenthetical added). All the data from the 2017 questionnaire on HCl was available to EPA when it performed the risk assessment that it used as the basis for its 2020 determination that risks are acceptable and that the existing regulations provide an ample margin of safety.

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<sup>8</sup> See 69 Fed. Reg. at 398 (EPA states that "under the authority of section 112(d)(4) of the CAA, we have determined that no further control is necessary because HCl is a "health threshold pollutant").

EPA must provide an explanation of its position, including the reversals and errors, on the four HAPs (HCl, mercury, organics and D/F) at issue. *See Motor Vehicle Mfrs. Assn. v. State Farm*, 463 U.S. 29, 49 (1983) (“We have frequently reiterated that an agency must cogently explain why it has exercised its discretion in a given manner”) (“...an agency changing its course by rescinding a rule is obligated to supply a reasoned analysis for the change beyond that which may be required when an agency does not act in the first instance.”) *Id.* at 42. The failure of EPA to explain its reasoning for abandoning its previous legal and policy interpretations related to these four HAPs is a clear violation of the Clean Air Act, which states that a rulemaking “shall be accompanied by a statement of basis and purpose...[which] shall include...the major legal interpretations and policy considerations underlying the proposed rule.” CAA § 307(d)(3), 42 U.S.C. § 7607(d)(3).

#### **IV. EPA SHOULD AUTHORIZE PLANT-WIDE EMISSIONS AVERAGING FOR ALL HAPS COVERED BY THE RULE, INCLUDING ORGANIC HAPS AND DIOXINS/FURANS**

In its comments on the January 2023 Proposed Rule, NLA requested that emissions averaging be incorporated into a final rule for the newly regulated HAPs, to allow lime plants to more cost-effectively optimize controls to prevent excessive emissions across the entire facility. NLA noted that in the 2004 Lime MACT, EPA permitted plant-wide averaging of PM emissions (with some limitations), explaining:

We believe that allowing averaging is appropriate here because of the identity of the units (kilns and coolers in all cases), and the emissions (same HAP in same type of emissions, since all emissions result from kilns and coolers). Averaged emissions under these circumstances would, thus, still reflect MACT for the affected source. The averaging provisions are included in the final NESHAP as a result of the recommendations of the Small Business Advocacy Panel convened as required by section 609(b) of the Regulatory Flexibility Act (RFA) and improves the compliance flexibility options for small businesses, which is the intent of the RFA.

69 Fed. Reg. 401 (Jan. 5, 2004).

In the 2024 Proposed Rule, EPA has proposed to allow emissions averaging for HCl and mercury emissions, with some restrictions. NLA commends EPA for including this approach but believes that the same logic supporting emissions averaging for HCl and Hg supports emissions averaging for all covered HAPs.

For HCl and mercury, with limitations based on pounds of HAP per ton or million (MM) ton of lime produced, and for lime kilns seeking to comply with the same numerical standard, NLA agrees that EPA should authorize the weighted average methodology currently available for PM in the current Lime MACT (40 C.F.R. § 63.7111) to show compliance. As explained

further below, NLA believes EPA should also authorize emissions averaging for organic HAPs and for dioxins and furans.<sup>9</sup>

#### **A. EPA Should Not Impose a Penalty on Emissions Averaging**

EPA should delete the provision that penalizes emissions averaging by imposing a more stringent standard on averaged emissions. This provision is arbitrary and unsupported by the facts. As noted repeatedly, EPA has found that risks are already acceptable with an ample margin of safety for all HAPs with no additional standards at all. Accordingly, there are no benefits to public health or the environment commensurate with any additional costs or controls that would be incurred to meet the emissions averaging “penalty.” EPA should delete this requirement and call for averaged emissions to meet the same standard (on average) as un-averaged emissions. As EPA said with respect to PM as noted above, “Averaged emissions under these circumstances would, thus, still reflect MACT for the affected source.” Averaging should be encouraged, not discouraged, because it allows sources to use the most efficient methods available to meet the standards.

Simple mathematics proves that incorporation of the proposed 10% penalty for those sources utilizing emissions averaging will be more restrictive than existing sources meeting the already proposed restrictive MACT floors for HCl and Hg at the unit level. Use of the emissions averaging alternative not only requires at least one kiln to operate below these new aggressive MACT floors, it then requires the unit to operate at an even more restrictive level for the averaging to be useful. In other words, the incorporation of a penalty for emissions averaging runs contrary to providing EPA’s express purpose of providing additional compliance flexibility.<sup>10</sup>

EPA presumes that this option will provide reductions at lower cost on a unit-by-unit basis. Even if there will be some cost savings, this does not justify the imposition of a penalty for averaging. Operators may choose to average emissions for reasons that are not purely economic. For example, there can be operational or site constraint reasons that will prompt an operator to choose averaging that are independent of cost.

As mentioned in these comments and in prior submittals, there are still fundamental technical issues to be overcome for candidate controls to meet EPA’s proposed aggressive standards before any arbitrary penalty is applied. As a result, EPA’s proposal for an averaging penalty is essentially adding unsupported beyond-the-floor requirements. As has been pointed out repeatedly, the proposed limits already provide an ample margin of safety, and no cost-effective beyond-the-floor controls are available. Thus, there is no environmental impact being mitigated through an arbitrary penalty for those utilizing the emissions averaging option to demonstrate compliance.

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<sup>9</sup> Accompanying these comments as Appendix A is a “blue-line” of the regulatory language that EPA included as a redline in the rulemaking docket. In this Appendix, NLA indicates suggested changes to the regulatory language reflecting these comments. EPA’s changes remain in red, while the suggested NLA changes are in blue.

<sup>10</sup> See 89 Fed. Reg. 28 9097. “*We are proposing the emissions averaging compliance alternative for existing sources because we expect that it will result in a greater level of emissions reduction than the unit-by-unit MACT floor limits at a lower cost per pound of pollutant removed, while also providing compliance flexibility.*”

Therefore, EPA should not incorporate any penalty on the emissions limits for those choosing emissions averaging under this rulemaking. Furthermore, the Lime MACT already includes emissions averaging for PM which has worked well for over 20 years, and no such penalty was applied.

## **B. EPA Should Allow Emissions Averaging for Organics and Dioxins and Furans**

EPA should allow for emissions averaging for organics and for dioxins and furans. The standards for these two categories of HAPs are extremely low (in the parts-per-million or parts-per-billion), and whether such pollutants are detected in a stack test are often dependent on random chance--whether such molecules happen to strike the probe during that test. Members have reported to NLA that similar kilns of the same size and type, using the same limestone feedstock and the same fuel, often have significantly different oHAP or D/F test results even for identical kilns. Allowing averaging of these two categories of pollutants would help to alleviate this issue and provide compliance flexibility to sources, and because EPA has found that lime industry emissions are acceptable with an ample margin of safety even in the absence of controls, no harm to human health and the environment would result from allowing such averaging.

While the limits for organics and D/F are concentration-based (as opposed to being based on production rates as with HCl and mercury), there is no technical or legal obstacle to the development of appropriate emissions averaging for these HAPs as well (and they should be developed without a penalty, as explained above).

A simple and appropriate approach for these HAPs would include the following requirements and methodology, and should be added to §63.7112 (see NLA “blueprint,” Appendix A):

- Step 1: Complete performance tests and collect oHAP and D/F data in the units of the emissions limitations, respectively. The measurement units are parts per million, dry basis and by volume (ppmdv) for oHAP and nanograms per dry standard cubic meter (ng/dscm) for D/F, both corrected to 7% O<sub>2</sub> in the exhaust gas stream.
- Step 2: Based on the average flowrate for each kiln and lime cooler from the performance test, compute a flowrate weighted emissions average for comparison to the applicable limitation.

The following is an illustration of how this would work in practice on a two- kiln emissions average:

- Kiln 1
  - $C_{K1}$  = Measured concentration for D/F = 0.05 mg/dscm in this example
  - $F_{K1}$  = Measured airflow = 25,000 dscm in this example
- Kiln 2
  - $C_{K2}$  = Measured concentration for D/F = 0.02 mg/dscm in this example
  - $F_{K2}$  = Measured airflow = 50,000 dscm in this example

- Emissions Averaging Calculation:
  - $E_{avg} = (C_{K1} \times F_{K1}) / (F_{K1} + F_{K2}) + (C_{K2} \times F_{K2}) / (F_{K1} + F_{K2})$
  - $E_{avg} = (0.05 \times 25,000) / (25,000 + 50,000) + (0.02 \times 50,000) / (25,000 + 50,000)$
  - $E_{avg} = 0.03$  ng/dscm which is less than the proposed limit of 0.037 ng/dscm

In terms of necessary recordkeeping and reporting for the emissions average, like HCl and Hg, an annual average recordkeeping should be incorporated when this compliance alternative is utilized. In place of tons of lime produced, the rule should provide that lime operators can either: 1) record total kiln gas flowrate from each unit in the average during each calendar month; or 2) develop a dscm/ton of stone feed from the performance test used in the emissions average and lime produced each month to demonstrate compliance with the emissions averages for these two pollutants.<sup>11</sup> Suggested rule language is below:

The emissions average for total organic HAP or D/F shall be computed as follows:

- (a) The concentration of total organic HAP or dioxins/furans shall be correct to 7 percent oxygen using equation 5 of this section for lime kilns included in the emissions average.
- (b) From the respective performance tests, obtain the flowrate in units of dscm for each kiln in the average.
- (c) Using the following equation, Equation [X], compute the emissions average concentration for comparison to the emissions limitation:

$$E_{avg} = \sum_{n=1}^{\infty} (C_{ki} * K_{ki}) / (F_{kt})$$

- $E_{avg}$  = Emission average in units of D/F in ng/dscm, 7% O<sub>2</sub> or total oHAPs ppm<sub>dv</sub>, 7% O<sub>2</sub>
- $C_{Ki}$  = Measured concentration for D/F in ng/dscm or total oHAPs ppm<sub>dv</sub>, 7% O<sub>2</sub> for a lime kiln
- $F_{Ki}$  = Measured exhaust gas in units of dscm for a lime kiln
- $F_{Kt}$  = Total combined measured airflow in units of dscm for all lime kilns in the emissions average

### C. EPA Should Allow Emissions Averaging Between New and Existing Kilns

For particulate matter (PM), EPA allows lime plants to average emissions between new and existing kilns, as explained below in the Proposed Rule preamble:

If the lime manufacturing plant has both new and existing kilns and coolers, then the emission limit would be an average of the existing and new kiln PM emissions limits, weighted by the annual actual production rates of the individual kilns, except that no new kiln may exceed the PM emission level of 0.10 lb/tsf.

<sup>11</sup> Given that lime kiln and cooler exhaust gas flows are proportional to decarbonization of limestone (and related fuel combustion to support calcination), lime production and exhaust gas flows are proportional by nature.

89 Fed. Reg. 9090.

The Proposed Rule does not permit averaging between new and existing kilns for HCl and mercury, even for kilns of the same type. EPA should allow such averaging for all HAPs, as it did for PM, so long as the new kiln does not exceed the new kiln standard.

**D. EPA Should Not Require a Separate Emissions Averaging Plan or Pre-Approval for Emission Averaging**

EPA's new proposal includes a requirement that sources using the option for emissions averaging to prepare and submit an emissions averaging plan for approval before emissions averaging can begin.<sup>12</sup> This requirement is unnecessary and unduly burdensome. Lime producers subject to this rule are already required to prepare an OM&M Plan and various performance test protocol and notification documents as part of this regulation. With this variety of administrative documents in place, EPA should simply allow lime producers to document the emissions averaging plan requirements in their OM&M Plan, without preparing a separate plan, and without submitting it for pre-approval. Inclusion of a pre-approval process injects a level of complexity and need for official action that is excessive, given the fact that emissions from the industry are already so low that risks are acceptable with an ample margin of safety without any new standards.

**E. EPA Should Allow for Averaging Across HCl Subcategories, Including Plant-Wide Averaging**

As previously discussed, a regulatory option that allows emissions averaging provides compliance flexibility for those sources that opt to use averaging. However, this option can be further enhanced by allowing existing kilns, regardless of their subcategories, to be averaged across a single plant. This would only apply to HCl, because EPA has only proposed subcategories for HCl. It would also be unnecessary if EPA establishes a health-based emission limit (HBEL) for HCl.

If EPA continues to set subcategories for HCl, NLA suggests that the final rule include a plant-wide, all kiln, averaging alternative. This regulatory approach can be accomplished by establishing a site-wide limit as follows:

Establish a sitewide allowable HCl emissions limit by the following steps:

1. Determine the annual production capacity of lime by subcategory type for the facility.
2. Multiply the sitewide total production capacity by lime type times the respective subcategory emissions limit.
3. The resulting value will establish the sitewide allowable HCl limitation in units of tons per year.

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<sup>12</sup> §63.7114(c)(2), Docket ID: EPA-HQ-OAR-2017-0015-0200.

Compliance with the annual HCl limit would be demonstrated by:

1. Multiplying the lime production for each month by lime type times the respective HCl limit (or most recent HCl performance test value as available) to compute the tons of HCl emitted during the month.
2. Add this result to the prior 11 calendar month period to compute a 12-month total HCl actual emissions level which is then compared to the site-wide allowable HCl limit.

This form of a limitation is comparable in form to an HBEL though it is more restrictive because the sitewide HCl limit would be based on the facility's Potential to Emit (PTE) HCl using the HCl limits in the Proposed Rule.<sup>13</sup>

#### **V. EPA CORRECTLY PROPOSED TO SET MONITORING REQUIREMENTS AS FIVE-YEAR STACK TESTING AND PARAMETRIC MONITORING**

NLA strongly supports EPA's proposal to establish 5-year stack testing and parametric monitoring as the monitoring requirements for emissions standards under the Proposed Rule.<sup>14</sup> This is consistent with the existing requirements for PM for the lime industry, and, as EPA notes, the parametric monitoring will ensure continuous compliance. Imposing more rigorous and costly monitoring requirements would not be justified in this case, given the low emissions of HAPs generally, and EPA's risk assessment showing that risks are acceptable with an ample margin of safety even without additional controls.

#### **VI. NLA SUPPORTS EPA'S PROPOSED 3-YEAR COMPLIANCE PERIOD, BUT EPA SHOULD EXERCISE ITS AUTHORITY TO ALLOW AN ADDITIONAL YEAR THROUGH PERMITTING FOR THE INSTALLATION OF NEW CONTROLS**

Given the extensive requirements for study, design, permitting and construction that lime plants would be subject to under the Proposed Rule, the need for a 3-year compliance period is fully justified to adequately test, engineer, design, and retrofit lime plant systems, and then demonstrate compliance with the applicable standards. Any period less than 3 years would jeopardize the industry's ability to comply with the proposed standard.

In addition, EPA should state in the preamble to the final rule that it encourages state permitting authorities (or EPA if it is the regulatory authority) to allow lime manufacturing plants an additional year to install new controls for this rule. The statute expressly allows this option under these circumstances:

The Administrator (or a State with a program approved under subchapter V) may issue a permit that grants an extension permitting an existing source up to 1 additional year to comply with standards under subsection (d) if such additional period is necessary for the installation of controls.

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<sup>13</sup> This suggested rule language is not included in the NLA blueline, which rather reflects an HBEL for HCl.

<sup>14</sup> NLA suggests some adjustments to the parametric monitoring requirements later in these comments.

42 USC § 7412(i)(3)(B).

Providing an additional year through permitting will be necessary given that the entire lime industry will be installing new controls simultaneously and will face difficulties with ensuring that a limited number of vendors are able to install controls on dozens of lime kilns across the nation, particularly given recent supply chain shortages and issues. Also, given EPA's determination that emissions from lime kilns are already acceptable with an ample margin of safety, allowing an extra year for installation of controls will not harm public health or the environment.

## **VII. EPA SHOULD CLARIFY THE USE OF “NEW” AND “EXISTING” KILNS**

EPA should also clarify its use of “new” and “existing” kilns in the Proposed Rule. The current NESHAP rule defines a new lime kiln (and its associated cooler), as one for which construction or reconstruction began after December 20, 2002. It also defines an existing lime kiln (and its associated cooler), as one that does not meet the definition of a new kiln.

In the 2024 Proposed Rule preamble, EPA states:

The EPA is including definitions of the terms “new source” and “existing source” as related to the requirements of this supplemental proposal and to clearly indicate that a “new source” in reference to the requirements of this supplemental proposal is any applicable source constructed after January 5, 2023, and an “existing source” in reference to the requirements of this supplemental proposal is any applicable source constructed before January 5, 2023.

89 Fed. Reg. 9097. NLA has identified two problems with this. First, there is no language in the docket redline with definitions as described in the paragraph above. (This emphasizes the importance of including proposed rule language in the *Federal Register* notice itself.) Appropriate language must be added to the final rule.

Second, NLA does not agree that the relevant date for what constitutes an existing kiln or a new kiln should be January 5, 2023. The current February 9, 2024, Proposed Rule sets new standards for the first time for all four HAPs and was carried out in response to the Small Business review panel described above. If the date for determining if a kiln is “new” is to be based on the proposed rule date, the relevant date should be February 9, 2024.

Accordingly, EPA should revise the Proposed Rule language to read as follows (changes marked in red):



§63.7082 What parts of my plant does this subpart cover?

(a) This subpart applies to each existing or new lime kiln(s) and their associated cooler(s), and processed stone handling (PSH) operations system(s) located at an LMP that is a major source.

(b) A new lime kiln is a lime kiln, and (if applicable) its associated lime cooler, for which construction or reconstruction began after December 20, 2002, if you met the applicability criteria in §63.7081 at the time you began construction or reconstruction, **except that with respect to emissions standards added [ADD DATE OF FINAL RULE], a new lime kiln is a lime kiln for which construction or reconstruction began after February 9, 2024.**

NLA believes that this change will make it appropriately clear that when “new” and “existing” are used elsewhere in the rule language, they refer either to the PM standards or to the additional standards being added in this rule. (Thus, for example, a kiln could be “new” for purposes of PM, but “existing” for purposes of the additional HAPs.)

In addition, the word “initially” should be added before the phrase “start up,” and the word “initial” should be added before the word “startup,” in sections 63.7083(a)(1) and (2), 63.7083(c), 63.7083(e)(1), 63.7110(f), and 63.7130(b) and (c), to make clear that the requirements in those sections apply to initial startup, not to each time a kiln is started up. This will avoid confusion with other provisions relating to recurring periods of startup and shutdown.

## **VIII. THE RULE LANGUAGE ON COMPLIANCE PERIOD SHOULD BE CORRECTED**

While EPA’s preamble clearly states that a 3-year compliance period is intended for existing sources, language in Section 63.7083(h)(1) in the redline rule language in the docket seems to indicate that the compliance period is only 180 days. The preamble states:

For all affected sources that commence construction or reconstruction on or before January 5, 2023, we are proposing to require compliance with the proposed standards within 3 years after the effective date of the final rule (or upon startup, whichever is later). For all affected sources that commenced construction or reconstruction after January 5, 2023, we are proposing that owners or operators comply with the provisions by the effective date of the final rule (or upon startup, whichever is later).

8 Fed. Reg. 9098. NLA understands “affected sources that commence construction on or before January 5, 2023” to mean “existing sources” with respect to the new standards proposed in this rule, and that these sources are intended to have three years from the date of the final rule to come into compliance.

However, the redline proposed regulatory language in the docket is inconsistent with the preamble language and refers to 180 days rather than 3 years. There is also a discrepancy between the preamble and the redline rule language on whether the relevant “on or before date” is Jan. 5, 2023, or the date of the final rule. NLA believes that EPA should refer to February 9, 2024, rather than the 2023 date, because, as noted above, EPA has made significant substantive changes to the rule. Indeed, it is possible that a source could have begun and completed reconstruction of a kiln between January of 2023 and February of 2024, without knowing what the relevant requirements would be. (Section 112(a)(2) precludes use of the final rule date for defining new vs. existing kilns.)

New section 67.7083(h)(1) in the EPA redline document reads:

If your affected source commenced construction or reconstruction on or before [INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER], then the compliance date for the revised requirements promulgated on [INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER] is [INSERT 180 DAYS AFTER THE DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER].

This language should be revised to read:

If your affected source commenced construction or reconstruction on or before February 9, 2024, then the compliance date for the revised requirements promulgated on [INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER] is [INSERT 3 YEARS AFTER THE DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER].

Note: EPA’s proposed revisions to §7083 means that numerous references to §7083(e) in the rule language will need to be changed to §7083(g). See the NLA blueline for these changes.

## **IX. THE RULE SHOULD ONLY APPLY PM STANDARDS TO COOLERS**

As currently written, the Proposed Rule would apply standards for HAPs other than PM to kilns and “associated coolers.” For the reasons below, this should be changed, and the rule should apply only PM standards to coolers. Definitional language should also be added to make this clear.

In a lime plant, limestone is calcined in a heated kiln, and it is the emissions exiting in exhaust from the kiln that contain the HAPs addressed in this regulation—HCl, mercury, organic HAPs, and dioxins/and furans. When the lime product is made, it leaves the kiln and is transferred to a cooler, a large vessel in which the lime product is cooled by the introduction of ambient air (not gases from the kiln). Pulling in ambient air to the cooler by means of a fan may result in the presence of dust or particulate matter in the cooler exhaust. This is why EPA established PM standards applicable to coolers in the original lime rule.

This distinction is not important when the air from the cooler vents to the same stack as gases from the kiln, because those kilns will have to meet all the HAP standards at the stack. However, in some cases cooler exhaust vents separately and is sent to a separate stack from kiln gases. In those cases, it is only necessary to test for PM at those stacks, because the other HAPs will not be present.

Furthermore, as explained in the separate comments filed by NLA members Lhoist, applying the oHAP standards to separately vented coolers would result in anomalous results. As Lhoist (which operates such a cooler) explains:

In addition, the methodology used to convert a pollutant to a standard O<sub>2</sub> concentration is meant to be utilized in combustion sources. Applying this same methodology to a source that utilizes ambient O<sub>2</sub> results in nonsensical emission rates. For example, consider a situation from a lime cooler, where no oHAP's were measured. Per the proposed rule, the source must report the total oHAP emission rate using the method detection limit. The following equation demonstrates how a non-detect measurement for oHAP in a lime cooler becomes a significant emission rate when converting this to a measurement at 7% O<sub>2</sub>.

$$E_{oHAP @ 7\% O_2} = C_{oHAP} \times \left( \frac{20.9-7}{20.9-O_2} \right) \text{ where,}$$

$E_{oHAP @ 7\% O_2}$  = Total oHAP concentration in ppmvd @ 7% O<sub>2</sub>

$C_{oHAP}$  = Total oHAP concentration at the measured oxygen concentration

O<sub>2</sub> = Measured oxygen concentration at the source

$$E = 0.56 \times \left( \frac{20.9 - 7}{20.9 - 20.85} \right) = 0.56 \times \left( \frac{13.9}{0.05} \right) = 0.56 \times 278 = 155.7 \text{ ppmvd @ 7\% O}_2$$

A total oHAP measurement that started as a non-detectable emission rate at an O<sub>2</sub> concentration of 20.85% results in a reported total emission rate of 155.7 ppmvd @ 7% O<sub>2</sub>. At this emission rate, an operator would be required to install an add-on pollution control device (likely an RTO) for an emission rate that is nonexistent.

Under the rule as written, this absurd result would occur even if no oHAPs were detected at the cooler at all, because the rule requires use of the MDL when no oHAPs are detected. (This is another reason EPA should use 0 for non-detects).

NLA suggests that this issue be addressed by modifying the definition of "Lime Cooler" in §63.7143 as follows:

*Lime cooler* means the device external to the lime kiln (or part of the lime kiln itself) used to reduce the temperature of the lime produced by the kiln. For the purposes of this regulation, a cooler is associated with a lime kiln with respect to particulate matter (PM) emissions, but is not associated with a lime kiln for the purposes of standards for additional air pollutants added to the regulation on [ADD DATE OF FINAL RULE].

In addition, references to coolers should be removed from §63.7112(o), and Table 1, Lines 13, 14, 15, and 16. In Table 4, Line 1, the term PM should be restored to the parenthetical, because only PM emissions from separate coolers need to be summed with kiln emissions.

**X. EPA SHOULD CLARIFY THAT NOT ALL PERFORMANCE TESTS ARE REQUIRED TO BE PERFORMED IN THE SAME SCHEDULE**

As written, §63.7112 could be read to require that performance tests for all HAPs, including PM, be performed at the same time. EPA should clarify that this is not required. Sources may have undertaken PM performance tests less than 5 years before the issuance of the final rule governing additional HAPs, and thus testing for PM could be on a different 5-year schedule than testing for the additional HAPs. In addition, sources may for practical reasons perform testing of the additional HAPs on varying schedules (although, of course, they would all have to be performed within the required period). NLA suggests adding the following language to §63.7112(b) to clarify this point:

Performance tests for the emission standards promulgated in this rule, including PM emission standards and emissions standards added on [DATE OF PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER] are not required to be performed at the same time.

**XI. EPA SHOULD EXPRESS STANDARDS IN TERMS OF “LIME PRODUCED,” NOT “STONE PRODUCED.”**

In the definitions section of the Proposed Rule redline (§63.7143), EPA includes the following:

*Stone produced* refers to the production of limestone from the lime kiln consisting of high calcium quick lime, dolomitic quick lime and/or dead burned dolomitic lime.

Subsequently, the term “stone produced” is used in several places in the rule language, while in other places (such as Tables 1 and 9), the term “lime produced” is used. EPA should consistently use the term “lime produced” to refer to quicklime and dolomitic lime produced in lime kilns. Limestone is the stone feedstock used to make lime (which is why some other standards are based on “stone feed.”) The lime products are not limestone, or stone at all. Limestone is a sedimentary rock composed primarily of calcium carbonate and/or calcium-magnesium carbonate, while lime is calcium oxide or calcium-magnesium oxide, a different compound and structure entirely.

Using the term “stone” for this material is likely to create confusion. Using the term “lime” to refer to lime products will be consistent with industry practice, and with terminology used by the U.S. Geological Survey.<sup>15</sup> Accordingly, the definition of “stone produced” should be deleted from §63.7143, and replaced with:

<sup>15</sup> See, e.g., <https://pubs.usgs.gov/periodicals/mcs2024/mcs2024-lime.pdf>.

*Lime produced* refers to the production of lime products produced from the lime kiln consisting of high calcium quicklime, dolomitic quicklime, and/or dead-burned dolomitic lime.

The term “stone produced” should be replaced with “lime produced” where the term appears elsewhere in the rule language. The term appears in §§ 63.7114(c)(2)(i), 63.7121(g)(3), and 63.7143. The term also appears in several locations in the Proposed Rule preamble, including in Tables 2, 3, 4, 6, and 7, and in text. These are inconsistent with the tables in the redline (which properly refer to “lime produced”). All instances of “stone produced” should be changed to “lime produced” if the reference is to lime product produced at the kiln. (Note further that “quicklime” is typically spelled as a single word with no spaces.)

## **XII. EPA PROPERLY DECLINES TO PROPOSE BEYOND-THE-FLOOR STANDARDS FOR EMISSIONS IN THE PROPOSED RULE**

In the new Proposed Rule, EPA correctly proposes not to set beyond-the-floor standards for any of the covered HAPs.<sup>16</sup>

EPA is obligated to consider costs with respect to beyond-the-floor controls, as it is directed to do in Clean Air Act section 112(d). A vital element in the analysis of the cost-effectiveness of an emissions standard is whether it will significantly reduce the risk imposed by the emissions to be controlled. In the case at hand, as recounted elsewhere in these comments, EPA performed a comprehensive risk assessment on all major sources in the lime industry in the 2020 RTR proceeding and determined that risks are acceptable at all major sources with an ample margin of safety for all affected HAPs *even with no additional controls for at all*. Accordingly, it cannot be cost-effective to impose additional costs on any existing source because the lack of a health or environmental benefit does not justify any new costs.

Imposing beyond-the-floor standards would impose unnecessary additional costs on sources. To comply with any emissions standard, sources must calibrate pollution control devices to achieve the standard, with an appropriate margin of error to prevent violations. For example, when the treatment technology EPA identifies for mercury control is activated carbon injection (ACI), the rate of injection—and thus the cost of carbon—will directly relate to the emissions standard. A lower standard means more carbon injected, and higher costs. Furthermore, existing plant configurations may not be able to accept higher rates of ACI due to operational constraints, further increasing costs. Similar additional costs would be incurred for other HAPs as well if lower standards were set. These additional costs cannot be justified by any consideration of costs compared to risks because EPA already determined that the risks do not justify any additional controls at all.

In sum, NLA strongly supports EPA’s decision not to set beyond-the-floor standards in the Proposed Rule.

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<sup>16</sup> In the January 2023 Proposed Rule, EPA proposed to set beyond-the-floor emission standards for mercury emissions from existing sources for most lime plants, and for both existing and new sources for sources making dead-burned dolomitic lime.

## ISSUES RELATING TO SPECIFIC STANDARDS

### HCL

#### **XIII. EPA SHOULD REGULATE HCL BY MEANS OF A HEALTH-BASED STANDARD IN THIS RULEMAKING UNDER CLEAN AIR ACT SECTION 112(D)(4)**

As noted above, EPA determined that HCl was a threshold pollutant when it issued the MACT standard for lime manufacturing in 2004. In the new Proposed Rule, EPA has reaffirmed that HCl is a threshold pollutant, and that a health-based standard under Clean Air Act Section 112(d)(1) would be justified for the lime industry. While EPA does not propose to set such a standard, it spells out the justification for such a standard, indicates what the standard would be, and requests comment on setting such a standard. Thus, EPA can choose to set a health-based standard in the final rule, and it should do so, for the reasons set out below.

##### **A. EPA Carefully Evaluated the Scientific Data and Concluded that HCl Was a Threshold Pollutant in the Original Lime MACT Standard in 2004 and That Finding Was, and Is, Correct**

The Clean Air Act allows EPA to use a health threshold when issuing emission standards under section 112(d) for pollutants for which a health threshold has been established. CAA § 112(d)(4); 42 U.S.C. § 7412(d)(4). Such a health-based standard must include an “ample margin of safety.” *Id.* In its 112(d) MACT standard for lime manufacturing, EPA concluded that HCl was a threshold pollutant, considering several factors such as “evidence and classification of carcinogenic risk and evidence of non-carcinogenic effects.” 67 Fed. Reg. at 78054-55.<sup>17</sup>

NLA conducted a risk assessment to determine whether emissions of HCl from lime kilns at baseline levels resulted in exposures below threshold values for HCl. EPA reviewed NLA’s risk assessment report and concluded that it used reasonable and conservative methodology, was consistent with EPA methodology and practice, and reached a reasonable conclusion that current levels of HCl emissions from lime kilns would be well under the threshold levels of concern for human receptors. *Id.* at 78055. To aid in its analysis, EPA reproduced several of NLA’s modeling analyses, performing its own analyses for selected facilities having the highest potential for risk to the surrounding community, and ultimately affirmed NLA’s assessment.

It is helpful to put these low risks in perspective. The Hazard Quotient (HQ) is the ratio of exposure (or modeled concentration) to the health reference value or threshold level (*i.e.*, reference concentration (RfC) or acute exposure guidance level (AEGL)). HQ values less than “1” indicate that exposures are below the health reference value or threshold level and are likely to be without appreciable risk of adverse effect in the exposed population. 67 Fed. Reg. 78,055-

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<sup>17</sup> In the preamble to the proposed lime MACT standard in 2002, EPA noted that it had included a detailed discussion of factors it considers in deciding whether a pollutant should be categorized as a health threshold pollutant in its proposed rule titled: *National Emission Standards for Hazardous Air Pollutants; Proposed Standards for Hazardous Air Pollutants From Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semicemical Pulp Mills*. 63 Fed. Reg. 18,766 (April 15, 1998).

56 (Dec. 20, 2002). Based on an HCl risk assessment of all lime kilns in the industry, EPA felt confident that exposures to HCl emissions from lime manufacturing facilities are unlikely to ever exceed an HQ of 0.2. *Id.* at 78,056. In other words, risks from HCl emissions from lime plants have a more than adequate “ample margin of safety” because they are expected to be significantly lower than the level at which there would likely be no appreciable risk (i.e., an HQ of 1.0).

EPA’s conclusions were validated in its RTR review. In 2019, as part of the residual risk review, EPA performed a comprehensive risk assessment for all 35 operating lime plants that are major sources of HAP. The maximum chronic noncancer hazard index (HI) for the lime manufacturing source category was estimated by EPA to be only 0.04 based on actual emission of HCl, nickel compounds, and acrolein emitted from lime kiln and cooler exhaust, and 0.05 based on allowable emissions, with HCl, nickel compounds, acrolein, and formaldehyde emissions as primary risk drivers, 85 Fed. Reg. 44,964 (July 24, 2020). In other words, when EPA did its follow-up residual risk assessment using representative data under actual and allowable emissions scenarios, it found that the chronic risks from all noncancer HAP (including, but not limited to HCl) were much lower than the risks estimated in 2002, and even further from an HQ of 1.0. This analysis proves that EPA was correct in determining that risks from uncontrolled emissions of HCl are acceptable with an ample margin of safety.

EPA also evaluated whether HCl emissions would cause any significant or widespread adverse environmental effects to wildlife, aquatic life, or other natural resources, ultimately concluding, “we do not anticipate any adverse ecological effects from HCl.” *Id.* at 78057.

Putting all this evidence together, EPA correctly concluded that “[t]he results of the exposure assessment showed that exposure levels to baseline HCl emissions from lime production facilities are well below the health threshold value.” *Id.* EPA concluded that HCl was a threshold pollutant and that the risks from emissions of HCl from lime manufacturing facilities were below such threshold value. No party challenged this conclusion, and the time for making any such challenge has long since passed. *See* CAA § 307(b)(1), 42 U.S.C. § 7607(b)(1). Accordingly, that conclusion is the “law of the case,” and must be respected in this rulemaking proceeding.<sup>18</sup>

In its recent RTR rule for lime manufacturing facilities, EPA hired an outside contractor to conduct a new comprehensive risk assessment for all hazardous air pollutants (including HCl). This new analysis found that the risks of lime manufacturing under the current MACT standard (which contains no HCl standard at all, let alone a health-based standard) were “acceptable” and that the “current NESHAP provides an ample margin of safety to protect public health.” 85 Fed. Reg. 44,960. EPA’s RTR fact sheet describing the conclusions of the risk assessment states that the “maximum individual cancer risk . . . for inhalation for the source category is estimated to be 1-in-1 million,” and that this data supported the conclusion that risks from lime manufacturing

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<sup>18</sup> As noted above, in 2004, after EPA decided that HCl was a threshold pollutant entitled to a health-based standard under 112(d)(4), EPA ultimately determined that the risks were so low that no standard was justified. If EPA had set a health-based standard—even a very high one that all sources would have met—there could be no claim now that EPA failed to adequately address HCl. For EPA to now set a non-health-based standard without explanation would be arbitrary and capricious and contrary to its own prior decisions.

source category were acceptable and safe. EPA, *Fact Sheet: Proposed Amendments to Air Toxics Standards for Lime Manufacturing Plants*, June, 2020.<sup>19</sup> As such, because EPA concluded that there are no health or safety risks under the current lime NESHAP, if EPA issues any standard at all, it should issue a health-based standard for HCl, as it would more than adequately protect the public and is based on the best available science.

EPA itself recently concluded that HCl is not a carcinogen. On November 18, 2021, EPA issued a final RTR for the flexible polyurethane foam fabrication operations industry. *National Emission Standards for Hazardous Air Pollutants: Flexible Polyurethane Foam Fabrication Operations Residual Risk and Technology Review and Flexible Polyurethane Foam Production and Fabrication Area Source Technology Review*, 86 Fed. Reg. 64385 (Nov. 18, 2021). These facilities emit HCl, and EPA promulgated standards for HCl, but EPA specifically concluded that “no carcinogens are emitted by this category.” 86 Fed. Reg. 64391-92.

Several other RTRs have confirmed that EPA’s longstanding position is that HCl is not a carcinogen. See *National Emission Standards for Hazardous Air Pollutants: Asphalt Processing and Asphalt Roofing Manufacturing Residual Risk and Technology Review*, 85 Fed. Reg. 14526, 14535 (Mar. 12, 2020) (citing to the International Agency for Research on Cancer’s conclusion that HCl is “not classifiable as to its carcinogenicity to humans”); *National Emission Standards for Hazardous Air Pollutants: Hydrochloric Acid Production Residual Risk and Technology Review*, 85 Fed. Reg. 20855, 20861 (Apr. 15, 2020) (“[t]he results of the inhalation cancer risk assessment ... indicate there is no quantifiable cancer risk posed by the source category...HCl is not classifiable as a human carcinogen”).

In the absence of new information or new law, for EPA to reverse its prior decision that HCl is a threshold pollutant for the lime industry would be arbitrary and capricious. As explained below, the recent *Sierra Club* decision in the brick/clay MACT rule does not provide any such new information or law. As noted above, newer information (including the Ramboll report), only serves to strengthen the determination that HCl is a threshold pollutant. Thus, EPA may not reverse its prior decision on this topic and should promulgate a health-based standard for HCl.

**B. EPA is Not Constrained by the Brick/Clay *Sierra Club* MACT Case because Lime Manufacturing Is Clearly Distinguishable from That Case in All Its Key Factual/Technical/Legal Conclusions**

In 2018, the Sierra Club and others challenged EPA’s use of a health-based standard for HCl in the MACT standard for the brick/clay industry. *Sierra Club v. EPA*, 895 F.3d 1 (D.C. Cir. 2018). Although the court sided with the Sierra Club in the case, the court did not say that EPA cannot issue a health-based standard for HCl. Rather the court remanded EPA’s standard for further consideration based on the three reasons discussed below. Critically, given current knowledge on HCl and the facts in the lime industry, none of these reasons is either relevant today, or can be used to deny use of a health-based standard for HCl for the lime manufacturing RTR.

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<sup>19</sup> [https://www.epa.gov/sites/default/files/2020-06/documents/lime\\_manufacturing\\_rtr\\_final\\_fs.pdf](https://www.epa.gov/sites/default/files/2020-06/documents/lime_manufacturing_rtr_final_fs.pdf)



First, the court held that EPA had not met the section 112(d)(4) requirement that a health threshold be “established.” *Id.* at 10-11. EPA had reviewed toxicity assessments in several databases and opinions from scientific bodies and found that none classified HCl as carcinogenic or “suggestive of the potential to be carcinogenic.” *Id.* However, the court held that EPA had not provided a sufficient record to determine that there was no cancer risk. EPA, the court stated, noted that “little research” had been conducted on carcinogenicity of HCl. Ultimately, the court characterized EPA as relying on the “lack of *any* significant studies.” *Id.* (emphasis in original). Therefore, the court held that EPA acted unreasonably by concluding that it is “established” that HCl poses no cancer risk. *Id.*

The overwhelming scientific consensus regarding the non-carcinogenicity of HCl is widely accepted and compels the conclusion that HCl does not cause cancer. To aid in promulgation of the revised RTR, NLA engaged toxicology experts from the firm Ramboll to prepare a report on the carcinogenicity of HCl, which NLA provided to EPA on June 29, 2021 (EPA-HQ-OAR-2017-0015-0073). In contrast to the insufficient record that served as the basis for the *Sierra Club* court’s holding, Ramboll concluded that “HCl has not been identified as a carcinogen, either by authoritative reviews or Ramboll’s own search of the scientific literature, despite its long history of use.” Ramboll, “*Evaluation of the Carcinogenicity of Hydrochloric Acid (HCl) and HCl Mist*,” (June 11, 2021) (“Ramboll Report”). Ramboll stated:

HCl has been the subject of toxicity studies in experimental animals and epidemiological studies in exposed workers. Several authoritative groups (including the World Health Organization’s International Agency for Research on Cancer [IARC], the International Programme on Chemical Safety [IPCS], and the international Organisation for Economic Co-operation and Development [OECD]), have conducted evaluations of the carcinogenic potential of HCl. None of these groups have concluded that HCl is a carcinogen. Other authoritative bodies (including the US Environmental Protection Agency and the US National Toxicology Program) have chosen not to evaluate the carcinogenicity of HCl, estimating that carcinogenicity is unlikely based on its physical, chemical, and corrosive properties and the lack of evidence suggesting an association with cancer.

...

In addition to relying upon previous authoritative reviews, Ramboll did a series of additional literature searches for any new studies which might indicate HCl is a carcinogen. We employed several search strategies to make sure we uncovered any new scientific evidence that may not have been considered by previous assessments. Despite this broad search, we identified only six additional publications. This newer evidence is consistent with the earlier body of scientific evidence. In addition to direct studies of cancer associations, we also examined other supporting evidence in the form of genotoxicity studies or potential to induce cell proliferation. Taking both the epidemiological and toxicological data into account, the evidence does not indicate that HCl is a carcinogen.

Ramboll Report, Executive Summary. These conclusions satisfy the requirements of the *Sierra Club* decision, and thus, for purposes of the lime manufacturing RTR revisions, HCl should be considered a health threshold pollutant.

In response to the new Proposed Rule, at NLA's request Ramboll has performed a further literature review for any new studies relating to the potential carcinogenicity of HCl. (See Second Ramboll Report, Appendix B to these comments). Ramboll identified three additional relevant studies, but analysis of those studies did not change Ramboll's conclusion that HCl is not a human carcinogen. (See below for further discussion of the Second Ramboll Report)

The second basis for the *Sierra Club* court's rejection of EPA's characterization of HCl as a threshold pollutant was the court's conclusion that EPA used only a single-low confidence, low-quality risk assessment in its review, and that EPA did not use a more stringent California EPA ("CalEPA") reference concentration for HCl that does not pose a health risk. 895 F.3d at 12. This concern does not apply to the lime RTR. The lime RTR risk assessment performed by EPA included multiple, robust dose-response assessments, *including* CalEPA chronic and acute inhalation reference exposure levels ("RELS")<sup>20 21</sup> Even using the more conservative CalEPA RELs for HCl, the EPA risk assessment found no unacceptable human health risk due to chronic or acute inhalation exposure.

Use of the CalEPA REL in the RTR risk assessment, combined with the Ramboll study, demonstrates that in utilizing a health-based threshold for HCl in the revised lime RTR, EPA would not be relying on a "single low-confidence, low-quality" risk assessment. Rather, EPA will be relying on a risk assessment that includes multiple robust dose-response assessments.

Finally, the *Sierra Club* court concluded that EPA's brick/clay health-based assessment was flawed because the court could not determine whether EPA provided any "ample margin of safety" in the HCl health threshold as required by section 112(d)(4). *Id.* at 13. This flaw in EPA's reasoning in the brick/clay context should be readily addressed in this rulemaking – EPA should break out specifically and set forth in precise terms its "ample margin of safety" conclusions (which it already made in the context of the risk assessment performed for the RTR).

### **C. EPA's New Proposed Rule Properly Concludes that HCl is a Threshold Pollutant**

In the new Proposed Rule, EPA seeks comment on potentially setting a health-based standard for HCl. EPA makes several key statements that support moving to such a standard. First, EPA recognizes that even a carcinogen may have a health threshold, allowing for a health-based standard (or as denoted by EPA, a health-based emission limit or HBEL) to be set. EPA states in the preamble:

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<sup>20</sup> *Residual Risk Assessment for the Lime Manufacturing Source Category in Support of the Risk and Technology Review 2019 Proposed Rule*, EPA 2019, May, p. 27.

<sup>21</sup> CalEPA defines the REL as "the concentration level at or below which no health effects are anticipated in the general human population."

With regard to carcinogenicity, it is important to acknowledge that the science and methods of cancer risk assessment have evolved over the 33 years since the CAA amendments were issued. The EPA now recognizes that carcinogens can be either non-threshold or threshold pollutants. Linear non-threshold carcinogens can cause adverse health effects, including cancer, at any level of exposure. In contrast, non-linear threshold carcinogens may pose a cancer risk only above a certain exposure level. Based on the science and methods developed over the last 33 years, and CAA section 112(d)(4)'s focus on a threshold, not cancer risk, we believe that the issue is not whether HCl is a carcinogen but rather whether HCl has a threshold.

89 Fed. Reg. 9092 (footnotes omitted). This is an important point, although as set out above, EPA should properly find that HCl is not a carcinogen.

EPA goes on to explain that HCl has not been shown to be mutagenic, and that evidence shows that there is a health threshold for hyperplasia, which could theoretically lead to cancer. 89 Fed. Reg. 9092-9093. EPA goes on to appropriately distinguish its current findings from concerns raised by the Court in *Sierra Club*.

Based on these conclusions, EPA calculated a potential health-based standard for HCl, explained as follows:

Based on this analysis, the HBEL would be an emission limit of 300 tpy, not to exceed 685 pounds per hour (lb/hr). We would expect such a limit to ensure that HCl emissions from this source category, while could be higher than in the proposal would remain at levels consistent with a chronic HQ no greater than 0.2 and a maximum acute HQ no greater than 0.6. We request comment on whether such a standard would provide an ample margin of safety and whether additional measures would be needed to do so.

89 Fed. Reg. 9094.

NLA strongly believes that such a standard would provide an ample margin of safety. Note that EPA has already performed a comprehensive risk assessment of HCl emissions from all lime plants and has (on multiple occasions) found that there are already acceptable risks with an ample margin of safety with no additional standards at all. Thus, the suggested HBEL will also provide an ample margin of safety—because one already exists. The HBEL would guarantee that HCl emissions would remain below any possible level of concern. NLA does not believe that other measures beyond those elsewhere in the Proposed Rule would be necessary to support the standard. (See discussion below of rule language changes that would be needed to implement the HBEL.)

In its Second Report (Appendix B), Ramboll reviewed EPA's methodology and conclusions, and confirmed that EPA was correct in its evaluation of the potential risks of HCl, including EPA's findings on carcinogenicity, mutagenicity, and other health effects. One point emphasized by Ramboll is that if HCl were a human carcinogen, it would be expected that evidence of its carcinogenicity would have emerged, given the extensive use of the material in workplace settings. Rather, as Ramboll states:

Because of its wide uses in industry, tens of thousands of employees exposed to HCl have been studied and no clear signals of elevated cancer risks have emerged. This is despite the fact that many individuals classified as being exposed to HCl were actually exposed to mixtures that included recognized occupational carcinogens, including acid mists.

Second Ramboll Report, Executive Summary (Appendix B). Furthermore, Ramboll reviewed EPA's air modelling approach, and confirmed that it was appropriate (and conservative). Ramboll states:

The air modeling performed by EPA for their risk assessment is expected to contribute to an acceptable margin of safety. The default assumptions of the air model are expected to produce conservative air concentrations, and the definition of the receptor locations should produce reasonable exposure estimates for existing receptors. In addition, the chronic and acute toxicity reference values used for the risk assessment are based on the best available science.

*Id.* Ramboll concludes:

HCl has not been identified as a carcinogen, despite its long history of use. Ramboll therefore recommends, as specified in 42 U.S.C. § 7412(d)(4), that the MACT standard for HCl be based on a health-based threshold, including an ample margin of safety.

*Id.*

NLA requested that a second consultant, Trinity, also review EPA's air dispersion modeling. Trinity also concluded that EPA's approach was correct. Trinity's report (accompanying these comments as Appendix C), states:

We did not find any material errors or flaws in EPA's methodology and the analysis is consistent with prior methods for analyzing risk for the residual risk and technology review process.

Based on Trinity's review, EPA has proposed an HBEL for HCl providing conservative estimates of concentrations in ambient air, the analysis relies on input data from the industry for the "worst case" sources and applied the air dispersion in a manner consistent with accepted practice. Therefore, we believe the predicted modeling impacts support EPA's conclusion that "300 tpy of HCl emissions per Lime Manufacturing facility is unlikely to result in adverse chronic or acute human health effects at any facility in the source category."

NLA strongly urges EPA to set a health-based standard for HCl, based on its own findings and the confirmation provided by Ramboll and Trinity.

**D. Strong Policy Reasons Support Concluding that HCl Is a Threshold Pollutant and Promulgating a Section 112(d)(4) Standard**

In addition to the legal and technical arguments above, there are several strong policy reasons that should compel EPA to issue a section 112(d)(4) health-based standard for HCl in this rulemaking. First, institutionally, EPA should always seek to preserve its regulatory authority/flexibility in this context. And, given the powerful data in support of a health-based threshold here, if EPA concludes to the contrary, it is hard to see how EPA could ever demonstrate a health threshold under section 112(d)(4). The *Sierra Club* court held that EPA is not “obligated to conclusively resolve every scientific uncertainty before it issues regulation.” 895 F.3d at 10 (citations omitted). Specifically, relating to section 112(d)(4), the court held:

The statutory term “established” does not unambiguously require that the EPA prove its scientific conclusions beyond all possible doubt. Nor does the term “health threshold” require that the EPA find a specific threshold that lacks uncertainty. With respect to scientific conclusions, “established” and “health threshold” are ambiguous terms and we give deference to the EPA to the extent its interpretations fall within the bounds of reasonableness.

*Id.*

Under this standard, it would clearly be reasonable for EPA to conclude that HCl is a threshold pollutant in the context of this rulemaking. Indeed, a conclusion to the contrary would be a harmful precedent, given the evidence here, and it could be read to deprive EPA of the flexibility to use health-based standards as provided under the statute. Regulating HCl using a health-based standard for lime is not only faithful to the intent of Congress in enacting section 112(d)(4) and to the D.C. Circuit’s concerns as expressed in the *Sierra Club* decision, but is also a reasonable and appropriate exercise of EPA’s discretion in setting standards for pollution prevention that protect the public with an ample margin of safety.

Second, EPA should make it clear that even if it believes that it must set standards pursuant to sections 112(d)(2) and (3) for additional HAPs, the provisions in the statute providing for alternative approaches to the methods described in 112(d)(2) and (3) remain available to EPA. These include the provisions allowing a health-based standard under 112(d)(4), as well as the provisions providing for subcategories under 112(d)(1) and work practices under 112(h). In the case at hand, there is already a robust existing record in support of a section 112(d)(4) standard, and thus applying such a standard will not prolong the time needed to draft and promulgate a standard.

Finally, use of a health-based standard would greatly simplify compliance (because there would be a single standard rather than multiple subcategories), and it would also simplify the issue of emissions averaging for HCl, because the health-based standard EPA suggests would be a facility-wide standard, and not a standard for each individual kiln. EPA’s own economic analysis found that almost half of the capital costs of the rule (47%) are attributable to control of HCl. Promulgating a health-based standard would therefore significantly reduce the cost impact

of the rule on small businesses and on the lime industry, while still protecting human health and the environment.

Use of a health-based standard under section 112(d)(4) is particularly appropriate here. EPA used two risk-based analyses and determined that there are no health risks from emissions of HCl from lime manufacturing facilities—the first being EPA’s evaluation of HCl health-based risks in the original MACT rule, and the second being its section 112(f) risk analysis from the 2020 lime RTR rule that there are no unacceptable risks from any pollutants regulated by the MACT standard.

#### **E. How a Health-Based Standard Should Be Implemented**

In the Proposed Rule preamble, EPA states:

Appropriate monitoring, recordkeeping, and reporting requirements would also be required to ensure compliance with the limit. The EPA is requesting comment on an appropriate structure for incorporating an HBEL in the rule text. Refer to the memorandum, “Revisions to 40 CFR part 63 Subpart AAAAAA to Accommodate a Health-Based Standard”, included in the docket for this rulemaking, for a description of potential revisions to the subpart to include initial compliance, continuous compliance, recordkeeping, and reporting rule language in support of an HBEL.

89 Fed. Reg. 9094. EPA has informed NLA that the referenced docket item was not used and that the reference to it should have been deleted from the preamble, but that EPA seeks comment on potential revisions to the rule language. Below, NLA provides comment on how a HBEL should be implemented in the rule.

EPA states that, based on its analysis of risk, a HBEL for HCl would be an emission limit of 300 tons per year, not to exceed 685 pounds per hour (lb/hr). NLA agrees with EPA’s evaluation that this standard would reflect acceptable risk with an ample margin of safety. (Indeed, as noted above, this standard is very conservative.)

The HBEL standard would be applied on a source-wide basis (as opposed to a kiln-by-kiln basis). This will necessitate some changes in rule language.

Proposed §63.7112(n) addresses computation of emission rates for HCl and mercury. Because under the HBEL, emissions of HCl will not be calculated as a production-related rate, this section will need to be modified. Suggested changes are shown in the NLA “Blueline,” Appendix A.

NLA suggests the following approach to demonstrate and document compliance with the HBEL for HCl, to be added to §63.7112:

An LMP may document that the sitewide HCl potential to emit from all lime kilns is below 300 tpy and submit this with a Notice of Compliance Status (NOCS) before the compliance date. The potential to emit shall be documented by completing a performance test on each lime kiln, developing an emission factor in units of pounds per ton of lime produced,

multiplied by the annual maximum lime production rate for each kiln, and summing the HCl for all kilns at the site.

If the LMP includes any kilns requiring add-on controls to comply with the HBEL, the operator shall develop and set a minimum DSI injection rate (or other operating parameter for other controls) for kilns that will continuously operate controls to maintain compliance with the HBEL. In this case, the LMP operator will submit documentation of the operating rate for DSI on units with controls, as applicable, and a compliance demonstration annually indicating actual emissions in the prior calendar year do not exceed 300 tpy.

Alternatively, the facility may seek a practically enforceable permit provision from the LMP's local air permitting authority that limits HCl to no more than 300 tpy.

The LMP shall also certify in a NOCS, by relying on the most recent HCl performance test data for each kiln, that the sum of the hourly emissions rate (i.e., the sum of 3-run averages for each kiln at the site) is no greater than 685 lb/hr.

Sections of the rule relating to dry sorbent injection can be left in place to apply to those sources that may use DSI to achieve the HBEL.

If EPA applies the HBEL, sections of the Proposed Rule relating to emissions averaging will not be necessary for HCl, because the standard is a sum of source-wide emissions and not an average. These should be modified to remove references to HCl. These sections include §63.7114 (b) and (c), §63.7121(g), and Table 9 (delete lines 1 through 6).

Table 1, lines 5 through 12, should be replaced with

<b>For...</b>	<b>You must meet the following emission limit</b>
5. All major sources	HCl emissions from all kilns must not exceed 300 tons per year (tpy), and must not exceed 685 pounds per hour (lb/hr)

Table 5, line 19, should be replaced with:

For . . .	You must . . .	Using . . .	According to the following requirements . . .
19. Each major source (all kilns)	Measure hydrochloric acid	Method 320 or 321 of appendix A of this part or ASTM 6348-12e1 (Note 1) or Method 26/26A as referenced in 40 CFR Part 60, Appendix A-8. <sup>22</sup>	The test duration must be at least one hour. For a positive pressure FF or ESP, determine the number of sampling points per the stratification check procedures of section 8.1.2 of Method 7E using the sample points determined using the procedures of Section 8 of EPA Method 5D.

Changes to other tables will not be necessary.

NLA strongly urges EPA to adopt the suggested HBEL, for all the reasons stated above.

#### **XIV. EPA ACTED REASONABLY IN PROPOSING SUBCATEGORIES FOR HCL**

As noted above, EPA should abide by its longstanding finding in 2004 that HCl is a threshold pollutant (and not a carcinogen) and should establish a health-based standard for HCl pursuant to Clean Air Act § 112(d)(4) in lieu of a MACT floor standard.

If, however, EPA continues to pursue non-health-based emissions standards for HCl, NLA supports the proposal to establish subcategories. NLA supports the six subcategories EPA has proposed. EPA has made several technical corrections to the subcategory analyses and MACT floors in the new Proposed Rule, which NLA supports.<sup>23</sup>

##### **A. EPA Has Flexibility to Set Standards for Subcategories**

Clean Air Act section 112(d)(1) provides: “The Administrator may distinguish among classes, types, and sizes of sources within a category or subcategory in establishing such standards except that, there shall be no delay in the compliance date for any standard applicable to any source under subsection (i) as the result of the authority provided by this sentence.” Under section 112(d)(3), the standard can be no less stringent than:

(A) the average emission limitation achieved by the best performing 12 percent of the existing sources (for which the Administrator has emissions information), excluding those sources that have, within 18 months before the emission standard is proposed or within 30 months before such standard is promulgated, whichever is later, first achieved a

<sup>22</sup> See discussion below on the addition of Method 26.26A.

<sup>23</sup> NLA’s “blueline” of suggested rule language changes in Appendix B reflects inclusion of a health-based standard for HCl. If EPA declines to set a health-based standard, several changes to the language would be required, as set out in this section, and in the section on emissions averaging above.



level of emission rate or emission reduction which complies, or would comply if the source is not subject to such standard, with the lowest achievable emission rate (as defined by section 7501 of this title) applicable to the source category and prevailing at the time, in the category or subcategory for categories and subcategories with 30 or more sources, or

(B) the average emission limitation achieved by the best performing 5 sources (for which the Administrator has or could reasonably obtain emissions information) in the category or subcategory for categories or subcategories with fewer than 30 sources.

Accordingly, if a subcategory has fewer than 30 sources, the standard is based on the average limitation achieved by the best performing 5 sources.

EPA's decision to set subcategories has been repeatedly upheld by the courts. In *Sierra Club v. EPA*, 895 F.3d 1 (D.C. Cir. 2018), the court upheld EPA's decision to establish subcategories for brick kilns by size. In setting a brick MACT floor, EPA set separate standards for PM (used as a surrogate for non-mercury hazardous metals) and mercury, with subcategories for large tunnel and small tunnel brick kilns. *NESHAP for Brick and Structural Clay Products Manufacturing; and NESHAP for Clay Ceramics Manufacturing*, 80 Fed. Reg. 65470, 65471 (Oct. 26, 2015).

In *U.S. Sugar Corp. v. EPA*, 830 F.3d 579 (D.C. Cir. 2016), the court upheld EPA's establishment of subcategories for major boilers (based on primary fuel combusted and method used to feed the boiler), and for area boilers (based on size). The court held that EPA's creation of subcategories of boilers based on the type of fuel the boilers burned was based on a reasonable interpretation of CAA provisions permitting EPA to distinguish among "classes, types, and sizes" of sources when establishing hazardous air pollutant emissions standards, and was not arbitrary and capricious, even though a single boiler could use different fuels over the course of its lifetime. EPA explained that boilers varied in their designs depending on the type of fuel they burned, which affected boiler emissions and the feasibility of emissions controls. *Id.* at 656. EPA demonstrated with sufficient evidence that burning a different fuel made a boiler a different type of boiler, and thus EPA's creation of subcategories of boilers based on the type of fuel the boilers burned was not arbitrary or capricious. *Id.* at 657.

In the Proposed Rule, EPA bases its HCl subcategories on two factors that affect HCl emissions, as shown by data analyzed by EPA—kiln type (preheater rotary, straight rotary, and vertical), and lime product produced (high calcium lime and dolomitic lime). EPA reasonably determined that these differences in equipment and in product resulted in differences in emissions that justify establishment of subcategories. NLA fully supports this determination, as explained in more detail below.

The proposed HCl subcategories for the lime manufacturing industry are based on kiln type (i.e., straight rotary, preheater rotary, and vertical), and lime product (high calcium quicklime or dolomitic lime). The six subcategories proposed by EPA are:

- a. Straight rotary kilns making dolomitic lime and dead-burned dolomitic lime
- b. Straight rotary kilns making high calcium quicklime

- c. Preheater rotary kilns making dolomitic lime and dead-burned dolomitic lime
- d. Preheater rotary kilns making high calcium quicklime
- e. Vertical kilns making dolomitic quicklime and/or dead-burned dolomitic lime
- f. Vertical kilns making high calcium quicklime

NLA supports these subcategories, which are explored in more detail below.

## **B. Subcategorization by Kiln Type Is Appropriate**

Subcategorization by kiln type includes the following:

- a. Straight Rotary kilns
- b. Preheater Rotary kilns
- c. Vertical kilns

HCl emissions from rotary kilns equipped with a preheater are typically lower than a straight rotary kiln with no preheater. This is because, among other things, HCl that exits the kiln can be chemically adsorbed by lime (CaO) and limestone (CaCO<sub>3</sub>) in the preheater section of the kiln. This has the overall effect of lowering HCl stack emissions. In addition, the stack temperature of a preheater kiln is lower than a straight rotary kiln, which lowers HCl formation.

Conversely, a straight rotary kiln with no preheater and similar inputs has HCl emissions higher than a preheater equivalent. Both kiln types will have some adsorption of HCl in the rotary kiln, but a straight rotary kiln does not have the additional opportunity for HCl adsorption in the preheater.

Vertical lime kilns also have a different emissions profile from straight kilns. In vertical kilns, close contact between the gases in the kiln and the stone and lime tends to scrub out HCl emissions.

## **C. Subcategorization by Lime Product Produced Is Appropriate**

In addition to kiln type, lime sources should be further subcategorized by product type, as EPA proposed:

- a. High calcium quicklime
- b. Dolomitic lime (and dead-burned dolomitic lime)

The data in the record show that kilns producing dolomitic lime consistently have significantly higher HCl emissions than kilns producing high calcium lime (this is true even when the two kinds of product are produced in the same kiln). These differences are due to differences in the stone feedstock, and not because of fuels or equipment. Dolomitic lime is made from naturally occurring stone with a higher percentage of magnesium chloride than high calcium quicklime. Also, it should be noted that dolomitic lime and high calcium quick lime are different products and have different uses and markets. Accordingly, the differences in HCl emissions between these two types of lime are appropriate for subcategorization.

#### **D. Subcategory for Vertical Kilns Making Dolomitic Lime**

Data submitted to EPA pursuant to the previous Information Collection Request (ICR) did not include data on vertical kilns producing dolomitic lime, so in the January 2023 Proposed Rule, EPA grouped all vertical kilns into a single category. NLA's prior comments noted, however, that in categorizing HCl emissions, vertical kilns producing dolomitic lime should be grouped with preheater kilns producing dolomitic lime, because in this case, similarities related to product type are more significant than similarities in kiln equipment. In the 2004 Proposed Rule, EPA places vertical kilns making dolomitic lime and dead-burned dolomitic lime into their own subcategory, but with the same applicable HCl standard as preheater kilns making these products. NLA supports this change.

### **XV. HCL—TECHNICAL CHANGES AND CORRECTIONS**

#### **A. The MACT Floor Calculations for HCl Have Been Properly Corrected for the Straight Rotary High Calcium Quicklime (SR, QL) and Preheater Rotary, High Calcium Quicklime (PR, QL), Except that the Limit for Straight Rotary Kilns Making Quicklime Has Been Incorrectly Calculated**

In EPA's prior MACT floor analysis, five kilns were miscategorized as preheater rotary kilns, when in fact they are straight rotary kilns. EPA has properly corrected this error, which affects the MACT floor numbers for the SR, QL and PR, QL subcategories, except that the limit for straight rotary kilns making quicklime has been incorrectly calculated (see discussion below). The necessary corrections were detailed in NLA's prior comments, which are incorporated here by reference. (EPA-HQ-OAR-2017-0015-0166.)

The MACT floor limits based on these corrections that NLA suggested EPA should promulgate for the subcategories are summarized below:

**Table A: Corrected Hydrogen Chloride MACT Floor Limits for New and Existing Lime Manufacturing Sources**

Kiln Type <sup>1</sup>	Lime Produced <sup>2</sup>	New Source MACT Floor Limit (lb/ton of lime produced)	Existing Source MACT Floor Limit (lb/ton of lime produced)
SR <sup>24</sup>	DL, DB	1.7	2.3
SR	QL	0.015	2.58 <sup>25</sup>
PR, VK	DL, DB	0.39	0.39 <sup>26</sup>
PR	QL	0.096	0.096
VK	QL	0.021	0.021

<sup>24</sup> Limits for the SR DL, DB subcategory have been revised to be consistent with Table 1 of the proposed rule redline.

<sup>25</sup> EPA has proposed a lower number for this subcategory. EPA's number is incorrect, as explained below, and 2.58 should be used in the final rule.

<sup>26</sup> EPA now proposes to set a separate subcategory for vertical kilns making dolomitic and deadburned dolomitic lime, but setting the same standard as preheater kilns making those products. NLA supports this change.

Note:

- 1 - Straight Rotary (SR), preheater rotary (PR), vertical (VK)
- 2 - Dolomitic lime (DL), high-calcium quicklime (QL), dead burned dolomite (DB)

**B. EPA's Emission Limit for HCl from Existing Straight Kilns Producing Quicklime Must Be Corrected**

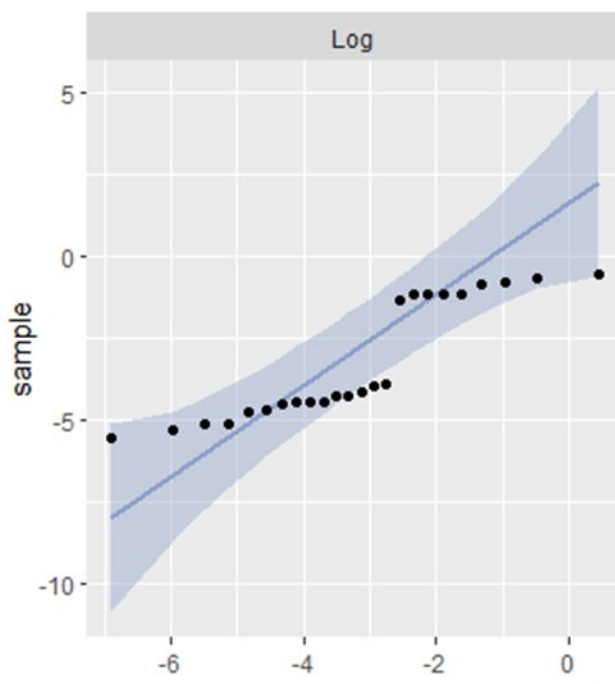
EPA's proposed emission limit for existing straight kilns producing quicklime is calculated using an upper prediction limit (UPL) calculation that incorrectly assumes that the data set is statistically skewed. This approach does not follow EPA guidance or prior precedent. In fact, EPA has arbitrarily deviated from prior UPL calculation precedent, applying a new procedural precedent to set this UPL limitation.

Following the instructions in EPA's own UPL calculation tool used in prior iterations of this rulemaking and in other similar UPL limit setting exercises, the data set should be considered "lognormal." However, with respect to this particular standard, EPA has arbitrarily applied a new statistical test, the Shapiro-Wilk test, which identified the data set as "skewed". The use of the Shapiro-Wilk test is not included in EPA guidance regarding the use of UPLs nor is NLA aware of any precedent for using this test in UPL MACT setting rulemakings. Further, EPA's memorandum *Use of the Upper Prediction Limit for Calculating MACT Floors* included in this docket states: "To evaluate the distribution of the data, EPA checks each dataset for distribution characteristics by applying skewness and kurtosis tests." (EPA-HQ-OAR-2017-0015-0177) Thus, EPA's established method already applies skewness and kurtosis tests, rendering it unnecessary and unreasonable in this case to use the Shapiro-Wilk test.

In this case, EPA apparently first evaluated the dataset in its traditional method using its UPL Calculation tool. As mentioned above, EPA's tool clearly concludes that the dataset is lognormal, resulting in a UPL limitation of 2.58 lb/ton lime produced. For reasons that are unclear, EPA abandoned the established approach and applied a new procedure, the Shapiro-Wilk test, to conclude the dataset is "skewed," resulting in a much lower UPL limitation of 0.52 lb/ton lime produced.

The Shapiro-Wilk test is a statistically conservative methodology for determining whether a data set is normal or lognormally distributed. This methodology only allows for a very narrow band of p-values to "pass" the normality test. The Shapiro-Wilk test is known to be conservative, especially for larger data sets as all data must be in a narrow range. In other words, this Shapiro-Wilk test significantly increases the likelihood of a finding that a dataset is "skewed" and not "lognormal."

Although this methodology is not supported by precedent in EPA's extensive history of setting MACT limits, NLA has reviewed this data set using this test. As shown in graph below, the data set using this new test is not normally distributed because a small subset of values lie slightly outside of the p-value allowable range. The outcome is that EPA's proposed limitation is substantially and unreasonably lowered.

**Figure 1 – Illustration of the Shapiro -Wilk Test Results and Corresponding P-values**

In the figure, the limited data points outside the blue shaded areas force the conservative conclusion from the Shapiro-Wilk test that the dataset is “skewed” contrary to EPA’s conventional normality tests for setting UPLs.

In addition to the arbitrary application of the Shapiro-Wilk test, and EPA’s failure to follow its own established procedures, the calculated emission limit fails to develop an emission limit that is achievable even by the MACT Floor sources. EPA utilizes the UPL methodology to calculate an emission limit that MACT Floor sources are capable of meeting within 99% certainty. In this case, not only is the proposed limit equal to the average result of one of the MACT Floor sources, two of the three runs for that kiln are equal to or greater than the proposed limit. Establishing an emission limit with which even the MACT Floor sources cannot continuously comply does not meet Clean Air Act MACT limit requirements. This outcome is unlawful and further demonstrates that EPA’s new use of the Shapiro-Wilk test does not properly set a MACT UPL limitation.

EPA should set the limitation based on its traditional method using its UPL Calculation Tool and set the limitation for this subcategory at 2.58 lb/ton lime produced.

### **C. EPA Should Authorize Use of Method 26/26A to Measure HCl**

Method 26/26A should be allowed by EPA to determine compliance with the proposed HCl emissions limits. Method 26/26A (used in testing HCl) was omitted from Table 7 in the preamble to the January 2023 Proposed Rule (88 Fed. Reg. 815), and is also absent from Table 5, Row 19, in the redline in the docket. Method 26/26A is a standard isokinetic method that can be run concurrently with PM sampling.

In Method 26/26A, gas is withdrawn from the source and collected directly in acidified impingers. The impinger solution captures the HCl, and drives it to chloride ions, where it is analyzed by ion-chromatography. This is a simple approach that does not have the sample transport difficulties found in the direct interface FTIR approach. It is one of EPA's promulgated methods (*see* <https://www.epa.gov/emc/emc-promulgated-test-methods>; *see also* 40 CFR Part 60, Appendix A-8), and it is allowed in other NESHAP rules (*see, e.g.*, 40 CFR section 63.7520 and Table 5 (boilers and process heaters)). Method 26/26A has several advantages over the more technically complex and expensive M.320/321. It can allow for significantly lower detection limits, does not require a trained FTIR specialist on site to operate the equipment, and is significantly quicker. The limited availability of trained FTIR specialists will be problematic for both the lime industry and the testing industry. Additional costs are significant and can easily be greater than \$10K/plant using FTIR. M26/26A is a tried and tested accepted method for HCl analyses and is allowed for compliance demonstration in other industries, including in EPA's recent final taconite rule.

EPA should authorize the use of Method 26/26A as an approved method for HCl compliance testing. References to Method 26/26A should be added to §63.7142, Table 4 line 1, and Table 5 line 19.

## MERCURY

### **XVI. EPA SHOULD APPLY AN INTRA-QUARRY VARIABILITY FACTOR FOR MERCURY**

On December 9, 2021, NLA's consultant Trinity Consultants submitted a memorandum (EPA-HQ-OAR-2017-0015-0074), explaining how EPA should set an intra-quarry variability factor (IQV) for mercury for lime plants, with supporting data. In the new Proposed Rule, EPA has proposed an IQV, and NLA commends EPA for doing so. However, NLA believes that the IQV proposed by EPA should be adjusted to allow sources more flexibility in meeting mercury standards.

The purpose of an IQV is to account for long-term variation in mercury content throughout the quarry and has been incorporated into other standards with significantly sparser data than the lime industry has provided. It is important to note that IQV stands for **intra**-quarry variability, not **inter**-quarry variability. The point of the exercise is to understand how mercury concentrations may vary in each quarry over time.

NLA believes that in a case in which emissions of mercury are not controlled by add-on pollution control devices, but rather depend on inputs from feedstocks, it would be arbitrary and capricious not to apply a reasonable IQV. Without an IQV, the MACT floor "best performer"—the source that currently has the lowest mercury emissions—could later find itself in violation of the standard if it is excavating limestone with higher mercury levels from a different part of the quarry. The concept of the MACT floor performers is that these sources can meet the standard without additional controls—something EPA cannot assert for mercury in this rulemaking without applying an appropriate IQV.

Sufficient data is available to establish an IQV for the lime industry. As provided in Appendix I (1-13) to NLA's prior comments (EPA-HQ-OAR-2017-0015-0166), the lime industry has 422 kiln feed samples as well as 61 samples from the Eden, Wisconsin quarry. This is substantially more data than found in the docket for the Brick and Structural Clay Products NESHAP, for which EPA promulgated an IQV standard. Nationwide, the Brick/Clay industry provided 167 samples and the final IQV used in calculating the mercury standard for their industry was based on seven samples from four plants.<sup>27</sup>

#### **A. EPA Should Use Quarry Data from the MACT Floor Sources**

An intra-quarry variability (IQV) factor would account for variability in the mercury content of the raw material over the long-term life of the quarry. NLA's suggested approach to achieving this objective is well documented and supported by information supplied to EPA during its rulemaking process. The data showed that intra-quarry variability of mercury in the real world is relatively high, and would have a significant impact on the mercury MACT floor. This is a strong justification for applying an IQV, not a reason for declining to do so.

The Eden quarry samples are more representative of this long-term variability than are kiln feed samples, because they represent limestone that will be used in the kiln over the life of the quarry. Samples that represent the life of the quarry are far more representative of IQV than materials stockpiled over hours, days or a week in transient short-term stockpiles. In addition, the samples from the Eden quarry were taken from drill holes throughout the quarry and at approximately 6-foot intervals. As such, each sample represents a section of the quarry that would be mined over decades of quarry operation. As such, the originally proposed IQV based on data for the two MACT floor plants, which includes quarry samples from Eden and kiln feed samples from both plants, is appropriate for setting a UPL-based standard. In addition, EPA should use this quarry data because it represents the MACT floor source.

#### **B. EPA's Use of Weighted Average Data in the Intra-Quarry Variability Is Not Technically Sound, and EPA Should Use the Calculations Provided by NLA**

NLA is pleased that EPA now proposes to apply an IQV based on data from the two MACT floor sources. However, EPA's calculation of the IQV must be corrected.

The methodology utilized by EPA in the proposed rulemaking does not properly reflect the variability of mercury content in limestone that should be reflected in an emissions limitation for a lime kiln. As detailed in NLA's prior comments on this rulemaking, an IQV is utilized to incorporate variability in limestone mercury content into the upper prediction limit (UPL) calculation used in developing an emission limit.

In NLA's proposed methodology for applying an IQV to this rulemaking, limestone mercury content for the two kilns in the MACT floor were utilized to calculate an IQV. The proposed rulemaking also uses this data set, but EPA chose to use *weighted* average mercury content rather than individual test values. Limestone samples collected from each of the five

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<sup>27</sup> EPA-HQ-OAR-2013-0291-0660, Appendix E

boreholes collected from a MACT pool quarry were weighted to reduce bias from varying sample interval thicknesses. Weighted sample data enables meaningful comparison across the quarry and within each geological unit. In other words, sample weighting supports comparison for geological study purposes, but weighting is not appropriate for an IQV calculation where capturing variability is necessary and appropriate.<sup>28</sup>

A consequence of sample weighting is to lower the standard deviation of the data set, and lower the relative standard deviation, which significantly reduces the IQV and corresponding emission rate, as much of the variability in the data set is averaged out. A data set of 70 data points was reduced to only 7 with EPA's approach, thus mathematically suppressing the natural variability that the IQV must account for.

An IQV is intended to adjust a UPL-based emission limit to reflect the expected stack testing results for the MACT Floor sources for any reasonably expected mercury content. By using weighted averages, EPA's calculations assume that all limestone in each core sample would have the same mercury content or be burned during a single stack test. However, each of these core samples represents a larger volume of stone across the deposit (in contrast to the specific grab sample data). Furthermore, using averages reflects false assumption with respect to how the quarry will be mined in practice, and how the mine's stone will eventually be processed in a lime kiln, and when mercury would actually be emitted. That is, any single (unaveraged) Hg data point could represent stone fed to a kiln over any one day, month or year.

Therefore, EPA should not apply quarry data averaging and should rather base the existing source Hg limitation on NLA's originally proposed mercury emission limit of 50.0 pounds mercury per million tons of limit produced. This remains the appropriate emission limit for existing sources.

### **C. EPA's Proposal to Not Use the Best Performing Emission Source to Set the Mercury Limit for New Kilns Is Arbitrary and Unlawful**

EPA evaluated two options for setting the mercury emission limit for new kilns, one using the best performing source (at Graymont's Eden Plant) and one using the second-best performing source (at Carmeuse's Maysville Plant). EPA proposes to set the new kiln limit based on the Maysville Plant. In each case, EPA included an IQV using the mercury limestone content data for only that plant. As a result, EPA sets a lower standard for new kilns that it would have set based on the best performing plant, because of the difference in IQVs.

The Maysville Plant has only seven mercury content values on which to set an IQV, all based on limestone feed data during two events. The Eden Plant data set is more extensive with core data sampling throughout the quarry which better represents the mercury variability of the quarry over time. The Maysville feed data is much more limited, and thus less able to show the variability throughout the full quarry. Any new kiln may be built at a limestone quarry with varying mercury content similar to the Eden Plant quarry. It is unreasonable to assume that any future kiln would have homogenous mercury content throughout its limestone supply (and indeed, feed pile data may not accurately indicate mercury content in the quarry, because, as

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<sup>28</sup> A more detailed explanation of this point is set out in NLA member Graymont's separate comments.



EPA notes in the preamble, feed piles represent only a small portion of the quarry, and not a mix of multiple areas of the quarry).

Notwithstanding the comments on calculating the IQV, setting an emission limit for new sources that is not based on the best-performing emission unit does not align with EPA policies and precedent. The Eden Plant kiln is the best-performing emission unit and based on available mercury data for the Eden quarry this unit itself cannot be reasonably assured to comply with the proposed emission limit for new kilns.

EPA should set the new source emission limit based on the best-performing source rather than arbitrarily using the second-best source.

## **ORGANICS**

### **XVII. USE OF THC AS A SURROGATE FOR ORGANIC HAPS IS UNLAWFUL**

In its comments on the January 23, 2023, Proposed Rule (EPA-HQ-OAR-2017-0015-0166), NLA submitted extensive information demonstrating that Total Hydrocarbons (THC) cannot be used as a surrogate for organic HAPs, because emissions of THC do not correlate with emissions of organic HAPs. Because EPA has appropriately decided not to use THC in this way, those points are not repeated here, but are incorporated herein by reference.

### **XVIII. EPA'S PROPOSAL TO SET AN AGGREGATED (TOTAL) ORGANIC HAP STANDARD IS AN APPROPRIATE APPROACH, BUT CORRECTIONS ARE NEEDED**

#### **A. NLA Supports EPA's Proposal to Set a Standard Based on Organic HAPs Detected and Measured at Lime Plants**

In a December 6, 2021, memorandum (EPA-HQ-OAR-2017-0015-0068), NLA urged EPA to adopt an emission standard based on an aggregate of organic HAPs, similar to the alternative that was established for the cement industry. NLA performed, with the help of a well-respected technical consultant (Alliance Technical Group ("Alliance")), a comprehensive review of oHAP testing done during the rule development period. Rather than focusing only on the nine oHAPs that were previously submitted, the consultant thoroughly reviewed the Method 320 spectra from twelve stack tests conducted at major source lime kilns in order to identify all detectable oHAPs in the tests. This review resulted in the identification of six additional oHAPs (including the four identified by EPA), providing a complete picture of oHAPs present using approved test methods, as shown on Table IV below. More details on this analysis are found in NLA's prior comments and its appendices, EPA-HQ-OAR-2017-0015-0166.

NLA, with the assistance of Alliance, generated a table including the complete list of identified oHAPs that could be included in an aggregated oHAP alternative. This list includes (a) all oHAPs detected using EPA methods M.18 and M.320 and specific to lime kilns identified in stack test reports provided to EPA in the 2016 section 114 ICR, and as part of a voluntary collection effort by the industry in 2021-22, and (b) 6 additional oHAPs identified by new review of the

test spectra, including all four of the additional oHAPs identified by EPA in the January 2023 Proposed Rule preamble (88 Fed. Reg. 813). The frequency of detection for each HAP is also shown.

**Table B: Organic HAP from Lime Kilns and Representative Method Detection Limits  
Parts per Million Adjusted to 7 Percent O<sub>2</sub>, Dry<sup>1</sup>**

PARAMETER	Analytical Method	RDL (ppm)	3x RDL	Frequency of Detection <sup>3</sup>
Benzene	M.18	0.025	0.075	8/16
Carbon Disulfide <sup>2</sup>	M.18	0.201	0.603	4/12
Ethyl Benzene <sup>2</sup>	M.18	0.024	0.072	6/10
Naphthalene	M.18	0.0068	0.020	4/12
Styrene	M.18	0.0036	0.011	4/14
Toluene	M.18	0.011	0.033	6/16
Vinyl Chloride <sup>2</sup>	M.18	0.268	0.804	7/12
Xylenes (Mixture of o, m, and p Isomers) <sup>4</sup>	M.18	0.0235	0.071	9/26
1,3-Butadiene <sup>5</sup>	M.320	0.268	0.804	7/12
Acetaldehyde	M.320	0.596	1.788	4/14
Acrolein <sup>2,5</sup>	M.320	0.670	2.010	2/12
Formaldehyde	M.320	0.521	1.563	8/14
Methanol <sup>5</sup>	M.320	0.223	0.669	8/12
<b>TOTAL</b>		<b>2.8</b>	<b>8.5</b>	<b>77/182 (42%)</b>

#### Notes

1. Assumes 10 percent moisture content.
2. In the January 2023 Proposed Rule preamble, EPA “also identified additional organic HAP pollutants in the analyses including the pollutants acrolein, carbon disulfide, ethyl benzene, and vinyl chloride.” These HAPs were also identified in the retroactive review of M.320 FTIR spectra from 12 samples.
3. Frequency of Detection using approved EPA methods i.e., M.18 and M.320 from stack tests provided in 2016 ICR, supplemental test data provided by industry, and retroactive M.320 review performed by Alliance.
4. Detection limit shown for xylenes is the sum of individual isomers (o-xylene = 0.0073, m-xylene = 0.0075, p-xylene = 0.0087) (all ppmvd@7% O<sub>2</sub>).
5. HAP was detected as part of retroactive review of M.320 FTIR spectra from 12 samples.

The representative detection limits (provided by Alliance based on its laboratory experience and expertise) were multiplied by three and then summed for an aggregate total of 8.5 ppmv at 7% O<sub>2</sub> dry, assuming 10 percent moisture content. NLA’s prior comments urged EPA to select this aggregated limit as a reasonable threshold for organic HAP based on the specificity of the HAP emitted from lime kilns combined with the low concentration and detection frequency.

This approach to an oHAP limitation is consistent with the Clean Air Act and EPA’s precedents in establishing MACT emissions limitations. As noted above, THC is an inappropriate surrogate for organic HAPs in the lime industry. An aggregated (total) oHAP limit, on the other hand, is a better option because it causes the allowable emission limit to be directly linked to the regulated pollutants and excludes irrelevant substances that THC would include. The use of an aggregated oHAP alternative was used in the Portland Cement MACT, recognizing inherent differences in emissions of oHAPs and THC from cement kilns. Lastly, the

proposed aggregated oHAP limit follows established conventions that EPA is proposing for D/F in this rulemaking. The limit for D/F is based on the aggregate amount of D/F congeners and given their very low levels below detection limits, the use of three times the Representative Detection Limit (3xRDL) setting method is appropriate in such cases.<sup>29,30</sup>

Use of an aggregated oHAP limit is also appropriate here because of the very low oHAP emissions, the very low detection limits for many of the substances, the sporadic appearance of these substances (note that no HAP listed above appeared in all tests, and many were not detected in a majority of tests),<sup>31</sup> and EPA's prior determination that risks from organic HAPs are acceptable with an ample margin of safety even with no additional controls at all. Overall, the use of an aggregated organic HAP limitation is superior to THC as a surrogate and should be incorporated into the final rulemaking.

Thus, EPA should use an aggregated oHAP approach as the emission standard for lime plants. Under this approach, sources would perform 5-year compliance testing for all the oHAPs on the list, and compliance would be based on the total aggregate detected being lower than the aggregate standard. Continuous compliance would be ensured by parametric monitoring of air pollution control devices.

#### **B. EPA's Proposed 8-HAP Aggregate oHAP Standard Must Be Corrected**

NLA is pleased that EPA has adopted the approach of setting an aggregate oHAP standard based on the sum of 3 times the representative detection limit (RDL) of a group of oHAPs. EPA has proposed to base the standard on 8 organics (as opposed to the 15 set out by NLA), as follows:

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<sup>29</sup> See EPA Docket Item: EPA-HQ-OAR-2017-0015-0117. Memorandum from Steffan Johnson, USEPA Regarding Determination of "non-detect" from EPA Method 29 (multi-metals) and EPA Method 23 (dioxin/furan) test data when evaluating the setting of MACT floors versus establishing work practice standards.

<sup>30</sup> See EPA Docket Item: EPA-HQ-OAR-2017-0015-0112. Memorandum to Docket EPA-HQ-OAR-2002-0058 from Peter Westlin, EPA/OAQPS/SPPD regarding Measurement Detection Capabilities for EPA for Instrumental Test Methods.

<sup>31</sup> Another reason THC should not be used as a surrogate for oHAPs is that no single oHAP is "invariantly present" in the proposed surrogate as required in *Sierra Club v. EPA*, 353 F.3d 976 984 (D.C. Cir. 2004).

**Table C: EPA's Proposed Aggregate Organic HAP Standard**

Pollutant	RDL (ppmvd @ 7 percent O <sub>2</sub> )	3xRDL (ppmvd @ 7 percent O <sub>2</sub> )
Formaldehyde	0.14	0.42
Acetaldehyde	0.29	0.87
Toluene	0.014	0.028 <sup>32</sup>
Benzene	0.022	0.066
Xylenes (mixture of m, o, and p isomers)	0.023	0.069
Styrene	0.0043	0.013
Ethyl benzene	0.057	0.18
Naphthalene	0.0081	0.025
TOTAL		1.7

NLA requested that experts in FTIR and detection limits at Alliance review EPA's revised approach and calculations, and this review revealed that certain elements of EPA's approach require correction. (Alliance's report is Appendix D, and the accompanying Excel spreadsheets have been submitted separately as Appendix D2.)

EPA's proposed RDLs for formaldehyde and acetaldehyde differ substantially from the RDLs calculated and submitted by Alliance. While there are also differences with respect to the other HAPs on the list between EPA's proposal and Alliance's suggested values, they vary much less. These differences appear to stem from differences in how detection limits are set for HAPs measured using Method 320 (used for formaldehyde and acetaldehyde), and those measured using Method 18 (used for the other oHAPs on EPA's list). With Method 18, each analytical laboratory typically uses a standard detection limit, based on testing of that lab's equipment and its capabilities. These tend to be similar to each other across the analytical service industry, and thus there is not likely to be a large range of values. With Method 320, on the other hand, a detection limit is calculated with respect to each test that is performed, and it can vary substantially, particularly if proper procedures are not followed in determining the detection limit.

In developing its proposed RDLs for the 8 HAPs, EPA averaged the five lowest detection limits used in tests for each HAP. This averaging approach did not produce anomalous results for HAPs tested using Method 18 because, as noted above, labs use a single value for all tests, and they tend to be similar. However, as detection limits for Method 320 tests vary due to factors other than the lab's capability, arbitrary use of the five lowest values creates anomalous results, and does not generate a representative value. Instead of averaging only the five lowest detection limits, EPA should (at least for the Method 320 tests), average all of the detection limits, to generate a more representative result. In setting the similar aggregated standard in the cement rule, EPA averaged the detection limits for all tests, and it should follow that precedent in this rule as well. The purpose of averaging is to identify representative detection limits, not to identify the arguably best performing labs.

<sup>32</sup> Note: There is a calculation error in the proposed chart from the preamble. The 3xRDL value shown for toluene is only 2 times the RDL, not 3 times as it should be. This should be corrected, and the correct number should be .042 (although the sum still rounds to 1.7).

Further review by Alliance of the same source testing reports used by EPA in its evaluation revealed that some of the detection limits from stack tests should not have been used to calculate RDLs. Removing those results from the averaging yields a smaller number of tests to be averaged, making the consideration of the issue of whether to average only the lowest results unnecessary.

The discussion below explains why several source testing reports should be removed from EPA's analysis and from the computed average. It also discusses several other corrections to the calculations that should be made. For the reasons discussed above, this discussion addresses only the Method 320 HAPs (formaldehyde and acetaldehyde), because revision of the Method 18 results would not alter the final limit significantly.

### **1. EPA Should Use Method Detection Limits Determined Only Using the MDC#2 Approach**

Two common approaches were utilized to calculate the reportable MDL in the data used by EPA. Both are from ASTM D6348, which EPA has often regarded as equivalent to EPA Method 320, which is the standard method for FTIR testing of gas phase emissions from stationary sources. Two reports did not include any MDL documentation, and are thus not included in further discussion, because it cannot be determined if proper methods were used to generate the MDLs used in those reports.


The first MDL used in four of the reports is the MDC#1 calculation, which measures the detector noise in a pure blank sample, within the analytical region for a given compound. This is useful to determine the analytical uncertainty of a value, but it is commonly understood that it does not speak to actual detector sensitivity.

The second MDL used in five of the reports is MDC#2, which similarly measures the noise of the detector, but with the inclusion of major matrix interference. This is generally regarded as a more appropriate MDL determination since FTIR is an optical measurement, and elevated absorbances from interference can significantly impact the analyzers ability to measure small changes in absorbance (and thereby concentration). Past EPA guidance has indicated that MDC#2 is the preferred approach for data, and Alliance confirms that MDC#2 is the preferred approach for this analysis.

The reports including MDC#1 returned lower MDLs than the reports including MDC#2 (see Tables 1 & 2). EPA's calculation of an appropriate MDL seems to consider these four reports, plus one MDC#2 calculated report in the determination of the proposed measurement limit.

EPA should revise the MDL values considered here to conform to EPA's standard directive of using MDC#2 calculated results to determine an appropriate calculation of a representative detection limit. As the charts below show, when only MDC#2 results are used, different (and higher) average values for both formaldehyde and acetaldehyde are produced.

**Table D: Comparison of Detection Limits for M320 oHAPs Between MDC#1 and MDC#2 Procedures**

Table 1 - MDC#1			Table 2 - MDC#2		
REPORT	Formaldehyde	Acetaldehyde	REPORT	Formaldehyde	Acetaldehyde
1	0.1426	0.2695	3	1.090	0.550
8	0.112	0.254	4	0.110	0.230
9	0.155	0.435	5	1.090	0.550
10	0.198	0.499	6	1.000	1.530
			11	0.340	0.980
					
Maximum	0.198	0.499	Maximum	1.090	1.530
Minimum	0.112	0.254	Minimum	0.110	0.230
Average	0.152	0.364	Average	0.726	0.768

EPA should revise its RDL calculations to reflect these corrected values from Table 2 for the two method 320 HAPs.

## **2. MDLs Should be Summed on the Same Basis of Moisture and Oxygen**

MDLs presented in reports are a mix of wet basis (i.e., not corrected for moisture), and dry corrected basis. This creates a certain amount of noise in the data set. Ultimately the detection limit values in the Proposed Rule do not appear to contain a correction for moisture in the source, which can cause a significant difference in the final result which is to be added to other components. For example, if a measured MDL is 1.0 ppmvw, when reported on a moisture corrected basis from a source that contains 15% moisture, the result becomes 1.176 ppmvd. Where results from multiple compounds must be summed, they should be summed on the same basis, rather than a mix of wet and dry corrected results. As this total result may contain some mix of detected and non-detected compounds, the MDLs used for this standard setting should include this adjustment criteria.

Similarly, as the final results are all to be corrected to a 7% oxygen concentration, an average oxygen concentration adjustment should also be made to the MDL values used for the floor calculation. These corrections are included in the discussion of a bulk correction factor below.

## **3. EPA Should Use a Bulk Average Correction Factor**

In the Proposed Rule, the values of multiple chemical species are summed to determine compliance with a limit that is based on a dry ppm basis, corrected to a 7% oxygen concentration. Values included in the summation must be corrected to this basis. To set an emissions limit that includes detection limits, those limits must be adjusted and corrected to match *before* including them in the sum. From the reports reviewed by Alliance, the average combined correction factor results in an increase of 22% to the results. However, Alliance notes that this is a source-specific correction factor depending on the moisture and oxygen content native to the source. As such, attempting to normalize the limit based on adjusted results can

have varied impacts depending on the source operating conditions. Given the variability, Alliance recommends taking a bulk average correction factor to the MDLs used in calculating the standard.

The data included in this analysis comprises multiple sources in some reports – in those cases the individual sources were averaged for inclusion in the presented table. Three reports were excluded due to the variety of testing conditions that included abnormally high or low oxygen and moisture concentrations.

Two separate calculations were performed – a combined correction factor (CF) determined by separately averaging the moisture and the oxygen to determine an average correction factor for each. These average factors were then combined for a total correction factor. A second calculation determines the total correction factor for each source, then looks at an average of these bulk correction factors. Both calculations are presented in Alliance's Table reproduced below. Notably, both approaches result in nearly an identical value; 1.217 for the total combined CF, and 1.218 for the average of total factors from each report.

**Table E: Summary of Moisture and Oxygen Correction Factors to Be Applied to Detection Limits**

Table 3 - Moisture and Oxygen Correction Factors					
REPORT	H2O%	O2%	Dry CF	7%O2 CF	Total CF
1	4.2	7.6	1.044	1.043	1.088
2	7.7	9.3	1.084	1.195	1.295
3	6.9	10.0	1.074	1.276	1.370
4	4.2	7.9	1.044	1.073	1.119
5	6.7	7.8	1.072	1.063	1.139
6	6.5	6.7	1.070	0.980	1.049
7	15.0	8.4	1.176	1.109	1.305
11	5.2	10.2	1.054	1.304	1.375
Maximum	15.0	10.2	1.176	1.304	1.375
Minimum	4.2	6.7	1.044	0.980	1.049
Standard Deviation	3.47	1.24	0.043	0.116	0.132
Average	7.0	8.5	1.077	1.130	1.218
STDEV contrib			4%	10%	11%
Combined CF					1.217

Accordingly, EPA should apply a bulk correction factor of 1.217 to the RDL calculations for formaldehyde and acetaldehyde.

#### 4. EPA Should Use Corrected M.320 Method Detection Limits

Using properly selected MDLs in the emissions limit determination, and accounting for the corrections that must be applied to all formaldehyde and acetaldehyde data for summation, Alliance's analysis shows a standard minimum reportable concentration of 0.88 ppmvd @7% O<sub>2</sub> formaldehyde, and 0.94 ppmvd @7%O<sub>2</sub> for acetaldehyde. Therefore, EPA should adopt these

RDLs for use in the aggregated oHAP limit. As shown in the table below, correcting these values results in an aggregated emission limit of 5.9 ppmvd @ 7% O<sub>2</sub>, and EPA should adopt this value as the limit in the final rule.

**Table F: Proposed Aggregate oHAP Limit with Corrections Applied**

Pollutant	RDL (ppmvd @ 7 percent O <sub>2</sub> )	3xRDL (ppmvd @ 7 percent O <sub>2</sub> )
Formaldehyde	0.88	2.64
Acetaldehyde	0.94	2.82
Toluene	0.014	0.042
Benzene	0.022	0.066
Xylenes (mixture of m, o, and p isomers)	0.023	0.069
Styrene	0.0043	0.013
Ethyl benzene	0.057	0.18
Naphthalene	0.0081	0.025
TOTAL		5.9

#### **5. EPA Should Allow the Use of Zero for Non-Detected oHAPs, and Should Revise the Definition of Total Organic HAPs**

Within the definition of “Total Organic HAP” in §63.7143 in the docket redline, EPA states:

If measurement results for any pollutant are reported as below the method detection level (e.g., laboratory analytical results for one or more sample components are below the method defined analytical detection level), you must use the method detection level as the measured emissions level for that pollutant in calculating the total organic HAP value.

This approach is unreasonable as applied to non-detect results. This approach would guarantee that each measurement would result in a total of at least one third of the standard, even if no oHAPs were detected at all. Considering that the aggregate standard is already extremely low, EPA’s treatment of non-detects will lead to erroneous over-estimation and potential false non-compliance results.

Rather, for results below the detection limit, a value of 0 should be used for that HAP, since the HAP was not in fact detected. Note again, as shown above, that for the 8 oHAPs EPA proposes to use in the aggregate standard, only two were found in more than half of the tests reviewed, and none was found in all tests. There is no reason to assume that an undetected oHAP is present in any test. Using 0 would also be consistent with the method EPA applies in the Proposed Rule with dioxin/furan congeners that are below the detection limit.<sup>33</sup>

In addition, the definition of “Total Organic HAP” should not refer to “method detection levels,” because this is likely to cause confusion. Rather, it should refer to the Representative

<sup>33</sup> While NLA believes that zero is the appropriate value to use for non-detects, EPA could, in the alternative, use one half of the RDL, as it has done in other contexts.



Detection Limits (RDLs) as specified in the table in the preamble. If EPA declines to use zero for non-detects, then it should include the table of RDLs in the final rule language and should revise the provision above to read “...you must use the method detection level or the representative detection level (RDL) as listed in Table \_\_, whichever is lower, as the measured emissions level for that pollutant...” The lower of these two figures should be used, because the RDL is the source of the standard, and undetected levels should not be presumed to be higher than the RDL.

## **DIOXINS/FURANS**

### **XIX. EPA LACKS SUFFICIENT DATA TO SET A MACT FLOOR FOR DIOXINS AND FURANS, AND SHOULD ISSUE A NEW ICR FOR DIOXIN/FURAN DATA**

EPA proposes to set a MACT floor for dioxins and furans (D/F) for all major lime sources based on data from only two lime kilns—one with non-detectable amounts of D/F, and another with very low but detectable amounts. EPA rejected all other D/F data submitted by the industry based on determinations that the test methods used were not recognized by EPA, or for other technical reasons. Based on these two data points, EPA proposes to set a MACT floor for the entire industry—96 lime kilns—assuming that MACT floor for the industry should be set based on non-detectable amounts of D/F.

EPA provides no data indicating that the tests from these two lime kilns—either individually or taken together—are representative of the emissions of the lime industry. It is arbitrary and capricious for EPA to set a standard based on such limited data. *Chem. Mfg. Ass’n v. EPA*, 28 F.3d 1259, 1268 (D.C. Cir. 1994) (“...we conclude that it was arbitrary and capricious for the EPA to list MDI as a high-risk pollutant solely upon the basis of the RfC for MDI, without identifying any serious health effect with which it has ever been associated”). EPA should withdraw the proposed D/F standard and issue a new Information Collection Request to collect sufficient data to make a statistically valid determination of a proper MACT standard.

Pursuing a new Information Collection Request for D/F would have multiple benefits. First, and most importantly, it would permit EPA to establish emission standards based on genuinely representative data from the industry. Second, if sufficient results are non-detect, it would assist in setting a work practice for D/F. Third, comprehensive data may show that subcategories would be appropriate for lime plants emitting D/F, based on type of equipment or type of product being manufactured, as was the case for HCl.

In the alternative, EPA’s lack of adequate data should support the establishment of a work practice for D/F, as described below. When EPA does not have sufficient HAP data to set a numeric standard, the D.C. Circuit has upheld EPA’s promulgation of a non-numeric work practice standard. *Chesapeake Climate Action Network v. EPA*, 952 F.3d 310, 315 (D.C. Cir. 2020).

Finally, EPA should consider the alternative of setting no standard for D/F at all as it did in 2004. EPA already established that D/F emissions from lime manufacturing processes are

negligible.<sup>34</sup> Accordingly, such emissions are *de minimis*, and do not require an emissions standard. *Alabama Power Co. v. Costle*, 636 F.2d 323, 400 (D.C. Cir. 1979) (describing EPA’s discretion to exempt certain *de minimis* releases from regulation under the Clean Air Act). Such a standard is clearly not “necessary” under the terms of the *LEAN* decision and the Clean Air Act.

## **XX. IN THE ALTERNATIVE, EPA SHOULD SET THE WORK PRACTICE STANDARD FOR DIOXINS/FURANS PROPOSED BY NLA**

During the development of the January 2023 Proposed Rule, EPA repeatedly and consistently informed NLA that it was planning to issue a work practice for dioxins and furans, because, according to EPA, it had D/F data showing that more than 55% of test results were non-detect, thus permitting EPA to establish a work practice. NLA and EPA had multiple discussions on the form a work practice would take, and NLA submitted a suggested work practice. *See* EPA-HQ-OAR-2017-0015-0090 and attachment. NLA noted that due to the extremely low D/F emissions, an appropriate work practice would require sources to properly operate the air pollution control devices already in place to control particulate matter. However, in both the January 2023 Proposed Rule and the new Proposed Rule, EPA proposed to set a MACT floor based on data from a single lime kiln. In the new Proposed Rule, EPA requests comment on a potential work practice.

NLA continues to believe that EPA should apply the work practice previously submitted by NLA in EPA-HQ-OAR-2017-0015-0090 and attachment. Considering that EPA has already found that risks from dioxin and furan emissions are acceptable with an ample margin of safety, and that D/F emissions are extremely low, a practice requiring sources to properly maintain existing air pollution control devices is sufficient to ensure that risks from D/F emissions remain low.<sup>35</sup>

## **XXI. EPA SHOULD PROVIDE AN ALTERNATIVE COMPLIANCE METHOD FOR DIOXINS AND FURANS**

NLA continues to believe that the work practice it previously suggested should be adopted by EPA. However, if EPA chooses not to provide a work practice, NLA suggests that EPA set an alternative method of complying with the numerical standard by allowing an appropriate inlet temperature to the air pollution control device (APCD) to be set on a site-

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<sup>34</sup> *See* EPA Docket No. A-95-41, Item No. II-B-121. (“Emissions of dioxin and furan congeners are well-documented but are shown to be emitted in extremely small quantities; therefore, dioxin and furan data were not collected in this search.”)

<sup>35</sup> NLA has not included its suggested work practice language in the “blueline,” because EPA previously declined to adopt this work practice. However, if EPA decides to include the work practice, the relevant rule language would state that “Lime kilns operators, as an indicator of good kiln operation, will comply with Lime MACT PMCD operating requirements at all times. For lime kilns with a fabric filter (FF) or an electro-static precipitator (ESP), comply with Tables 1, 2, and 5 requirements which serve to affirm good operating practices, and for lime kilns with a wet scrubber comply with Tables 1, 2, and 5 requirements including continuous performance levels for flow and pressure drop and flow rate which continuously assures good operation is occurring.”

specific basis. This is due to the wide variety of gas temperatures entering the various APCD and the variety of kiln/APCD configurations.<sup>36</sup>

This approach is justified because compliance testing combined with a site-specific temperature (i.e., inlet to APCD temperature) would ensure that each plant's configuration and temperature parameters result in D/F emissions that meet the numeric standard. Compliance with the site-specific temperature should be on a 30-day rolling average. If annual compliance testing for a period of three years shows the lime plant meets the numeric standard and the temperature requirement is met, then the lime plant should be allowed to discontinue stack testing for D/F and show compliance through the parametric temperature requirement alone.

This temperature-based approach would be a parametric way of implementing the 0.037 ng/dscm standard. Therefore, the temperature-based approach is not a work practice, and measuring 0.037 with a stack test or measuring site-specific temperature would be alternative means of complying with the same numerical standard. (NLA would like to emphasize that this approach should only be set as an alternative means of compliance to periodic stack testing, and not the sole means of compliance, because some lime plants will be able to meet the numeric standard without temperature control, and other plants may have to employ controls other than temperature controls to meet the numerical standard.)

NLA suggests adding the following language to Table 6, Line 22:

As an alternative compliance method to the performance testing specified above, a source may perform annual testing for a period of three years to establish a site-specific temperature of gases entering the inlet to the air pollution control device at which the numerical standard for dioxins/furans is met. Subsequently the source may rely on parametric temperature monitoring on a 30-day rolling average, and further performance testing is not required.

## XXII. D/F—REQUIRED TECHNICAL CHANGES AND CORRECTIONS

If EPA chooses to promulgate a numerical emissions standard for dioxins and furans, the following technical corrections should be made.

### A. EPA Has Properly Corrected the Proposed D/F Emissions Based on EPA's Proposed D/F Testing Requirements.

In the January 2023 Proposed Rule, EPA proposed a limit on D/F based on EPA's Johnson memo.<sup>37</sup> To properly utilize Reference Image 4-3 to obtain a limit, the stack gas sample volume, in dry standard cubic meter (dscm), is required to select the appropriate 3xRDL value. NLA pointed out in comments that EPA's proposed D/F limit was set incorrectly in that it

<sup>36</sup> These variations are also the reason no temperature-based work practice has been identified that would be practicable for the lime industry.

<sup>37</sup> See Reference Image 4-3: EPA Docket Item: EPA-HQ-OAR-2017-0015-0117. Memorandum from Steffan Johnson, USEPA Regarding Determination of "non-detect" from EPA Method 29 (multi-metals) and EPA Method 23 (dioxin/furan) test data when evaluating the setting of MACT floors versus establishing work practice standards, June 5, 2014.

improperly referenced a sample collection volume of 4 dscm (and not 3 dscm as is included in the rulemaking). EPA has recognized this issue and has corrected the D/F limit to 0.037 ng/dscm in the 2024 Proposed Rule. NLA commends EPA for this correction.

**B. The TEF in Table 11 of the Proposed Rule Redline and EPA’s 2010 TEF Docket Document Do Not Match.**

In the preamble to the new Proposed Rule, EPA states the following:

Additionally, the EPA is incorporating by reference EPA/100/R– 10/005, “Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2, 3, 7, 8- Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds,” December 2010, which is the source of the toxicity equivalence factors (TEF) for dioxins and furans used in calculating the toxic equivalence quotient of the proposed dioxin and furan standard.

89 Fed. Reg. 9103.

Table 2 of the December 2010 document referenced in the preamble provides the recommended TEFs for D/F that are apparently incorporated by reference. However, Table 11 in the Proposed Rule redline contains incorrect TEF factors from 1989. This disparity could create confusion in future testing for D/F and should be corrected.

Also note that in the definitions section of the docket redline (§63.7143), the definition of TEQ refers to Table 10, when it should refer to Table 11.<sup>38</sup>

**COMMENTS ON MONITORING**

As noted above, NLA supports EPA’s decision to base monitoring on periodic stack testing and parametric monitoring. However, some adjustments to the proposed parametric monitoring are needed.

**XXIII. EPA SHOULD MODIFY PARAMETRIC MONITORING REQUIREMENTS FOR PERIODS OF STARTUP AND SHUTDOWN**

The Proposed Rule requires sources to comply with emissions limits and operating limits at all times, except during startup and shutdown as indicated in Table 2 of the docket redline. Even though NLA endorses the use of periodic stack test and parametric monitoring to demonstrate continuous compliance, the Proposed Rule does not appropriately address how operating limits will be met during lime kiln startup or shutdown for kilns using dry sorbent injection, ACI or thermal oxidizers. During these periods, sorbent and carbon cannot be injected at the same rates as during normal operations, and operating conditions for RTOs differ as well.

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<sup>38</sup> Note that if Table 9, referring to emissions averaging, is deleted as NLA suggests, the TEQ table would again be Table 10. EPA should make sure the definition reference is consistent with the table number.

NLA requests that EPA add the following (new) language to Table 2 to address applicable operating limits in the Proposed Rules during startup and shutdown.

5. All new and existing lime kilns that use dry sorbent injection or carbon injection during startup and shutdown	When a lime kiln is in startup or shutdown (as defined in section 63.7143), the Table 3 operating limits for sorbent and/or carbon injection do not apply and the lime kiln operator shall ensure that sorbent or carbon injection is in operation until the unit is no longer in startup or shutdown. During startup and shutdown, the control device shall be operated in accordance with manufacturer's recommendations or by a site-specific operating procedure for startup and shutdown events.
6. All new and existing lime kilns that use a thermal oxidizer during startup and shutdown	When a lime kiln is in startup or shutdown (as defined in section 63.7143), the Table 3 temperature limits for a thermal oxidizer do not apply and the lime kiln operator shall ensure that the thermal oxidizer is in operation until the unit is no longer in startup or shutdown. During startup and shutdown, the control device shall be operated in accordance with manufacturer's recommendations or by a site-specific operating procedure for startup and shutdown events.

#### **XXIV. EPA SHOULD PERMIT USE OF APPROVED MONITORING APPROACHES (SUCH AS BAG LEAK DETECTION SYSTEMS) DURING STARTUP AND SHUTDOWN**

In the 2020 Lime MACT RTR rulemaking, EPA incorporated new requirements for startup and shutdown of kilns as it related to existing visible emissions standards for PM. However, the final rulemaking did not specify how kilns already using approved monitoring systems other than continuous opacity monitoring systems (COMS), such as bag leak detection systems (BLDS), during normal operations should comply during startup and shutdown events.

Kilns in the lime industry have used BLDS (and other approved methods) for continuous compliance standards under the Lime MACT since its original inception in lieu of COMS. EPA, however, in several instances, has disapproved applications for Alternative Monitoring approaches proposing that a BLDS, like a COM, be allowed during startup/shutdown events. EPA should clarify this issue now and should make it clear that an approved method such as BLDS may be used during startup/shutdown events as they are allowed for use under normal operation. Therefore, NLA requests that the following provision be added to §63.7090(c) of the regulation to clearly authorize use of these methods during startup/shutdown events:

When a lime kiln is in startup or shutdown, a lime kiln may use any method approved for use to show continuous compliance during normal operations (such as a bag leak detection system) to demonstrate proper operation of the baghouse as a surrogate to demonstrating compliance with visible emission limits during these events.

## **XXV. EPA SHOULD ADJUST LANGUAGE IN §63.7113**

In §63.7113(h)(2) and (3) of the redline, EPA, in reference to monitors used to measure injection rates, states that the device should be installed and calibrated “in accordance with the manufacturer's procedures and specifications.” In some cases, manufacturers’ procedures and specifications are unavailable or out of date, or are otherwise incomplete or inapplicable. NLA requests that EPA add the phrase “or other applicable procedures (such as industry standards or best practices) to ensure proper operation of the device.”

In §63.7113(i)(3), EPA states that “The calibration reference for the temperature measurement must be a National Institute of Standards and Technology calibrated reference thermocouple-potentiometer system or alternate reference, subject to approval by the Administrator.” NLA notes that it would be preferable for this section to call for the measurement to be “calibrated to a National Institute of Standards and Technology traceable certified reference thermocouple,” because such traceable certified reference thermocouples are more readily available.

In §63.7113(4), the term “and other temperature sensors” should be deleted. NLA is not aware of temperature sensors other than thermocouples in use in this application.

## **XXVI. EPA SHOULD ADD CLARIFYING LANGUAGE TO §63.7112(d)**

In §63.7112(d), EPA adds language on test runs for performance tests. NLA believes that the language on test duration could cause some confusion, and recommends that EPA revise the last sentence in the section to read “Each test run must last at least 1 hour for PM testing or as specified in Table 5 to this subpart for HAPs other than PM.” Alternatively, EPA could incorporate the 1 hour test run requirement for PM testing into Table 5 (as with the duration requirement for other HAPs), and simply revise the language in (d) to “The duration of each test run shall be as specified in Table 5 to this subpart.”

## **ADDITIONAL COMMENTS AND CORRECTIONS**

### **XXVII. EPA SHOULD CORRECT THE EQUATION FOR CALCULATING HCl AND MERCURY LBS/TON OF LIME PRODUCED EMISSION RATES**

EPA’s proposed redline text includes Equation 4 in Section 63.7112(n) to calculate the HCl and Hg emission rates in pounds per ton of lime produced for HCl and pounds per million tons of lime produced for Hg. The equation is stated in the redline as follows:

$$E = \frac{(C_k Q_k + C_c Q_c)}{KP} \text{ where,}$$

E = Emission rate of mercury, pounds per million tons (lb/MMton) of lime produced or HCl per ton (lb/ton) of lime produced

C<sub>k</sub> = Concentration in the kiln effluent of mercury (µg/dscf) or HCl (ppmvd)

Q<sub>k</sub> = Volumetric flow rate of kiln gas effluent (dscf/hr)

$Q_c$  = Volumetric flow rate of cooler effluent gas, dscf/hr. This value is zero if there is not a separate cooler exhaust to the atmosphere.

$C_c$  = Concentration in the cooler effluent of mercury ( $\mu\text{g/dscf}$ ) or HCl (ppmvd). This value is zero if there is not a separate cooler exhaust to the atmosphere.

$P$  = Stone production rate (ton/hr) for HCl and (MMton/hr) for Hg.

$K$  = Conversion factor, for mercury  $2.2 \times 10^{-9} \mu\text{g/lb}$ . For HCl  $9.20 \times 10^{-8}$  ppmvd HCl per lb/dscf HCl.

Careful review of this equation has determined that the conversion factor units for HCl and mercury are incorrect. Also, as noted in section IX above, calculation of HAP emission rates from coolers other than PM is unnecessary and should be deleted. Therefore, to calculate the correct emission rate, the follow revisions should be made to the equation:

$$E = \frac{K(C_k Q_k)}{P} \quad \text{where,}$$

$K$  = Conversion factor

Mercury conversion factor =  $2.2 \times 10^{-9}$  lb/ $\mu\text{g}$ .

HCl conversion factor =  $9.20 \times 10^{-8}$  lb/dscf HCl per ppmvd HCl.

Other terms are as defined above.

The corrected equation includes  $K$  in the numerator, not the denominator, emissions rate calculations from coolers have been dropped, and conversion factor units have been corrected.

EPA should update equation 4 accordingly. Note: If EPA sets an HBEL for HCl, this formula would not be necessary for HCl, and would apply only to mercury.

## **XXVIII. EPA SHOULD PROVIDE THAT TESTING TO RESET OPERATING LIMITS DOES NOT VIOLATE STANDARDS**

The Proposed Rule states that operating limits must be complied with at all times (except to a limited extent during startup and shutdown). However, operators when seeking to reset operating limits require the ability to reset at the appropriate level at the time of the test, which may be at a different level than the prior operating limit. The rule should clarify that a source is allowed to deviate from an existing operating limit when conducting a subsequent engineering evaluation or performance test. The rule should include the following language in §63.7100 (a), and in the definition of “Deviation” in 63.7143:

However, when a lime kiln emissions control device is being evaluated for engineering purposes or for performance testing purposes, the existing operating limits for the control device do not apply and variance from current operating limits is not a deviation.

## **XXIX. EPA SHOULD CORRECT LANGUAGE REFERRING TO SCRUBBERS**

The Proposed Rule misconstrues the difference between a PM (typically venturi) type scrubber and a WPTGA used to control acid gases which a lime kiln may need to install to

comply with the new requirements of this rulemaking. This apparently led EPA to erroneously delete some references to PM in the rule language, when those references are intended to make clear that the provisions refer to scrubbers used to control PM. EPA should clarify the Proposed Rule by retaining all references to PM scrubbers in the existing rule language and ensure that references to setting parameter limits for PM scrubbers or acid gas scrubbers explicitly state that establishing operating parameters only apply when conducting performance tests for the specific pollutant being measured.

For example, in Table 5, lines 8, 9, 14, and 15, deleting the scrubber flow rate reference to PM could imply that the PM scrubber flow rate requirement is to be reset for a performance test of any regulated HAP in the rule when it should only apply when completing a PM limit performance test. The same is the case for Table 3 lines 2 and 4, and Table 6 lines 1 and 3. The reference to PM should be retained in each of those provisions.

**XXX. IN TABLE 5, ROW 6, THERE IS A REFERENCE “REFER TO NOTE 1” THAT APPEARS TO BE INCORRECT**

Row 6 on Table 5 (addressing PM) in the docket redline includes, in the third column, the reference “Refer to Note 1.” Note 1, however, relates to utilizing ASTM D6384-12e1 for HCl and organic testing and does not appear to be relevant to Row 6. The reference in Row 6 should be corrected or deleted.

**XXXI. EPA SHOULD SIMPLIFY THE DEFINITION OF DRY SORBENT INJECTION**

The definition of dry sorbent injection in §63.7143 refers to use of this technology “to react with and neutralize acid gases (such as SO<sub>2</sub> and HCl), Hg, organic HAP, or dioxin furans.” NLA believes that this language should be simplified to refer only to HAPs being regulated in this rule, and thus should read “to react with and neutralize HCl, Hg, organic HAP, or dioxins and furans.”

**XXXII. EPA SHOULD REVISE TABLES 3, 4 AND 6 TO INCLUDE PARALLEL LANGUAGE ON REQUIREMENTS AND TO CLARIFY REQUIREMENTS.**

Line 7 of Table 3 in the redline should be revised to require “flow rate greater than or equal to the flow rate operating limit,” to parallel similar language in Line 8.

Table 3, Lines 7 and 8 should be revised to add the words “for the applicable pollutant” to the end to reflect that not all pollutants will necessarily be tested in each performance test. Similarly, the word “applicable” should be added to Table 4, Line 1, before the term “performance test.” In Table 6, Lines 7 and 8, the word “applicable” should also be added before the term “performance test.” (These suggested changes are shown in the NLA “blue line.”)

**XXXIII. TABLE 5 SHOULD BE REVISED FOR CLARITY**

Table 5, Line 20, should be revised to make clear that there are different required test durations for different test methods. See the NLA blue line for suggested language.



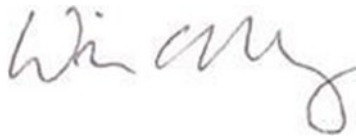
**XXXIV. EPA SHOULD CORRECT A TYPO IN TABLE 4**

Table 4, Line 1 refers to measuring mercury using “Method 29 or 30B 5D in appendix A to part 60” and measuring Total Organic HAP “using Method 18 5D in appendix A to part 60”. In both cases the use of 5D appears to be a typographical error and should be deleted.

**CONCLUSION**

NLA appreciates the opportunity to comment on these important issues.

Very truly yours,

A handwritten signature in dark ink, appearing to read "W. Herz", is positioned above the typed name and contact information.

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## **LIST OF APPENDICES**

APPENDIX A: “BLUELINE” SHOWING NLA’S SUGGESTED RULE LANGUAGE CHANGES (A separate copy of the Blueline in Microsoft Word format is being submitted as Appendix A2 with these comments.)

APPENDIX B: SECOND RAMBOLL REPORT

APPENDIX C: TRINITY REPORT

APPENDIX D: ATG (ALLIANCE) REPORT (Accompanying Excel Spreadsheets are being submitted separately as Appendix D2 for ease of reference)

## Appendix A: NLA Suggested Changes to Regulatory Language (3/11/2024)

EPA's Redline in **Red**, NLA's Suggested Changes in **Blue**<sup>1</sup>

### Subpart AAAAA—National Emission Standards for Hazardous Air Pollutants for Lime Manufacturing Plants

#### WHAT THIS SUBPART COVERS

- §63.7080 What is the purpose of this subpart?
- §63.7081 Am I subject to this subpart?
- §63.7082 What parts of my plant does this subpart cover?
- §63.7083 When do I have to comply with this subpart?

#### EMISSION LIMITATIONS

- §63.7090 What emission limitations must I meet?

#### GENERAL COMPLIANCE REQUIREMENTS

- §63.7100 What are my general requirements for complying with this subpart?

#### TESTING AND INITIAL COMPLIANCE REQUIREMENTS

- §63.7110 By what date must I conduct performance tests and other initial compliance demonstrations?
- §63.7111 When must I conduct subsequent performance tests?
- §63.7112 What performance tests, design evaluations, and other procedures must I use?
- §63.7113 What are my monitoring installation, operation, and maintenance requirements?
- §63.7114 How do I demonstrate initial compliance with the emission limitations standard?

#### CONTINUOUS COMPLIANCE REQUIREMENTS

- §63.7120 How do I monitor and collect data to demonstrate continuous compliance?
- §63.7121 How do I demonstrate continuous compliance with the emission limitations standard?

#### NOTIFICATION, REPORTS, AND RECORDS

- §63.7130 What notifications must I submit and when?
- §63.7131 What reports must I submit and when?
- §63.7132 What records must I keep?
- §63.7133 In what form and for how long must I keep my records?

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<sup>1</sup> In converting the PDF of the redline to Word, NLA had difficulty making equations display and paginate properly, so some of them are displayed as images in a box. Also note that suggested strikeouts are in blue, because Word will not allow a different color for text and strikeout lines.

## OTHER REQUIREMENTS AND INFORMATION

- §63.7140 What parts of the General Provisions apply to me?  
§63.7141 Who implements and enforces this subpart?  
§63.7142 What are the requirements for claiming area source status?  
§63.7143 What definitions apply to this subpart?

## TABLES TO SUBPART AAAAA OF PART 63

- Table 1 to Subpart AAAAA of Part 63—Emission Limits  
Table 2 to Subpart AAAAA of Part 63—Startup and Shutdown Emission Limits for Kilns and Coolers  
Table 3 to Subpart AAAAA of Part 63—Operating Limits  
Table 4 to Subpart AAAAA of Part 63—Initial Compliance With Emission Limits  
Table 5 to Subpart AAAAA of Part 63—Requirements for Performance Tests  
Table 6 to Subpart AAAAA of Part 63—Continuous Compliance With Operating Limits  
Table 7 to Subpart AAAAA of Part 63—Periodic Monitoring for Compliance With Opacity and Visible Emissions Limits  
Table 8 to Subpart AAAAA of Part 63—Requirements for Reports  
~~Table 9 to Subpart AAAAA of Part 63—Emissions Averaging Emission Limits~~  
~~Table 9 to Subpart AAAAA of Part 63—Applicability of General Provisions to Subpart AAAAA~~  
~~Table 10 to Subpart AAAAA of Part 63—Applicability of General Provisions to Subpart AAAAA~~  
~~TABLE 11 TO SUBPART AAAAA OF PART 63 -TOXIC EQUIVALENCY FACTORS (1989)~~

## WHAT THIS SUBPART COVERS

### §63.7080 What is the purpose of this subpart?

This subpart establishes national emission standards for hazardous air pollutants (NESHAP) for lime manufacturing plants. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations.

### §63.7081 Am I subject to this subpart?

(a) You are subject to this subpart if you own or operate a lime manufacturing plant (LMP) that is a major source, or that is located at, or is part of, a major source of hazardous air pollutant (HAP) emissions, unless the LMP is located at a kraft pulp mill, soda pulp mill, sulfite pulp mill, beet sugar manufacturing plant, or only processes sludge containing calcium carbonate from water softening processes.

(1) An LMP is an establishment engaged in the manufacture of lime product (calcium oxide, calcium oxide with magnesium oxide, or dead burned dolomite) by calcination of limestone, dolomite, shells or other calcareous substances.

(2) A major source of HAP is a plant site that emits or has the potential to emit any single HAP at a rate of 9.07 megagrams (10 tons) or more per year or any combination of HAP at a rate of 22.68 megagrams (25 tons) or more per year from all emission sources at the plant site.

(b) [Reserved]

**§63.7082 What parts of my plant does this subpart cover?**

(a) This subpart applies to each existing or new lime kiln(s) and their associated cooler(s), and processed stone handling (PSH) operations system(s) located at an LMP that is a major source.

(b) A new lime kiln is a lime kiln, and (if applicable) its associated lime cooler, for which construction or reconstruction began after December 20, 2002, if you met the applicability criteria in §63.7081 at the time you began construction or reconstruction, [except that with respect to emissions standards added on \[ADD DATE OF FINAL RULE\], a new lime kiln is a lime kiln which construction or reconstruction began after February 9, 2024.](#)

(c) A new PSH operations system is the equipment in paragraph (g) of this section, for which construction or reconstruction began after December 20, 2002, if you met the applicability criteria in §63.7081 at the time you began construction or reconstruction.

(d) A lime kiln or PSH operations system is reconstructed if it meets the criteria for reconstruction defined in §63.2.

(e) An existing lime kiln is any lime kiln, and (if applicable) its associated lime cooler, that does not meet the definition of a new kiln of paragraph (b) of this section.

(f) An existing PSH operations system is any PHS operations system that does not meet the

definition of a new PSH operations system in paragraph (c) of this section.

(g) A PSH operations system includes all equipment associated with PSH operations beginning at the processed stone storage bin(s) or open storage pile(s) and ending where the processed stone is fed into the kiln. It includes man-made processed stone storage bins (but not open processed stone storage piles), conveying system transfer points, bulk loading or unloading systems, screening operations, surge bins, bucket elevators, and belt conveyors. No other materials processing operations are subject to this subpart.

(h) Nuisance dust collectors on lime coolers are part of the lime materials processing operations and are not covered by this subpart.

(i) Lime hydrators are not subject to this subpart.

(j) Open material storage piles are not subject to this subpart.

### **§63.7083 When do I have to comply with this subpart?**

(a) If you have a new affected source, you must comply with this subpart according to paragraphs (a)(1) and (2) of this section.

(1) If you **initially** start up your affected source before January 5, 2004, you must comply with the **PM** emission limitations no later than January 5, 2004, and you must have completed all applicable performance tests no later than July 5, 2004, except as noted in paragraphs

~~(e)~~(g)(1)

and (2) of this section.

(2) If you **initially** start up your affected source after January 5, 2004, then you must comply with the **PM** emission limitations for new affected sources upon **initial** startup of your affected source and you must have completed all applicable performance tests no later than 180 days after **initial** startup, except as noted in paragraphs ~~(e)~~(g)(1) and (2) of this section.

(b) If you have an existing affected source, you must comply with the applicable **PM**

emission limitations for the existing affected source, and you must have completed all applicable performance tests no later than January 5, 2007, except as noted in paragraphs ~~(e)~~(g)(1) and (2) of this section.

(c) If you initially start up your affected source after [INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER] then you must comply with all emission limitations for new affected sources upon startup of your affected source and you must have completed all applicable performance tests no later than 180 days after initial startup, except as noted in paragraphs (h)(1) and (2) of this section.

(d) If you have an existing affected source, you must comply with all applicable emission limitations for the existing affected source, and you must have completed all applicable performance tests no later than [INSERT 3 YEARS AFTER DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER], except as noted in paragraphs (h)(1) and (2) of this section.

~~(e)~~(e) If you have an LMP that is an area source that increases its emissions or its potential to emit such that it becomes a major source of HAP, the deadlines specified in paragraphs ~~(ee)~~(1) and (2) of this section apply.

(1) New affected sources at your LMP you must be in compliance with this subpart upon initial startup.

(2) Existing affected sources at your LMP must be in compliance with this subpart within 3 years after your source becomes a major source of HAP.

~~(d)~~(f) You must meet the notification requirements in §63.7130 according to the schedule in §63.7130 and in subpart A of this part. Some of the notifications must be submitted before you are required to comply with the emission limitations in this subpart.

~~(e)~~(g)(1) If your affected source commenced construction or reconstruction on or before

September, 16, 2019, then the compliance date for the revised requirements promulgated at §§63.7090, 63.7100, 63.7112, 63.7113, 63.7121, 63.7130, 63.7131, 63.7132, 63.7140, 63.7141, 63.7142, and 63.7143 and Tables 2, 3, 4, 5, 7, 8 and 9 (except changes to the cross references to 63.6(f)(1) and (h)(1)) of 40 CFR 63, subpart AAAAA, published on July 24, 2020 is January 20, 2021.

(2) If your affected source commenced construction or reconstruction after September 16, 2019, then the compliance date for the revised requirements promulgated at §§63.7090, 63.7100, 63.7112, 63.7113, 63.7121, 63.7130, 63.7131, 63.7132, 63.7140, 63.7141, 63.7142, and 63.7143 and Tables 2, 3, 4, 5, 7, 8 and 9 to this subpart, published on July 24, 2020, is July 24, 2020, or the date of initial startup, whichever is later.

(h)(1) If your affected source commenced construction or reconstruction on or before February 9, 2024, ~~[INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER]~~, then the compliance date for the revised requirements promulgated on [INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER] is [INSERT ~~180-DAYS~~ 3 YEARS AFTER THE DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER].

(2) If your affected source commenced construction or reconstruction after February 9, 2024 ~~[INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER]~~, then the compliance date for the revised requirements promulgated on [INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER] is [INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER] or the date of initial startup, whichever is later.



## EMISSION LIMITATIONS

### §63.7090 What emission limitations must I meet?

- (a) You must meet each emission limit in Table 1 to this subpart that applies to you.
- (b) You must meet each operating limit in Table 3 to this subpart that applies to you.
- (c) On or after the relevant compliance date for your source as specified in §63.7083(eg), you must meet each startup and shutdown period emission limit in Table 2 to this subpart that applies to you, *except that, notwithstanding the terms in Table 2, when a lime kiln is in startup or shutdown, a lime kiln may use any method approved for use to show continuous compliance during normal operations (such as a bag leak detection system) to demonstrate proper operation of the baghouse as a surrogate to demonstrating compliance with visible emission limits during these events.*
- ~~(d) For those LMP using emissions averaging for either HCl emission limits or mercury emission limits in accordance with the procedures in §63.7114(b) and (c), must not exceed the applicable emission limits in Table 9 to this subpart.~~

## GENERAL COMPLIANCE REQUIREMENTS

### §63.7100 What are my general requirements for complying with this subpart?

- (a) Prior to the relevant compliance date for your source as specified in §63.7083(eg), you must be in compliance with the emission limitations (including operating limits) in this subpart at all times, except during periods of startup, shutdown, and malfunction. On and after the relevant compliance date for your source as specified in §63.7083(eg), you must be in compliance with the applicable emission limitations (including operating limits) at all times. *However, when a lime kiln emissions control device is being evaluated for engineering purposes or for performance testing purposes, the existing operating limits for the control device do not apply and variance from current operating limits is not a deviation.*

(b) Prior to the relevant compliance date for your source as specified in §63.7083(eg), you must be in compliance with the opacity and visible emission (VE) limits in this subpart at all times, except during periods of startup, shutdown, and malfunction. On and after the relevant compliance date for your source as specified in §63.7083(eg), you must be in compliance with the applicable opacity and VE limits at all times.

(c) Prior to the relevant compliance date for your source as specified in §63.7083(eg), you must always operate and maintain your affected source, including air pollution control and monitoring equipment, according to the provisions in §63.6(e)(1)(i). On and after the relevant compliance date for your source as specified in §63.7083(eg), you must always operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require the owner or operator to make any further efforts to reduce emissions if levels required by the applicable standard have been achieved. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source.

(d) You must prepare and implement for each LMP, a written operations, maintenance, and monitoring (OM&M) plan. You must submit the plan to the applicable permitting authority for review and approval as part of the application for a 40 CFR part 70 or 40 CFR part 71 permit. Any subsequent changes to the plan must be submitted to the applicable permitting authority for review and approval. Pending approval by the applicable permitting authority of an initial or amended plan, you must comply with the provisions of the submitted plan. Each plan must contain the following information:

(1) Process and control device parameters to be monitored to determine compliance, along with established operating limits or ranges, as applicable, for each emission unit.

(2) A monitoring schedule for each emission unit.

(3) Procedures for the proper operation and maintenance of each emission unit and each air pollution control device used to meet the applicable emission limitations and operating limits in Tables 1, 2 and 3 to this subpart, respectively. On and after the relevant compliance date for your source as specified in §63.7083(eg), your OM&M plan must address periods of startup and shutdown.

(4) Procedures for the proper installation, operation, and maintenance of monitoring devices or systems used to determine compliance, including:

(i) Calibration and certification of accuracy of each monitoring device;

(ii) Performance and equipment specifications for the sample interface, parametric signal analyzer, and the data collection and reduction systems;

(iii) Prior to the relevant compliance date for your source as specified in §63.7083(eg), ongoing operation and maintenance procedures in accordance with the general requirements of §63.8(c)(1)(i) and (ii), (3), and (4)(ii). On and after the relevant compliance date for your source as specified in §63.7083(eg), ongoing operation and maintenance procedures in accordance with the general requirements of paragraph (c) of this section and §§63.8(c)(1)(ii), (3), and (4)(ii); and

(iv) Ongoing data quality assurance procedures in accordance with the general requirements of §63.8(d).

(5) Procedures for monitoring process and control device parameters.

(6) Corrective actions to be taken when process or operating parameters or add-on control device parameters deviate from the operating limits specified in Table 3 to this subpart,

including:

(i) Procedures to determine and record the cause of a deviation or excursion, and the time the deviation or excursion began and ended; and

(ii) Procedures for recording the corrective action taken, the time corrective action was initiated, and the time and date the corrective action was completed.

(7) A maintenance schedule for each emission unit and control device that is consistent with the manufacturer's instructions and recommendations for routine and long-term maintenance.

(e) Prior to the relevant compliance date for your source as specified in §63.7083(eg), you must develop a written startup, shutdown, and malfunction plan (SSMP) according to the provisions in §63.6(e)(3).

## **TESTING AND INITIAL COMPLIANCE REQUIREMENTS**

### **§63.7110 By what date must I conduct performance tests and other initial compliance demonstrations?**

(a) If you have an existing affected source, you must complete all applicable performance tests within January 5, 2007, according to the provisions in §§63.7(a)(2) and 63.7114.

(b) If you have a new affected source, and commenced construction or reconstruction between December 20, 2002, and January 5, 2004, you must demonstrate initial compliance with either the proposed emission limitation or the promulgated emission limitation no later than 180 calendar days after January 5, 2004 or within 180 calendar days after startup of the source, whichever is later, according to §§63.7(a)(2)(ix) and 63.7114.

(c) If you commenced construction or reconstruction between December 20, 2002, and January 5, 2004, and you chose to comply with the proposed emission limitation when demonstrating initial compliance, you must conduct a demonstration of compliance with the promulgated emission limitation within January 5, 2007 or after startup of the source, whichever

is later, according to §§63.7(a)(2)(ix) and 63.7114.

(d) For each initial compliance requirement in Table 4 to this subpart that applies to you where the monitoring averaging period is 3 hours, the 3-hour period for demonstrating continuous compliance for emission units within existing affected sources at LMP begins at 12:01 a.m. on the compliance date for existing affected sources, that is, the day following completion of the initial compliance demonstration, and ends at 3:01 a.m. on the same day.

(e) For each initial compliance requirement in Table 4 to this subpart that applies to you where the monitoring averaging period is 3 hours, the 3-hour period for demonstrating continuous compliance for emission units within new or reconstructed affected sources at LMP begins at 12:01 a.m. on the day following completion of the initial compliance demonstration, as required in paragraphs (b) and (c) of this section, and ends at 3:01 a.m. on the same day.

(f) If your affected source commenced construction or reconstruction before [INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER], you must demonstrate initial compliance with the emission limitations added to this subpart on [INSERT DATE OF FINAL RULE PUBLICATION IN THE FEDERAL REGISTER] ~~in in this subpart~~ no later than [INSERT DATE 3 YEARS AFTER PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER] or within 180 calendar days after initial startup of the source, whichever is later, according to §§63.7(a)(2)(ix) and 63.7114.

#### **§63.7111 When must I conduct subsequent performance tests?**

You must conduct a performance test within 5 years following the initial performance test and within 5 years following each subsequent performance test thereafter.

#### **§63.7112 What performance tests, design evaluations, and other procedures must I use?**

(a) You must conduct each performance test in Table 5 to this subpart that applies to you.

(b) Prior to the relevant compliance date for your source as specified in §63.7083(eg), each

performance test must be conducted according to the requirements in §63.7(e)(1) and under the specific conditions specified in Table 5 to this subpart. Beginning [DATE OF PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER], each performance test must include the methods specified in rows 19-24 of Table 5 to this subpart. Performance tests for the emission standards promulgated in this rule, including PM emission standards and emissions standards added on [DATE OF PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER] are not required to be performed at the same time. On and after the relevant compliance date for your source as specified in §63.7083(eg), each performance test must be conducted based on representative performance (i.e., performance based on normal operating conditions) of the affected source and under the specific conditions in Table 5 to this subpart. Representative conditions exclude periods of startup and shutdown. The owner or operator may not conduct performance tests during periods of malfunction. The owner or operator must record the process information that is necessary to document operating conditions during the test and include in such record an explanation to support that such conditions represent normal operation. Upon request, the owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of performance tests.

(c) Prior to the relevant compliance date for your source as specified in §63.7083(eg), you may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in §63.7(e)(1). On and after the relevant compliance date for your source as specified in §63.7083(eg), you may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in §63.7112(b).

(d) Except for opacity and VE observations, you must conduct three separate test runs for each performance test required in this section, as specified in §63.7(e)(3). Each test run must last at least 1 hour for PM testing or as specified in Table 5 to this subpart for HAPs other than PM.

(e) The emission rate of particulate matter (PM) from each lime kiln (and each lime cooler if there is a separate exhaust to the atmosphere from the lime cooler) must be computed for each run using Equation 1 of this section:

$$E = (C_k Q_k + C_c Q_c) / PK \quad (Eq. 1)$$

Where:

E = Emission rate of PM, pounds per ton (lb/ton) of stone feed.

C<sub>k</sub> = Concentration of PM in the kiln effluent, grain/dry standard cubic feet (gr/dscf).

Q<sub>k</sub> = Volumetric flow rate of kiln effluent gas, dry standard cubic feet per hour (dscf/hr).

C<sub>c</sub> = Concentration of PM in the cooler effluent, grain/dscf. This value is zero if there is not a separate cooler exhaust to the atmosphere.

Q<sub>c</sub> = Volumetric flow rate of cooler effluent gas, dscf/hr. This value is zero if there is not a separate cooler exhaust to the atmosphere.

P = Stone feed rate, tons per hour (ton/hr).

K = Conversion factor, 7000 grains per pound (grains/lb).

(f)(1) If you choose to meet a weighted average emission limit as specified in item 4 of Table 1 to this subpart, you must calculate a combined particulate emission rate from all kilns and coolers within your LMP using Equation 2 of this section:

$$E_T = \frac{\sum_{i=1}^n E_i P_i}{\sum_{i=1}^n P_i} \quad (Eq. 2)$$

Where:

E<sub>T</sub> = Emission rate of PM from all kilns and coolers, lb/ton of stone feed.

E<sub>i</sub> = Emission rate of PM from kiln i, or from kiln/cooler combination i, lb/ton of stone feed.

P<sub>i</sub> = Stone feed rate to kiln i, ton/hr.

n = Number of kilns you wish to include in averaging.

(2) You do not have to include every kiln in this calculation, only include kilns you wish to

average. Kilns that have a PM emission limit of 0.60 lb/tsf are ineligible for any averaging.

(g) The weighted average PM emission limit from all kilns and coolers for which you are averaging must be calculated using Equation 3 of this section:

$$E_{TN} = \frac{\sum_{j=1}^m E_j P_j}{\sum_{j=1}^m P_j} \quad (Eq. 3)$$

Where:

$E_{TN}$  = Weighted average PM emission limit for all kilns and coolers being included in averaging at the LMP, lb/ton of stone feed.

$E_j$  = PM emission limit (0.10 or 0.12) for kiln j, or for kiln/cooler combination j, lb/ton of stone feed.

$P_j$  = Stone feed rate to kiln j, ton/hr.

$m$  = Number of kilns and kiln/cooler combinations you are averaging at your LMP. You must include the same kilns in the calculation of  $E_T$  and  $E_{TN}$ . Kilns that have a PM emission limit of 0.60 lb/tsf are ineligible for any averaging.

(h) Performance test results must be documented in complete test reports that contain the information required by paragraphs (h)(1) through (10) of this section, as well as all other relevant information. The plan to be followed during testing must be made available to the Administrator at least 60 days prior to testing.

- (1) A brief description of the process and the air pollution control system;
- (2) Sampling location description(s);
- (3) A description of sampling and analytical procedures and any modifications to standard procedures;
- (4) Test results, including opacity;
- (5) Quality assurance procedures and results;
- (6) Records of operating conditions during the test, preparation of standards, and calibration



procedures;

(7) Raw data sheets for field sampling and field and laboratory analyses;

(8) Documentation of calculations;

(9) All data recorded and used to establish operating limits; and

(10) Any other information required by the test method.

(i) [Reserved]

(j) You must establish any applicable 3-hour block average operating limit indicated in Table 3 to this subpart according to the applicable requirements in Table 4 to this subpart and paragraphs (j)(1) through (4) of this section.

(1) Continuously record the parameter during the ~~PM~~ performance test and include the parameter record(s) in the performance test report.

(2) Determine the average parameter value for each 15-minute period of each test run.

(3) Calculate the test run average for the parameter by taking the average of all the 15-minute parameter values for the run.

(4) Calculate the 3-hour operating limit by taking the average of the three test run averages.

(k) For each building enclosing any PSH operations that is subject to a VE limit, you must conduct a VE check according to item 18 in Table 5 to this subpart, and in accordance with paragraphs (k)(1) through (3) of this section.

(1) Conduct visual inspections that consist of a visual survey of the building over the test period to identify if there are VE, other than condensed water vapor.

(2) Select a position at least 15 but not more 1,320 feet from each side of the building with the sun or other light source generally at your back.

(3) The observer conducting the VE checks need not be certified to conduct EPA Method 9 in appendix A-4 to part 60 of this chapter. However, the observer must meet the training

requirements as described in EPA Method 22 in appendix A-7 to part 60 of this chapter.

(l) When determining compliance with the opacity standards for fugitive emissions from PSH operations in item 8 of Table 1 to this subpart, you must conduct EPA Method 9 in appendix A-4 to part 60 of this chapter according to item 17 in Table 5 to this subpart, and in accordance with paragraphs (l)(1) through (3) of this section.

(1) The minimum distance between the observer and the emission source shall be 4.57 meters (15 feet).

(2) The observer shall, when possible, select a position that minimizes interference from other fugitive emission sources (*e.g.*, road dust). The required observer position relative to the sun must be followed.

(3) If you use wet dust suppression to control PM from PSH operations, a visible mist is sometimes generated by the spray. The water mist must not be confused with particulate matter emissions and is not to be considered VE. When a water mist of this nature is present, you must observe emissions at a point in the plume where the mist is no longer visible.

(m) On and after the relevant compliance date for your source as specified in §63.7083(eg), during startup, kilns must be tested hourly to determine when lime product meets the definition of on-specification lime product.

(n) An LMP may document that the sitewide HCl potential to emit from all lime kilns is below 300 tpy and submit this with a Notice of Compliance Status (NOCS) before the compliance date. The potential to emit shall be documented by completing a performance test on each lime kiln, developing an emission factor in units of pound per ton of lime produced multiplied by annual maximum lime production rate for each kiln, and summing the HCl for all kilns at the site. If the LMP includes any kilns requiring add-on controls to comply with the HBEL, the operator shall develop and set a minimum DSI injection rate (or other operating

parameter for other controls) for kilns that will continuously operate controls to maintain compliance with the HBEL. In this case, the LMP operator will submit documentation of the operating rate for DSI on units with controls, as applicable, and a compliance demonstration annually indicating actual emissions in the prior calendar year do not exceed 300 tpy.

Alternatively, the facility may seek a practically enforceable permit provision from the LMP's local air permitting authority that limits HCl to no more than 300 tpy. The LMP shall also certify in a NOCS, by relying on the most recent HCl performance test data for each kiln, that the sum of the hourly emissions rate (i.e., the sum of 3-run averages for each kiln at the site) is no greater than 685 lb/hr.

(o) ~~The emission rate of mercury and hydrochloric acid (HCl) from each lime kiln (and each lime cooler as applicable) must be computed for each run using Equation 4 of this section:~~<sup>2</sup>

Delete incorrect equation:

$$E = \frac{(C_k Q_k + C_c Q_c)}{KP} \quad (\text{Eq. 4})$$

Add correct equation:

$$E = \frac{K(C_k Q_k)}{P} \quad (\text{Eq. 4})$$

Where:

E = Emission rate of mercury, pounds per million tons (lb/MMton) of lime produced or HCl pounds per ton (lb/ton) of lime produced.

C<sub>k</sub> = Concentration in the kiln effluent of mercury, micrograms/dry standard cubic feet (µg/dscf)

<sup>2</sup> Equation 4 will only apply to calculating mercury emission rates if a HBEL for HCl is established. If the HBEL for HCl is established, references to HCl in this calculation should be deleted.

or HCl, parts per million by volume on a dry basis (ppmvd).

$Q_k$  = Volumetric flow rate of kiln effluent gas, dry standard cubic feet per hour (dscf/hr).

~~$C_e$  = Concentration in the cooler effluent of mercury,  $\mu\text{g}/\text{dscf}$  or HCl, ppmvd. This value is zero if there is not a separate cooler exhaust to the atmosphere.~~

~~$Q_e$  = Volumetric flow rate of cooler effluent gas, dscf/hr. This value is zero if there is not a separate cooler exhaust to the atmosphere.~~

$P$  = Lime Stone production rate, tons per hour (ton/hr) for HCl and MMton/hr for Hg.

$K$  = Conversion factor, for mercury,  $2.20 \times 10^{-9}$  pounds per microgram ( $\text{lb}/\mu\text{g}$ ) ~~micrograms per pound ( $\mu\text{g}/\text{lb}$ )~~ for HCL  $9.20 \times 10^{-8}$   $\text{lb}/\text{dscf}$  HCl per  $\text{lb}/\text{dscf}$  HCl ~~ppmvd HCl per  $\text{lb}/\text{dscf}$  HCl.~~

(p) The concentration of total organic HAP and dioxins/furans shall be corrected to 7 percent oxygen using equation 5 of this section:

$$C_{7\%} = C_{unc} * \frac{13.9}{(20.9 - C_{O_2})} \quad (Eq. 5)$$

Where:

$C_{7\%}$  = concentration of total organic HAP ppmv on a dry basis or dioxins/furans in ng/dscm corrected to 7 percent oxygen.

$C_{unc}$  = uncorrected total organic HAP concentration, ppmv on a dry basis basis or dioxins/furans in ng/dscm.

$C_{O_2}$  = concentration of oxygen (percent).

### §63.7113 What are my monitoring installation, operation, and maintenance requirements?

(a) You must install, operate, and maintain each continuous parameter monitoring system

(CPMS) according to your OM&M plan required by §63.7100(d) and paragraphs (a)(1) through (5) of this section, and you must install, operate, and maintain each continuous opacity monitoring system (COMS) as required by paragraph (g) of this section

(1) The CPMS must complete a minimum of one cycle of operation for each successive 15-minute period.

(2) To calculate a valid hourly value, you must have at least four equally spaced data values (or at least two, if that condition is included to allow for periodic calibration checks) for that hour from a CPMS that is not out of control according to your OM&M plan, and use all valid data.

(3) To calculate the average for each 3-hour block averaging period, you must use all valid data, and you must have at least 66 percent of the hourly averages for that period using only hourly average values that are based on valid data (*i.e.*, not from out-of-control periods).

(4) You must conduct a performance evaluation of each CPMS in accordance with your OM&M plan.

(5) You must continuously operate and maintain the CPMS according to the OM&M plan, including, but not limited to, maintaining necessary parts for routine repairs of the monitoring equipment.

(b) For each flow measurement device, you must meet the requirements in paragraphs (a)(1) through (5) and (b)(1) through (4) of this section.

(1) Use a flow sensor with a minimum tolerance of 2 percent of the flow rate.

(2) Reduce swirling flow or abnormal velocity distributions due to upstream and downstream disturbances.

(3) Conduct a flow sensor calibration check at least semiannually.

(4) At least monthly, inspect all components for integrity, all electrical connections for continuity, and all mechanical connections for leakage.

(c) For each pressure measurement device, you must meet the requirements in paragraphs (a)(1) through (5) and (c)(1) through (7) of this section.

(1) Locate the pressure sensor(s) in or as close to as possible a position that provides a representative measurement of the pressure.

(2) Minimize or eliminate pulsating pressure, vibration, and internal and external corrosion.

(3) Use a gauge with a minimum tolerance of 0.5 inch of water or a transducer with a minimum tolerance of 1 percent of the pressure range.

(4) Check pressure tap pluggage daily.

(5) Using a manometer, check gauge calibration quarterly and transducer calibration monthly.

(6) Conduct calibration checks any time the sensor exceeds the manufacturer's specified maximum operating pressure range or install a new pressure sensor.

(7) At least monthly, inspect all components for integrity, all electrical connections for continuity, and all mechanical connections for leakage.

(d) For each bag leak detection system (BLDS), you must meet any applicable requirements in paragraphs (a)(1) through (5) and (d)(1) through (10) of this section.

(1) The BLDS must be certified by the manufacturer to be capable of detecting PM emissions at concentrations of 10 milligrams per actual cubic meter (0.0044 grains per actual cubic foot) or less.

(2) The sensor on the BLDS must provide output of relative PM emissions.

(3) The BLDS must be equipped with a device to continuously record the output signal from the sensor.

(4) The BLDS must have an alarm that will sound automatically when it detects an increase in relative PM emissions greater than a preset level.

(5) The alarm must be located in an area where appropriate plant personnel will be able to hear it.

(6) For a positive-pressure fabric filter (FF), each compartment or cell must have a bag leak detector (BLD). For a negative-pressure or induced-air FF, the BLD must be installed downstream of the FF. If multiple BLD are required (for either type of FF), the detectors may share the system instrumentation and alarm.

(7) Each triboelectric BLDS must be installed, calibrated, operated, and maintained according to EPA-454/R-98-015, “Fabric Filter Bag Leak Detection Guidance,” (incorporated by reference—see §63.14). Other types of bag leak detection systems must be installed, operated, calibrated, and maintained according to the manufacturer's written specifications and recommendations. Standard operating procedures must be incorporated into the OM&M plan.

(8) At a minimum, initial adjustment of the system must consist of establishing the baseline output in both of the following ways, according to section 5.0 of the EPA-454/R-98-015, “Fabric Filter Bag Leak Detection Guidance,” (incorporated by reference--see §63.14):

(i) Adjust the range and the averaging period of the device.

(ii) Establish the alarm set points and the alarm delay time.

(9) After initial adjustment, the sensitivity or range, averaging period, alarm set points, or alarm delay time may not be adjusted except as specified in the OM&M plan required by §63.7100(d). In no event may the range be increased by more than 100 percent or decreased by more than 50 percent over a 365-day period unless such adjustment follows a complete FF inspection that demonstrates that the FF is in good operating condition, as defined in section 5.2 of the “Fabric Filter Bag Leak Detection Guidance,” (incorporated by reference—see §63.14). Record each adjustment.

(10) Record the results of each inspection, calibration, and validation check.

(e) For each PM detector, you must meet any applicable requirements in paragraphs (a)(1) through (5) and (e)(1) through (8) of this section.

(1) The PM detector must be certified by the manufacturer to be capable of detecting PM emissions at concentrations of 10 milligrams per actual cubic meter (0.0044 grains per actual cubic foot) or less.

(2) The sensor on the PM detector must provide output of relative PM emissions.

(3) The PM detector must have an alarm that will sound automatically when it detects an increase in relative PM emissions greater than a preset level.

(4) The alarm must be located in an area where appropriate plant personnel will be able to hear it.

(5) For a positive-pressure electrostatic precipitator (ESP), each compartment must have a PM detector. For a negative-pressure or induced-air ESP, the PM detector must be installed downstream of the ESP. If multiple PM detectors are required (for either type of ESP), the detectors may share the system instrumentation and alarm.

(6) Particulate matter detectors must be installed, operated, adjusted, and maintained according to the manufacturer's written specifications and recommendations. Standard operating procedures must be incorporated into the OM&M plan.

(7) At a minimum, initial adjustment of the system must consist of establishing the baseline output in both of the following ways:

(i) Adjust the range and the averaging period of the device.

(ii) Establish the alarm set points and the alarm delay time.

(8) After initial adjustment, the range, averaging period, alarm set points, or alarm delay time may not be adjusted except as specified in the OM&M plan required by §63.7100(d). In no



event may the range be increased by more than 100 percent or decreased by more than 50 percent over a 365-day period unless a responsible official as defined in §63.2 certifies in writing to the Administrator that the ESP has been inspected and found to be in good operating condition.

(f) For each emission unit equipped with an add-on air pollution control device, you must inspect each capture/collection and closed vent system at least once each calendar year to ensure that each system is operating in accordance with the operating requirements in item 6 of Table 3 to this subpart and record the results of each inspection.

(g) For each COMS used to monitor an add-on air pollution control device, you must meet the requirements in paragraphs (g)(1) and (2) of this section.

(1) Install the COMS at the outlet of the control device.

(2) Install, maintain, calibrate, and operate the COMS as required by 40 CFR part 63, subpart A, General Provisions and according to Performance Specification (PS)-1 of appendix B to part 60 of this chapter. Facilities that operate COMS installed on or before February 6, 2001, may continue to meet the requirements in effect at the time of COMS installation unless specifically required to re-certify the COMS by their permitting authority.

(h) For each mass flow rate monitor used for measuring the dry sorbent injection rate (*e.g.*, sorbent, activated carbon, etc.) you must meet the requirements of (h)(1) through (3) of this section.

(1) Locate the device in a position(s) that provides a representative measurement of the total sorbent injection rate.

(2) Install and calibrate the device in accordance with manufacturer's procedures and specifications or other applicable procedures (such as industry standards or best practices) to ensure proper operation of the device.

(3) At least annually, calibrate the device in accordance with the manufacturer's procedures and specifications or other applicable procedures (such as industry standards or best practices) to ensure proper operation of the device.

(i) For each temperature monitoring device installed to monitor the temperature of a thermal oxidizer, you must meet the requirements of (i)(1) through (34) of this section.

(1) Install the temperature monitoring device in the fire box or in the ductwork immediately downstream of the fire box in a position before any substantial heat exchange occurs.

(2) The temperature measurement system must be capable of measuring the temperature over a range that extends at least 20 percent beyond the normal expected operating range and has an accuracy of  $\pm 1$  percent of temperature measured or 2.8 degrees Celsius (5 degrees Fahrenheit) whichever is greater. The data recording system associated with affected CPMS must have a resolution that is equal to or better than one-half of the required system accuracy.

(3) ~~The calibration reference for the temperature measurement must be a National Institute of Standards and Technology calibrated reference thermocouple-potentiometer system or alternate reference, subject to approval by the Administrator~~ The temperature measurement must be calibrated to a National Institute of Standards and Technology traceable certified reference thermocouple.

(4) The calibration of all thermocouples ~~and other temperature sensors~~ must be verified at least once every three months.

#### **§63.7114 How do I demonstrate initial compliance with the emission limitations standard?**

(a) You must demonstrate initial compliance with each emission limit in Table 1 to this subpart that applies to you, according to Table 4 to this subpart. For existing lime kilns and their associated coolers, you may perform VE measurements in accordance with EPA Method 9 of appendix A to part 60 in lieu of installing a COMS or PM detector if any of the conditions in

paragraphs (a)(1) through (3) of this section exist:

(1) You use a FF for PM control, and the FF is under positive pressure and has multiple stacks; or

(2) The control device exhausts through a monovent; or

(3) The installation of a COMS in accordance with PS-1 of appendix B to part 60 is infeasible.

(b) For those LMP that comply with either the HCl emissions limit or the mercury, organic HAP, or dioxin/furan emissions limits using emissions averaging, the average HCl or mercury emissions determined according to the procedures in §63.7112(n), must not exceed the applicable emission limit in Table 19 to this subpart.

~~(c) For those LMP that comply with either the HCl emissions limit or the mercury emission limit using emissions averaging, you must comply with the requirements in paragraph (c)(1) through (4) of this section.~~

~~(1) You must complete the stack testing required in paragraph §63.7112(n) of this section for all lime kilns you wish to include in the emission average before submitting the implementation plan required in paragraph (c)(2) of this section.~~

~~(2) You must develop and submit to the applicable regulatory authority for review and approval, an implementation plan for emission averaging no later than 180 days before the date you intend to demonstrate compliance using the emission averaging option. You must include the information contained in paragraphs (c)(2)(i) through (iii) of this section in your implementation plan.~~

~~(i) Identification of all lime kilns in the averaging group, including the lime kiln subcategory, type of stone produced, typical stone production rate, control technology installed, and types of fuel(s) that will be burned.~~

~~(ii)~~ The HCl or mercury emission rate for each lime kiln for each of the fuels identified in paragraph (c)(2)(i) of this section.

~~(iii)~~ The date on which you are requesting emission averaging to commence.

~~(3)~~ The regulatory authority shall review and approve or disapprove the plan according to the following criteria:

~~(i)~~ Whether the content of the plan includes all the information specified in paragraph (c)(2) of this section, and

~~(ii)~~ Whether the plan presents sufficient information to determine that compliance will be achieved and maintained.

~~(4)~~ The applicable regulatory authority shall not approve an emission averaging implementation plan containing any of the following provisions:

~~(i)~~ Averaging between emissions of differing pollutants;

~~(ii)~~ Averaging that includes lime kilns constructed or reconstructed on or after [DATE OF PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER], or

~~(iii)~~ Averaging between lime kilns located at different facilities.

~~(iv)~~ Averaging between lime kilns in different subcategories.

~~(b)~~ ~~(d)~~ (c) You must establish each site-specific operating limit in Table 3 to this subpart that applies to you according to the requirements in §63.7112(j) and Table 5 to this subpart.

Alternative parameters may be monitored if approval is obtained according to the procedures in §63.8(f).

~~(e)~~ ~~(e)~~ (d) You must submit the Notification of Compliance Status containing the results of the initial compliance demonstration according to the requirements in §63.7130(e).

## CONTINUOUS COMPLIANCE REQUIREMENTS

### **§63.7120 How do I monitor and collect data to demonstrate continuous compliance?**

- (a) You must monitor and collect data according to this section.
- (b) Except for monitor malfunctions, associated repairs, required quality assurance or control activities (including, as applicable, calibration checks and required zero adjustments), and except for PSH operations subject to monthly VE testing, you must monitor continuously (or collect data at all required intervals) at all times that the emission unit is operating.
- (c) Data recorded during the conditions described in paragraphs (c)(1) through (2) of this section may not be used either in data averages or calculations of emission or operating limits; or in fulfilling a minimum data availability requirement. You must use all the data collected during all other periods in assessing the operation of the control device and associated control system.
  - (1) Monitoring system breakdowns, repairs, preventive maintenance, calibration checks, and zero (low-level) and high-level adjustments;
  - (2) Periods of non-operation of the process unit (or portion thereof), resulting in cessation of the emissions to which the monitoring applies.

### **§63.7121 How do I demonstrate continuous compliance with the emission limitations standard?**

- (a) You must demonstrate continuous compliance with each emission limitation in Tables 1 and 3 to this subpart that applies to you according to the methods specified in Tables 6 and 7 to this subpart.
- (b) You must report each instance in which you did not meet each operating limit, opacity limit, and VE limit in Tables 2, 3 and 7 to this subpart that applies to you. These deviations must be reported according to the requirements in §63.7131.
- (c) [Reserved]

(d) Prior to the relevant compliance date for your source as specified in §63.7083(eg), consistent with §§63.6(e) and 63.7(e)(1), deviations that occur during a period of startup, shutdown, or malfunction are not violations if you demonstrate to the Administrator's satisfaction that you were operating in accordance with §63.6(e)(1). The Administrator will determine whether deviations that occur during a period of startup, shutdown, or malfunction are violations, according to the provisions in §63.6(e).

(e) For each PSH operation subject to an opacity limit as specified in Table 1 to this subpart, and any vents from buildings subject to an opacity limit, you must conduct a VE check according to item 1 in Table 7 to this subpart, and as follows:

(1) Conduct visual inspections that consist of a visual survey of each stack or process emission point over the test period to identify if there are VE, other than condensed water vapor.

(2) Select a position at least 15 but not more 1,320 feet from the affected emission point with the sun or other light source generally at your back.

(3) The observer conducting the VE checks need not be certified to conduct EPA Method 9 in appendix A-4 to part 60 of this chapter, but must meet the training requirements as described in EPA Method 22 of appendix A-7 to part 60 of this chapter.

(f) For existing lime kilns and their associated coolers, you may perform VE measurements in accordance with EPA Method 9 of appendix A to part 60 in lieu of installing a COMS or PM detector if any of the conditions in paragraphs (f)(1) or (3) of this section exist:

(1) You use a FF for PM control, and the FF is under positive pressure and has multiple stacks; or

(2) The control device exhausts through a monovent; or

(3) The installation of a COMS in accordance with PS-1 of appendix B to part 60 is

infeasible.

(g) If you elect to comply with emissions limits for mercury, organic HAPs, or dioxins/furans either the HCl emission limit or the mercury emission limit in Table 9 to this subpart using emissions averaging in accordance with an implementation plan approved under the provisions in §63.7114(e), you must comply with the requirements in paragraphs (g)(1) through (56) of this section.

(1) For lime kilns included in the emissions averaging group that are equipped with DSI or ACI systems, you must comply with the requirements in §63.7113(h).

(2) For kilns included in the emissions averaging group that use a control device or method other than DSI or ACI, you must comply with your site-specific monitoring plan of this section in accordance with the requirements of §63.7100(d).

(3) Calculate the monthly production-weighted average emission rate using the HCl or mercury emission rate determined during the last performance test and the actual production data for each kiln included in the emissions averaging option, as shown in Equation 6 of this section.

$$E_g = \frac{\sum_{k=1}^n (E_k \times P_k)}{\sum_{k=1}^n (P_k)} \quad (Eq.6)$$

Where:

$E_g$  = Monthly production-weighted average emission rate for month “g” for the group of kilns,

$E_k$  = Emission rate for kilns “k”, as determined during the last compliance stack test,

$P_k$  = Total monthly production of stone lime produced for kilns “k”, and

$n$  = Number of kilns in the averaging group.

(4) Until 12 monthly weighted average emission rates have been accumulated, the monthly weighted average emissions rate, calculated as shown in paragraph (g)(4) of this section, must

not exceed the emission limit in Table 9 of this subpart in any calendar month.

(5) After 12 monthly weighted average emission rates have been accumulated, for each subsequent calendar month, you must use Equation 7 of this section to calculate the 12-month rolling average of the monthly weighted average emission rates for the current month and the previous 11 months. The 12-month rolling weighted average emissions rate for the kilns included in the group must not exceed the emission limits in Table 9 of this subpart.

$$E_{avg} = \frac{\sum_{i=1}^{12} E_i}{12} \quad (Eq. 7)$$

Where:

$E_{avg}$  = 12-month rolling average emission rate.

$E_i$  = Monthly weighted average for month “i” calculated as shown in Equation 6 of this section.

(6) The emissions average for total organic HAP or D/F shall be computed as follows:

- (a) The concentration of total organic HAP or dioxins/furans shall be correct to 7 percent oxygen using equation 5 of this section for lime kilns included in the emissions average.
- (b) From the respective performance tests, obtain the flowrate in units of dscm for each kiln in the average.
- (c) Using the following equation, Equation [X], compute the emissions average concentration for comparison to the emissions limitation:

$$E_{avg} = \sum_{n=1}^{\infty} (C_{ki} * K_{ki}) / (F_{kt})$$

- $E_{avg}$  = Emission average in units of D/F in ng/dscm, 7% O<sub>2</sub> or total oHAPs ppm<sub>dv</sub>, 7% O<sub>2</sub>
- $C_{ki}$  = Measured concentration for D/F in ng/dscm or total oHAPs ppm<sub>dv</sub>, 7% O<sub>2</sub> for a lime kiln
- $F_{ki}$  = Measured exhaust gas in units of dscm for a lime kiln
- $F_{kt}$  = Total combined measured airflow in units of dscm for all lime kilns in the emissions average



## NOTIFICATION, REPORTS, AND RECORDS

### §63.7130 What notifications must I submit and when?

(a) You must submit all of the notifications in §§63.6(h)(4) and (5); 63.7(b) and (c); 63.8(e); (f)(4) and (6); and 63.9(a) through (j) that apply to you, by the dates specified.

(b) As specified in §63.9(b)(2), if you **initially** start up your affected source before January 5, 2004, you must submit an initial notification not later than 120 calendar days after January 5, 2004.

(c) If you **initially** start up your new or reconstructed affected source on or after January 5, 2004, you must submit an initial notification not later than 120 calendar days after you **initially** start up your affected source.

(d) If you are required to conduct a performance test, you must submit a notification of intent to conduct a performance test at least 60 calendar days before the performance test is scheduled to begin, as required in §63.7(b)(1).

(e) If you are required to conduct a performance test, design evaluation, opacity observation, VE observation, or other initial compliance demonstration as specified in Table 4 or 5 to this subpart, you must submit a Notification of Compliance Status according to §63.9(h)(2)(ii). Beginning on the relevant compliance date for your source as specified in §63.7083(**eg**), submit all subsequent Notification of Compliance Status following the procedure specified in §63.7131(h).

(1) For each initial compliance demonstration required in Table 4 to this subpart that does not include a performance test, you must submit the Notification of Compliance Status before the close of business on the 30th calendar day following the completion of the initial compliance demonstration.

(2) For each compliance demonstration required in Table 6 to this subpart that includes a

performance test conducted according to the requirements in Table 5 to this subpart, you must submit the Notification of Compliance Status, including the performance test results, before the close of business on the 60th calendar day following the completion of the performance test according to §63.10(d)(2).

**§63.7131 What reports must I submit and when?**

(a) You must submit each report listed in Table 8 to this subpart that applies to you.

(b) Unless the Administrator has approved a different schedule for submission of reports under §63.10(a), you must submit each report by the date specified in Table 8 to this subpart and according to the requirements in paragraphs (b)(1) through (6) of this section:

(1) The first compliance report must cover the period beginning on the compliance date that is specified for your affected source in §63.7083 and ending on June 30 or December 31, whichever date is the first date following the end of the first half calendar year after the compliance date that is specified for your source in §63.7083.

(2) The first compliance report must be postmarked or delivered no later than July 31 or January 31, whichever date follows the end of the first half calendar year after the compliance date that is specified for your affected source in §63.7083.

(3) Each subsequent compliance report must cover the semiannual reporting period from January 1 through June 30 or the semiannual reporting period from July 1 through December 31.

(4) Each subsequent compliance report must be postmarked or delivered no later than July 31 or January 31, whichever date is the first date following the end of the semiannual reporting period.

(5) For each affected source that is subject to permitting regulations pursuant to part 70 or part 71 of this chapter, if the permitting authority has established dates for submitting semiannual reports pursuant to §§70.6(a)(3)(iii)(A) or 71.6(a)(3)(iii)(A) of this chapter, you may submit the

first and subsequent compliance reports according to the dates the permitting authority has established instead of according to the dates specified in paragraphs (b)(1) through (4) of this section.

(6) Beginning on the relevant compliance date for your source as specified in §63.7083(eg), submit all subsequent compliance reports following the procedure specified in paragraph (h) of this section.

(c) The compliance report must contain the information specified in paragraphs (c)(1) through (6) of this section.

(1) Company name and address.

(2) Statement by a responsible official with that official's name, title, and signature, certifying the truth, accuracy, and completeness of the content of the report.

(3) Date of report and beginning and ending dates of the reporting period.

(4) Prior to the relevant compliance date for your source as specified in §63.7083(eg), if you had a startup, shutdown or malfunction during the reporting period and you took actions consistent with your SSMP, the compliance report must include the information in §63.10(d)(5)(i).

(5) If there were no deviations from any emission limitations (emission limit, operating limit, opacity limit, and VE limit) that apply to you, the compliance report must include a statement that there were no deviations from the emission limitations during the reporting period.

(6) If there were no periods during which the continuous monitoring systems (CMS) were out-of-control as specified in §63.8(c)(7), a statement that there were no periods during which the CMS were out-of-control during the reporting period.

(d) For each deviation from an emission limitation (emission limit, operating limit, opacity limit, and VE limit) that occurs at an affected source where you are not using a CMS to comply

with the emission limitations in this subpart, the compliance report must contain the information specified in paragraphs (c)(1) through (4) and (d)(1) and (2) of this section. The deviations must be reported in accordance with the requirements in §63.10(d) prior to the relevant compliance date for your source as specified in §63.7083(eg) and the requirements in §63.10(d)(1)-(4) beginning on the relevant compliance date for your source as specified in §63.7083(eg).

(1) The total operating time of each emission unit during the reporting period.

(2) Information on the number, duration, and cause of deviations (including unknown cause, if applicable), and the corrective action taken.

(3) An estimate of the quantity of each regulated pollutant emitted over a ~~particulate matter~~ non-opacity or VE emission limit, and a description of the method used to estimate the emissions.

(e) For each deviation from an emission limitation (emission limit, operating limit, opacity limit, and VE limit) occurring at an affected source where you are using a CMS to comply with the emission limitation in this subpart, you must include the information specified in paragraphs (c)(1) through (4) and (e)(1) through (11) of this section, except that beginning on the relevant compliance date for your source as specified in §63.7083(eg), the semiannual compliance report must also include the information included in paragraph (e)(12) of this section. This includes periods of startup, shutdown, and malfunction.

(1) The date and time that each malfunction started and stopped.

(2) The date, time, and duration that each CMS was inoperative, except for zero (low-level) and high-level checks.

(3) The date, time and duration that each CMS was out-of-control, including the information in §63.8(c)(8).

(4) The date and time that each deviation started and stopped, and whether each deviation

occurred during a period of startup, shutdown, or malfunction or during another period.

(5) A summary of the total duration of the deviations during the reporting period and the total duration as a percent of the total affected source operating time during that reporting period.

(6) A breakdown of the total duration of the deviations during the reporting period into those that are due to startup, shutdown, control equipment problems, process problems, other known causes, and other unknown causes.

(7) A summary of the total duration of CMS downtime during the reporting period and the total duration of CMS downtime as a percent of the total emission unit operating time during that reporting period.

(8) A brief description of the process units.

(9) A brief description of the CMS.

(10) The date of the latest CMS certification or audit.

(11) A description of any changes in CMS, processes, or controls since the last reporting period.

(12) An estimate of the quantity of each regulated pollutant emitted over a **non-opacity or VE particulate-matter** emission limit, and a description of the method used to estimate the emissions.

(f) Each facility that has obtained a title V operating permit pursuant to part 70 or part 71 of this chapter must report all deviations as defined in this subpart in the semiannual monitoring report required by §§70.6(a)(3)(iii)(A) or 71.6(a)(3)(iii)(A) of this chapter. If you submit a compliance report specified in Table 8 to this subpart along with, or as part of, the semiannual monitoring report required by §§70.6(a)(3)(iii)(A) or 71.6(a)(3)(iii)(A) of this chapter, and the compliance report includes all required information concerning deviations from any emission limitation (including any operating limit), submission of the compliance report shall be deemed

to satisfy any obligation to report the same deviations in the semiannual monitoring report.

However, submission of a compliance report shall not otherwise affect any obligation you may have to report deviations from permit requirements to the permit authority.

(g) If you are required to submit reports following the procedure specified in this paragraph, you must submit reports to the EPA via the Compliance and Emissions Data Reporting Interface (CEDRI), which can be accessed through the EPA's Central Data Exchange (CDX) (<https://cdx.epa.gov/>). You must use the appropriate electronic report template on the CEDRI website (<https://www.epa.gov/electronic-reporting-air-emissions/compliance-and-emissions-data-reporting-interface-cedri>) for this subpart. The date report templates become available will be listed on the CEDRI website. The report must be submitted by the deadline specified in this subpart, regardless of the method in which the report is submitted. The EPA will make all the information submitted through CEDRI available to the public without further notice to you. Do not use CEDRI to submit information you claim as Confidential Business Information (CBI). Although we do not expect persons to assert a claim of CBI, if you wish to assert a CBI claim for some of the information in the report, you must submit a complete file, including information claimed to be CBI, to the EPA following the procedures in paragraph (g). Clearly mark the part or all of the information that you claim to be CBI. Information not marked as CBI may be authorized for public release without prior notice. Information marked as CBI will not be disclosed except in accordance with procedures set forth in 40 CFR part 2. All CBI claims must be asserted at the time of submission. Anything submitted using CEDRI cannot later be claimed CBI. Furthermore, under CAA section 114(c), emissions data is not entitled to confidential treatment, and the EPA is required to make emissions data available to the public. Thus, emissions data will not be protected as CBI and will be made publicly available. You must submit the same file submitted to the CBI office with the CBI omitted to the EPA via the EPA's

CDX as described earlier in this paragraph.

(1) The preferred method to receive CBI is for it to be transmitted electronically using email attachments, File Transfer Protocol, or other online file sharing services. Electronic submissions must be transmitted directly to the OAQPS CBI Office at the email address [oaqpscbi@epa.gov](mailto:oaqpscbi@epa.gov), and as described above, should include clear CBI markings and be flagged to the attention of the Lime Manufacturing Sector Lead. If assistance is needed with submitting large electronic files that exceed the file size limit for email attachments, and if you do not have your own file sharing service, please email [oaqpscbi@epa.gov](mailto:oaqpscbi@epa.gov) to request a file transfer link.

(2) If you cannot transmit the file electronically, you may send CBI information through the postal service to the following address: OAQPS Document Control Officer (C404-02), OAQPS, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, Attention Lime Manufacturing Sector Lead. The mailed CBI material should be double wrapped and clearly marked. Any CBI markings should not show through the outer envelope.

~~If you claim some of the information required to be submitted via CEDRI is confidential business information (CBI), submit a complete report, including information claimed to be CBI, to the EPA. The report must be generated using the appropriate form on the CEDRI website. Submit the file on a compact disc, flash drive, or other commonly used electronic storage medium and clearly mark the medium as CBI. Mail the electronic medium to U.S. EPA/OAQPS/CORE CBI Office, Attention: Group Leader, Measurement Policy Group, MD C404-02, 4930 Old Page Rd., Durham, NC 27703. The same file with the CBI omitted must be submitted to the EPA via the EPA's CDX as described earlier in this paragraph.~~

(h) *Performance Tests*. Within 60 days after the date of completing each performance test required by this subpart, you must submit the results of the performance test following the procedures specified in paragraphs (h)(1) through (3) of this section.

(1) *Data collected using test methods supported by the EPA's Electronic Reporting Tool (ERT) as listed on the EPA's ERT website (<https://www.epa.gov/electronic-reporting-air-emissions/electronic-reporting-tool-ert>) at the time of the test.* Submit the results of the performance test to the EPA via CEDRI, which can be accessed through the EPA's CDX (<https://cdx.epa.gov/>). The data must be submitted in a file format generated through the use of the EPA's ERT. Alternatively, you may submit an electronic file consistent with the extensible markup language (XML) schema listed on the EPA's ERT website.

(2) *Data collected using test methods that are not supported by the EPA's ERT as listed on the EPA's ERT website at the time of the test.* The results of the performance test must be included as an attachment in the ERT or an alternate electronic file consistent with the XML schema listed on the EPA's ERT website. Submit the ERT generated package or alternative file to the EPA via CEDRI.

(3) *Confidential business information (CBI).* (i) **The EPA will make all the information submitted through CEDRI available to the public without further notice to you. Do not use CEDRI to submit information you claim as CBI. Although we do not expect persons to assert a claim of CBI, if you wish to assert a CBI claim for some of the information submitted under paragraph (a)(1) or (2) of this section, you must submit a complete file, including information claimed to be CBI, to the EPA.**

(ii) **The file must be generated using the EPA's ERT or an alternate electronic file consistent with the XML schema listed on the EPA's ERT website.**

(iii) **Clearly mark the part or all of the information that you claim to be CBI. Information not marked as CBI may be authorized for public release without prior notice. Information marked as CBI will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.**



(iv) The preferred method to receive CBI is for it to be transmitted electronically using email attachments, File Transfer Protocol, or other online file sharing services. Electronic submissions must be transmitted directly to the OAQPS CBI Office at the email address [oaqpscbi@epa.gov](mailto:oaqpscbi@epa.gov), and as described above, should include clear CBI markings and be flagged to the attention of the Group Leader, Measurement Policy Group. If assistance is needed with submitting large electronic files that exceed the file size limit for email attachments, and if you do not have your own file sharing service, please email [oaqpscbi@epa.gov](mailto:oaqpscbi@epa.gov) to request a file transfer link.

(v) If you cannot transmit the file electronically, you may send CBI information through the postal service to the following address: OAQPS Document Control Officer (C404-02), OAQPS, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, Attention Group Leader, Measurement Policy Group. The mailed CBI material should be double wrapped and clearly marked. Any CBI markings should not show through the outer envelope.

(vi) All CBI claims must be asserted at the time of submission. Anything submitted using CEDRI cannot later be claimed CBI. Furthermore, under CAA section 114(c), emissions data is not entitled to confidential treatment, and the EPA is required to make emissions data available to the public. Thus, emissions data will not be protected as CBI and will be made publicly available.

(vii) You must submit the same file submitted to the CBI office with the CBI omitted to the EPA via the EPA's CDX as described in paragraphs (h)(1) and (2) of this section.

~~If you claim some of the information submitted under paragraph (i) of this section is CBI, you must submit a complete file, including information claimed to be CBI, to the EPA. The file must be generated through the use of the EPA's ERT or an alternate electronic file consistent with the XML schema listed on the EPA's ERT website. Submit the file on a compact disc, flash~~

~~drive, or other commonly used electronic storage medium and clearly mark the medium as CBI. Mail the electronic medium to U.S. EPA/OAQPS/CORE CBI Office, Attention: Group Leader, Measurement Policy Group, MD C404-02, 4930 Old Page Rd., Durham, NC 27703. The same file with the CBI omitted must be submitted to the EPA via the EPA's CDX as described in paragraph (i) of this section.~~

(i) If you are required to electronically submit a report or notification through CEDRI in the EPA's CDX, you may assert a claim of EPA system outage for failure to timely comply with the reporting requirement. To assert a claim of EPA system outage, you must meet the requirements outlined in paragraphs (i)(1) through (7) of this section.

(1) You must have been or will be precluded from accessing CEDRI and submitting a required report within the time prescribed due to an outage of either the EPA's CEDRI or CDX systems.

(2) The outage must have occurred within the period of time beginning five business days prior to the date that the submission is due.

(3) The outage may be planned or unplanned.

(4) You must submit notification to the Administrator in writing as soon as possible following the date you first knew, or through due diligence should have known, that the event may cause or has caused a delay in reporting.

(5) You must provide to the Administrator a written description identifying:

(i) The date(s) and time(s) when CDX or CEDRI was accessed and the system was unavailable;

(ii) A rationale for attributing the delay in reporting beyond the regulatory deadline to EPA system outage;

(iii) Measures taken or to be taken to minimize the delay in reporting; and

(iv) The date by which you propose to report, or if you have already met the reporting requirement at the time of the notification, the date you reported.

(6) The decision to accept the claim of EPA system outage and allow an extension to the reporting deadline is solely within the discretion of the Administrator.

(7) In any circumstance, the report must be submitted electronically as soon as possible after the outage is resolved.

(j) *Claims of force majeure.* If you are required to electronically submit a report through CEDRI in the EPA's CDX, you may assert a claim of force majeure for failure to timely comply with the reporting requirement. To assert a claim of force majeure, you must meet the requirements outlined in paragraphs (j)(1) through (5) of this section.

(1) You may submit a claim if a force majeure event is about to occur, occurs, or has occurred or there are lingering effects from such an event within the period of time beginning five business days prior to the date the submission is due. For the purposes of this section, a force majeure event is defined as an event that will be or has been caused by circumstances beyond the control of the affected facility, its contractors, or any entity controlled by the affected facility that prevents you from complying with the requirement to submit a report electronically within the time period prescribed. Examples of such events are acts of nature (e.g., hurricanes, earthquakes, or floods), acts of war or terrorism, or equipment failure or safety hazard beyond the control of the affected facility (e.g., large scale power outage).

(2) You must submit notification to the Administrator in writing as soon as possible following the date you first knew, or through due diligence should have known, that the event may cause or has caused a delay in reporting.

(3) You must provide to the Administrator:

- (i) A written description of the force majeure event;
  - (ii) A rationale for attributing the delay in reporting beyond the regulatory deadline to the force majeure event;
  - (iii) Measures taken or to be taken to minimize the delay in reporting; and
  - (iv) The date by which you propose to report, or if you have already met the reporting requirement at the time of the notification, the date you reported.
- (4) The decision to accept the claim of force majeure and allow an extension to the reporting deadline is solely within the discretion of the Administrator.
- (5) In any circumstance, the reporting must occur as soon as possible after the force majeure event occurs.

**§63.7132 What records must I keep?**

- (a) You must keep the records specified in paragraphs (a)(1) through (3) of this section.
- (1) A copy of each notification and report that you submitted to comply with this subpart, including all documentation supporting any Initial Notification or Notification of Compliance Status that you submitted, according to the requirements in §63.10(b)(2)(xiv).
- (2) Prior to the relevant compliance date for your source as specified in §63.7083(eg), the records in §63.6(e)(3)(iii) through (v) related to startup, shutdown, and malfunction. On and after the relevant compliance date for your source as specified in §63.7083(eg), the records in paragraphs (a)(2)(i) and (ii) of this section.
- (i) You must keep records for each startup period of the date, the time startup began, the time began producing on-specification lime product, and the time discharge from the kiln began for any affected source that is subject to a standard during startup that differs from the standard applicable at other times.
- (ii) You must keep records of the date, time, cause and duration of each malfunction (as

defined in 40 CFR 63.2) that causes an affected source to fail to meet an applicable standard; if there was also a monitoring malfunction, the date, time, cause, and duration of the monitoring malfunction; the record must list the affected source or equipment; if there was a failure to meet a particulate matter emissions limit, an estimate of the volume of each regulated pollutant emitted over the limit, and a description of the method used to estimate the emissions.

(3) Records of performance tests, performance evaluations, and opacity and VE observations as required in §63.10(b)(2)(viii).

(b) You must keep the records in §63.6(h)(6) for VE observations.

(c) You must keep the records required by Tables 6 and 7 to this subpart to show continuous compliance with each emission limitation that applies to you.

(d) You must keep the records which document the basis for the initial applicability determination as required under §63.7081.

### **§63.7133 In what form and for how long must I keep my records?**

(a) Your records must be in a form suitable and readily available for expeditious review, according to §63.10(b)(1).

(b) As specified in §63.10(b)(1), you must keep each record for 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record.

(c) You must keep each record onsite for at least 2 years after the date of each occurrence, measurement, maintenance, corrective action, report, or record, according to §63.10(b)(1). You may keep the records offsite for the remaining 3 years.

(d) Any records required to be maintained by this part that are submitted electronically via the EPA's CEDRI may be maintained in electronic format. This ability to maintain electronic copies does not affect the requirement for facilities to make records, data, and reports available upon request to a delegated air agency or the EPA as part of an on-site compliance evaluation.

## **OTHER REQUIREMENTS AND INFORMATION**

### **§63.7140 What parts of the General Provisions apply to me?**

Table 9 to this subpart shows which parts of the General Provisions in §§63.1 through 63.16 apply to you. When there is overlap between subpart A and subpart AAAAA, as indicated in the “Explanations” column in Table 9, subpart AAAAA takes precedence.

### **§63.7141 Who implements and enforces this subpart?**

(a) This subpart can be implemented and enforced by us, the U.S. EPA, or by a delegated authority such as your State, local, or tribal agency. If the U.S. EPA Administrator has delegated authority to your State, local, or tribal agency, then that agency (as well as the U.S. EPA) has the authority to implement and enforce this subpart. You should contact your U.S. EPA Regional Office to find out if this subpart is delegated to your State, local, or tribal agency.

(b) In delegating implementation and enforcement authority of this subpart to a State, local, or tribal agency under subpart E of this part, the authorities contained in paragraph (c) of this section are retained by the Administrator of the U.S. EPA and are not transferred to the State, local, or tribal agency.

(c) The authorities that will not be delegated to State, local, or tribal agencies are as specified in paragraphs (c)(1) through (7) of this section.

(1) Approval of alternatives to the non-opacity emission limitations in §63.7090(a).

(2) Approval of alternative opacity emission limitations in §63.7090(a) and (c).

(3) Approval of alternatives to the operating limits in §63.7090(b).

(4) Approval of major alternatives to test methods under §63.7(e)(2)(ii) and (f) and as defined in §63.90.

(5) Approval of major alternatives to monitoring under §63.8(f) and as defined in §63.90.

(6) Approval of major alternatives to recordkeeping and reporting under §63.10(f) and as

defined in §63.90.

(7) Approval of an alternative to any electronic reporting to the EPA required by this subpart.

**§63.7142 What are the requirements for claiming area source status?**

(a) If you wish to claim that your LMP is an area source, you must measure the emissions of hydrogen chloride from all lime kilns, except as provided in paragraph (c) of this section, at your plant using either:

(1) EPA Method 320 of appendix A to this part, or

(2) As an alternative to Method 320 of Appendix A, ASTM D6348-03 (Reapproved 2010) including Annexes A1 through A8 (incorporated by reference—see §63.14). ASTM D6348–12e1 (incorporated by reference—see §63.14) is an acceptable alternative to EPA Method 320 of appendix A, provided that the provisions of paragraphs (a)(2)(i) and (ii) of this section are followed:

(i) The test plan preparation and implementation in the Annexes to ASTM D6348–03 (Reapproved 2010), Sections A1 through A8 are mandatory.

(ii) In ASTM D6348–03 (Reapproved 2010) Annex A5 (Analyte Spiking Technique), the percent recovery (%R) must be determined for each target analyte (Equation A5.5). In order for the test data to be acceptable for a compound, %R must be greater than or equal to 70 percent and less than or equal to 130 percent. If the %R value does not meet this criterion for a target compound, the test data are not acceptable for that compound and the test must be repeated for that analyte (i.e., the sampling and/or analytical procedure should be adjusted before a retest). The %R value for each compound must be reported in the test report, and all field measurements must be corrected with the calculated %R value for that compound by using the following equation: Reported Results = ((Measured Concentration in the Stack))/(%R) x 100; or

(3) EPA Method 321 of appendix A to this part, or

(4) Method 26/26A, as referenced in 40 CFR Part 60, Appendix A-8.

(5) [RESERVED] ~~As an alternative to EPA Method 321, ASTM Method D6735-01~~

~~(Reapproved 2009), Standard Test Method for Measurement of Gaseous Chlorides and Fluorides from Mineral Calcining Exhaust Sources—Impinger Method (incorporated by reference—see §63.14), provided that the provisions in paragraphs (a)(3)(i) through (vi) of this section are followed.~~

(i) ~~A test must include three or more runs in which a pair of samples is obtained simultaneously for each run according to section 11.2.6 of ASTM Method D6735-01 (Reapproved 2009).~~

(ii) ~~You must calculate the test run standard deviation of each set of paired samples to quantify data precision, according to Equation 1 of this section:~~

$$RSD_a = (100) \text{ Absolute Value } \left[ \frac{C1_a - C2_a}{C1_a + C2_a} \right] \quad (Eq. 1)$$

~~Where:~~

~~RSD<sub>a</sub>—The test run relative standard deviation of sample pair a, percent.~~

~~C1<sub>a</sub> and C2<sub>a</sub>—The HCl concentrations, milligram/dry standard cubic meter (mg/dscm), from the paired samples.~~

(iii) ~~You must calculate the test average relative standard deviation according to Equation 2 of this section:~~

$$RSD_{TA} = \frac{\sum_{a=1}^p RSD_a}{p} \quad (Eq. 2)$$

~~Where:~~



~~RSD<sub>TA</sub> = The test average relative standard deviation, percent.~~

~~RSD<sub>a</sub> = The test run relative standard deviation for sample pair a.~~

~~p = The number of test runs,  $\geq 3$ .~~

~~(iv) If RSD<sup>TA</sup> is greater than 20 percent, the data are invalid and the test must be repeated.~~

~~(v) The post test analyte spike procedure of section 11.2.7 of ASTM Method D6735-01 (Reapproved 2009) is conducted, and the percent recovery is calculated according to section 12.6 of ASTM Method D6735-01 (Reapproved 2009).~~

~~(vi) If the percent recovery is between 70 percent and 130 percent, inclusive, the test is valid. If the percent recovery is outside of this range, the data are considered invalid, and the test must be repeated.~~

(b) If you conduct tests to determine the rates of emission of specific organic HAP from lime kilns at LMP for use in applicability determinations under §63.7081, you may use either:

(1) Method 320 of appendix A to this part, or

(2) As an alternative to Method 320 of Appendix A, ASTM D6348-03 (Reapproved 2010) including Annexes A1 through A8 (incorporated by reference—see §63.14). ASTM D6348–12e1 (incorporated by reference—see §63.14) is an acceptable alternative to EPA Method 320 of appendix A, provided that the provisions of paragraphs (b)(2)(i) and (ii) of this section are followed:

(i) The test plan preparation and implementation in the Annexes to ASTM D6348–03 (Reapproved 2010), Sections A1 through A8 are mandatory.

(ii) In ASTM D6348–03 (Reapproved 2010) Annex A5 (Analyte Spiking Technique), the percent recovery (%R) must be determined for each target analyte (Equation A5.5). In order for the test data to be acceptable for a compound, %R must be greater than or equal to 70 percent

and less than or equal to 130 percent. If the %R value does not meet this criterion for a target compound, the test data are not acceptable for that compound and the test must be repeated for that analyte (i.e., the sampling and/or analytical procedure should be adjusted before a retest). The %R value for each compound must be reported in the test report, and all field measurements must be corrected with the calculated %R value for that compound by using the following equation: Reported Results = ((Measured Concentration in the Stack))/(%R) x 100; or

(3) Method 18 of appendix A-6 to part 60 of this chapter; or

(4) As an alternative to Method 18, ASTM D6420-99 (Reapproved 2010), Standard Test Method for Determination of Gaseous Organic Compounds by Direct Interface Gas Chromatography-Mass Spectrometry (GC/MS) (incorporated by reference – see §63.14), provided that the provisions of paragraphs (b)(3)(i) through (iv) of this section are followed:

(i) The target compound(s) are those listed in section 1.1 of ASTM D6420-99 (Reapproved 2010) as measurable;

(ii) This ASTM should not be used for methane and ethane because their atomic mass is less than 35 and

(iii) ASTM D6420-99 (Reapproved 2010) should never be specified as a total VOC method.

(c) It is left to the discretion of the permitting authority whether or not idled kilns must be tested for (HCl) to claim area source status. If the facility has kilns that use common feed materials and fuel, are essentially identical in design, and use essentially identical emission controls, the permitting authority may also determine if one kiln can be tested, and the HCl emissions for the other essentially identical kilns be estimated from that test.

#### **§63.7143 What definitions apply to this subpart?**

Terms used in this subpart are defined in the Clean Air Act, in §63.2, and in this section as follows:

*Bag leak detector system* (BLDS) is a type of PM detector used on FF to identify an increase in PM emissions resulting from a broken filter bag or other malfunction and sound an alarm.

*Belt conveyor* means a conveying device that transports *processed stone* from one location to another by means of an endless belt that is carried on a series of idlers and routed around a pulley at each end.

*Bucket elevator* means a *processed stone* conveying device consisting of a head and foot assembly which supports and drives an endless single or double strand chain or belt to which buckets are attached.

*Building* means any frame structure with a roof.

*Capture system* means the equipment (including enclosures, hoods, ducts, fans, dampers, etc.) used to capture and transport PM to a control device.

*Control device* means the air pollution control equipment used to reduce PM emissions released to the atmosphere from one or more process operations at an LMP.

*Conveying system* means a device for transporting *processed stone* from one piece of equipment or location to another location within a plant. Conveying systems include but are not limited to feeders, belt conveyors, bucket elevators and pneumatic systems.

*Deviation* means any instance in which an affected source, subject to this subpart, or an owner or operator of such a source:

(1) Fails to meet any requirement or obligation established by this subpart, including but not limited to any emission limitation (including any operating limit);

(2) Fails to meet any term or condition that is adopted to implement an applicable requirement in this subpart and that is included in the operating permit for any affected source required to obtain such a permit; or

(3) Prior to the relevant compliance date for your source as specified in §63.7083(eg), fails to meet any emission limitation (including any operating limit) in this subpart during startup, shutdown, or malfunction, regardless of whether or not such failure is allowed by this subpart.

(4) However, when a lime kiln emissions control device is being evaluated for engineering purposes or for performance testing purposes, the existing operating limits for the control device do not apply and variance from current operating limits is not a deviation.

*Dry sorbent injection (DSI)* means an add-on air pollution control system in which sorbent (e.g., conventional activated carbon, brominated activated carbon, Trona, hydrated lime, sodium carbonate, etc.) is injected into the flue gas stream upstream of a PM control device to react with and neutralize acid gases (such as SO<sub>2</sub> and HCl), Hg, organic HAP, or dioxins and furans in the exhaust stream forming a dry powder material that may be removed in a primary or secondary PM control device.

*Emission limitation* means any emission limit, opacity limit, operating limit, or VE limit.

*Emission unit* means a lime kiln, lime cooler, storage bin, conveying system transfer point, bulk loading or unloading operation, bucket elevator or belt conveyor at an LMP.

*Fugitive emission* means PM that is not collected by a capture system.

*Hydrator* means the device used to produce hydrated lime or calcium hydroxide via the chemical reaction of the lime product with water.

*Lime cooler* means the device external to the lime kiln (or part of the lime kiln itself) used to reduce the temperature of the lime produced by the kiln. For the purposes of this regulation, a cooler is associated with a lime kiln with respect to particulate matter (PM) emissions, but is not associated with a lime kiln for the purposes of standards for additional air pollutants added to the regulation on [ADD DATE OF FINAL RULE].

*Lime kiln* means the device, including any associated preheater, used to produce a lime

product from stone feed by calcination. Kiln types include, but are not limited to, rotary kiln, vertical kiln, rotary hearth kiln, double-shaft vertical kiln, and fluidized bed kiln.

*Lime manufacturing plant (LMP)* means any plant which uses a lime kiln to produce lime product from limestone or other calcareous material by calcination.

*Lime produced* refers to the production of lime products produced from the lime kiln consisting of high calcium quicklime, dolomitic quicklime, and/or dead-burned dolomitic lime.

*Lime product* means the product of the lime kiln calcination process including, calcitic lime, dolomitic lime, and dead-burned dolomite.

*Limestone* means the material comprised primarily of calcium carbonate (referred to sometimes as calcitic or high calcium limestone), magnesium carbonate, and/or the double carbonate of both calcium and magnesium (referred to sometimes as dolomitic limestone or dolomite).

*Monovent* means an exhaust configuration of a building or emission control device (e.g., positive pressure FF) that extends the length of the structure and has a width very small in relation to its length (i.e., length-to-width ratio is typically greater than 5:1). The exhaust may be an open vent with or without a roof, louvered vents, or a combination of such features.

*On-specification Lime Product* means lime product that has been sufficiently calcined to meet end use requirements.

*Particulate matter (PM) detector* means a system that is continuously capable of monitoring PM loading in the exhaust of FF or ESP in order to detect bag leaks, upset conditions, or control device malfunctions and sounds an alarm at a preset level. A PM detector system includes, but is not limited to, an instrument that operates on triboelectric, light scattering, light transmittance, or other effects to continuously monitor relative particulate loadings. A BLDS is a type of PM detector.

*Positive pressure FF or ESP* means a FF or ESP with the fan(s) on the upstream side of the control device.

*Process stone handling operations* means the equipment and transfer points between the equipment used to transport *processed stone*, and includes, storage bins, conveying system transfer points, bulk loading or unloading systems, screening operations, bucket elevators, and belt conveyors.

*Processed stone* means limestone or other calcareous material that has been processed to a size suitable for feeding into a lime kiln.

*Screening operation* means a device for separating material according to size by passing undersize material through one or more mesh surfaces (screens) in series and retaining oversize material on the mesh surfaces (screens).

*Shutdown* means the cessation of kiln operation. Shutdown begins when feed to the kiln is reduced below planned production quantities and ends when stone feed is halted and fuel combustion from the main burner ceases.

*Stack emissions* means the PM that is released to the atmosphere from a capture system or control device.

*Startup* means the beginning of kiln operation. Startup begins when a shutdown kiln begins firing fuel in the main burner. Startup ends when the lime kiln first generates on-specification lime product or 12 hours following first discharge from the kiln, whichever is earlier.

~~*Stone produced* refers to the production of limestone from the lime kiln consisting of high-calcium quick lime, dolomitic quick lime and/or dead burned dolomitic lime.~~

*Storage bin* means a manmade enclosure for storage (including surge bins) of *processed stone* prior to the lime kiln.

*TEQ* means the international method of expressing toxicity equivalents for dioxins and

furans as defined in EPA/100/R-10/005, “*Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds*”, December 2010 (incorporated by reference—see §63.14). The Toxic Equivalency Factors (TEFs) used to determine the dioxin and furan TEQs are listed in Table 10 of this subpart.

*Total Organic HAP* means, for the purposes of this subpart, the sum of the concentrations of compounds of formaldehyde, acetaldehyde, toluene, benzene, m-xylene, p-xylene, o-xylene, styrene, ethyl benzene, and naphthalene as measured by EPA Test Method 320 or Method 18 of appendix A to this part or ASTM D6348–03[1] or a combination of these methods, as appropriate. If measurement results for any pollutant are reported as below the method detection level (e.g., laboratory analytical results for one or more sample components are below the method defined analytical detection level), a value of zero (0) should be used ~~you must use the method detection level~~ as the measured emissions level for that pollutant in calculating the total organic HAP value. The measured result for a multiple component analysis (e.g., analytical values for multiple Method 18 fractions) may include a combination of method detection level data and analytical data reported above the method detection level. The owner or operator of an affected source may request the use of other test methods to make this determination under paragraphs 63.7(e)(2)(ii) and (f) of this part.

*Transfer point* means a point in a conveying operation where the material is transferred to or from a belt conveyor.

*Vent* means an opening through which there is mechanically induced air flow for the purpose of exhausting from a building air carrying PM emissions from one or more emission units.

**Table 1 to Subpart AAAAA of Part 63—Emission Limits**

As required in §63.7090(a), you must meet each emission limit in the following table that applies to you, except for kilns and coolers during startup and shutdown (See Table 2 for emission limits for kilns and coolers during startup and shutdown).

For . . .	You must meet the following emission limit
1. <del>All e</del> Existing lime kilns and their associated lime coolers that did not have a wet scrubber installed and operating prior to January 5, 2004	PM emissions must not exceed 0.12 pounds per ton of stone feed (lb/tsf).
2. <del>All e</del> Existing lime kilns and their associated lime coolers that have a wet scrubber, where the scrubber itself was installed and operating prior to January 5, 2004	PM emissions must not exceed 0.60 lb/tsf. If, at any time after January 5, 2004, the kiln changes to a dry control system, then the PM emission limit in item 1 of this Table 1 applies, and the kiln is hereafter ineligible for the PM emission limit in item 2 of this Table 1 regardless of the method of PM control.
3. <del>All n</del> New lime kilns and their associated lime coolers	PM emissions must not exceed 0.10 lb/tsf.
4. All existing and new lime kilns and their associated coolers at your LMP, and you choose to average PM emissions, except that any kiln that is allowed to meet the 0.60 lb/tsf PM emission limit is ineligible for averaging	Weighted average PM emissions calculated according to Eq. 2 in §63.7112 must not exceed 0.12 lb/tsf (if you are averaging only existing kilns) or 0.10 lb/tsf (if you are averaging only new kilns). If you are averaging existing and new kilns, your weighted average PM emissions must not exceed the weighted average emission limit calculated according to Eq. 3 in §63.7112, except that no new kiln and its associated cooler considered alone may exceed an average PM emissions limit of 0.10 lb/tsf.
5. All major sources	HCl emissions from all kilns must not exceed 300 tons per year (tpy), and must not exceed 685 pounds per hour (lb/hr).
<del>5. New straight rotary lime kilns and their associated coolers producing dolomitic quick lime and/or dead-burned dolomitic lime</del>	<del>HCl emissions must not exceed 1.7 lb/ton of lime produced.</del>
<del>6. Existing straight rotary lime kilns and their associated coolers producing dolomitic quick lime and/or dead-burned dolomitic lime</del>	<del>HCl emissions must not exceed 2.3 lb/ton of lime produced.</del>



<del>7. New straight rotary lime kilns and their associated coolers producing high calcium quick lime</del>	<del>HCl emissions must not exceed 0.015 lb/ton of lime produced.</del>
<del>8. Existing straight rotary lime kilns and their associated coolers producing high calcium quick lime</del>	<del>HCl emissions must not exceed 0.52 lb/ton of lime produced.</del>
<del>9. All preheater rotary lime kilns and their associated coolers producing dolomitic quick lime and/or dead-burned dolomitic lime</del>	<del>HCl emissions must not exceed 0.39 lb/ton of lime produced.</del>
<del>10. All preheater rotary lime kilns and their associated coolers producing high calcium quick lime</del>	<del>HCl emissions must not exceed 0.096 lb/ton of lime produced.</del>
<del>11. All vertical lime kilns and their associated coolers producing dolomitic quick lime and/or dead-burned dolomitic lime</del>	<del>HCl emissions must not exceed 0.39 lb/ton of lime produced.</del>
<del>12. All vertical lime kilns and their associated coolers producing high calcium quick lime</del>	<del>HCl emissions must not exceed 0.021 lb/ton of lime produced.</del>
<del>13.6. All new lime kilns and their associated coolers</del>	<del>Mercury emissions must not exceed 27 lb/MMton of lime produced.</del>
<del>14.7. All existing lime kilns and their associated coolers</del>	<del>Mercury emissions must not exceed 34 50 lb/MMton of lime produced.</del>
<del>15.8. All lime kilns and their associated coolers</del>	<del>Total Organic HAP emissions must not exceed 5.9 1.7 ppmvd @ 7% O<sub>2</sub>.</del>
<del>16.9. All lime kilns and their associated coolers</del>	<del>D/F emissions must not exceed 0.037 ng/dscm (TEQ)<sup>1</sup> @ 7% O<sub>2</sub>.</del>
<del>17.10. Stack emissions from all PSH operations at a new or existing affected source</del>	<del>PM emissions must not exceed 0.05 grams per dry standard cubic meter (g/dscm).</del>
<del>18.11. Stack emissions from all PSH operations at a new or existing affected source, unless the stack emissions are discharged through a wet scrubber control</del>	<del>Emissions must not exceed 7 percent opacity.</del>

device	
<del>19</del> .12. Fugitive emissions from all PSH operations at a new or existing affected source, except as provided by item 8 of this Table 1	Emissions must not exceed 10 percent opacity.
<del>20</del> .13. All PSH operations at a new or existing affected source enclosed in a building	All of the individually affected PSH operations must comply with the applicable PM and opacity emission limitations in items 5 through 7 of this Table 1, or the building must comply with the following: There must be no VE from the building, except from a vent; and vent emissions must not exceed the stack emissions limitations in items 5 and 6 of this Table 1.
<del>21</del> .14. Each FF that controls emissions from only an individual, enclosed storage bin	Emissions must not exceed 7 percent opacity.
<del>22</del> .15. Each set of multiple storage bins at a new or existing affected source, with combined stack emissions	You must comply with the emission limits in items 5 and 6 of this Table 1.

<sup>1</sup> Determined using the toxic equivalency factors listed in Table 2 of Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2, 3, 7, 8- Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds. When calculating TEQ, zero may be used for congeners that are below the estimated detection level (EDL).

**Table 2 to Subpart AAAAA of Part 63—Startup and Shutdown Emission Limits for Kilns and Coolers**

As required in §63.7090(b), on and after the relevant compliance date for your source as specified in §63.7083([eg](#)), you must meet each emission limit in the following table that applies to you

For . . .	You must meet the following emission limit	You have demonstrated compliance, if after following the requirements in §63.7112 . . .
1. All new and existing lime kilns and their associated coolers equipped with an FF or an ESP during each startup	Emissions must not exceed 15 percent opacity (based on startup period block average)	i. Installed, maintained, calibrated and operated a COMS as required by 40 CFR part 63, subpart A, General Provisions and according to PS-1 of appendix B to part 60 of this chapter, except as specified in §63.7113(g)(2);

		ii. Collected the COMS data at a frequency of at least once every 15 seconds, determining block averages for each startup period and demonstrating for each startup block period the average opacity does not exceed 15 percent.
2. All existing lime kilns and their associated coolers that have a wet scrubber during each startup	See item 2.b of Table 3 of subpart AAAAA for emission limit.	See item 1 of Table 6 of subpart AAAAA for requirements for demonstrating compliance.
3. All new and existing lime kilns and their associated coolers equipped with an FF or an ESP during shutdown	Emissions must not exceed 15 percent opacity (based on 6-minute average opacity for any 6-minute block period does not exceed 15 percent).	i. Installed, maintained, calibrated and operated a COMS as required by 40 CFR part 63, subpart A, General Provisions and according to PS-1 of appendix B to part 60 of this chapter, except as specified in §63.7113(g)(2);
		ii. Collecting the COMS data at a frequency of at least once every 15 seconds, determining block averages for each 6-minute period and demonstrating for each 6-minute block period the average opacity does not exceed 15 percent.
4. All existing lime kilns and their associated coolers that have a wet scrubber during shutdown	See item 2.b of Table 3 of subpart AAAAA for emission limit	See item 1 of Table 6 of subpart AAAAA for requirements for demonstrating compliance
5. All new and existing lime kilns that use dry sorbent injection or carbon injection during startup and shutdown		When a lime kiln is in startup or shutdown (as defined in section 63.7143), the Table 3 operating limits for sorbent and/or carbon injection do not apply and the lime kiln operator shall ensure that sorbent or carbon injection is in operation until the unit is no longer in startup or shutdown. During startup and shutdown, the control device shall be operated in accordance with manufacturer's recommendations or by a site-specific operating procedure for startup and shutdown events.
6. All new and existing lime kilns that use a thermal oxidizer during startup and shutdown		When a lime kiln is in startup or shutdown (as defined in section 63.7143), the Table 3 temperature limits for a thermal oxidizer do not apply and the lime kiln operator shall ensure that the thermal oxidizer is in operation until the

		unit is no longer in startup or shutdown. During startup and shutdown, the control device shall be operated in accordance with manufacturer's recommendations or by a site-specific operating procedure for startup and shutdown events.
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**Table 3 to Subpart AAAAA of Part 63—Operating Limits**

As required in §63.7090(b), you must meet each operating limit in the following table that applies to you, except for kilns and coolers during startup and shutdown (See Table 2 for operating limits during startup and shutdown)

For . . .	You must . . .
1. Each lime kiln and each lime cooler (if there is a separate exhaust to the atmosphere from the associated lime cooler) equipped with an FF	Maintain and operate the FF such that the BLDS or PM detector alarm condition does not exist for more than 5 percent of the total operating time in a 6-month period; and comply with the requirements in §63.7113(d) through (f) and Table 6 to this subpart. In lieu of a BLDS or PM detector maintain the FF such that the 6-minute average opacity for any 6-minute block period does not exceed 15 percent; and comply with the requirements in §63.7113(f) and (g) and Table 6 to this subpart.
2. Each lime kiln equipped with a wet scrubber	a. Maintain the 3-hour block exhaust gas stream pressure drop across the wet scrubber greater than or equal to the pressure drop operating limit established during the most recent <del>PM</del> PM performance test; and
	b. Maintain the 3-hour block scrubbing liquid flow rate greater than the flow rate operating limit established during the most recent performance test.
3. Each lime kiln equipped with an electrostatic precipitator	Install a PM detector and maintain and operate the ESP such that the PM detector alarm is not activated and alarm condition does not exist for more than 5 percent of the total operating time in a 6-month period, and comply with §63.7113(e); or, maintain the ESP such that the 6-minute average opacity for any 6-minute block period does not exceed 15 percent, and comply with the requirements in §63.7113(g); and comply with the requirements in §63.7113(f) and Table 6 to this subpart.
4. Each PSH operation subject to a PM limit which uses a wet scrubber	Maintain the 3-hour block average exhaust gas stream pressure drop across the wet scrubber greater than or equal to the pressure drop operating limit established during the <del>PM</del> PM performance test; and maintain the 3-hour block average scrubbing liquid flow rate greater than or equal to the flow rate operating limit established during the performance test.

5. All affected sources	Prepare a written OM&M plan; the plan must include the items listed in §63.7100(d) and the corrective actions to be taken when required in Table 6 to this subpart.
6. Each emission unit equipped with an add-on air pollution control device	a. Vent captured emissions through a closed system, except that dilution air may be added to emission streams for the purpose of controlling temperature at the inlet to an FF; and  Operate each capture/collection system according to the procedures and requirements in the OM&M plan.
7. Each lime kiln equipped with dry sorbent injection	Maintain the 3-hour block dry sorbent flow rate greater than or equal to the flow rate operating limit established during the most recent performance test for the applicable pollutant.
8. Each lime kiln equipped with a thermal oxidizer	Maintain the 3-hour block average combustion chamber temperature greater or equal to the combustion chamber operating limit established in the most recent performance test for the applicable pollutant.

**Table 4 to Subpart AAAAA of Part 63—Initial Compliance With Emission Limits**

As required in §63.7114, you must demonstrate initial compliance with each emission limitation that applies to you, according to the following table.

For . . .	For the following emission limit . . .	You have demonstrated initial compliance, if after following the requirements in §63.7112 . . .
1. All new or existing lime kilns and their associated lime coolers (kilns/coolers)	<del>PM emissions must not exceed 0.12 lb/tsf for all existing kilns/coolers with dry controls; 0.60 lb/tsf for existing kilns/coolers with wet scrubbers; 0.10 lb/tsf for all new kilns/coolers</del> Emission limits as identified in Table 1, or a weighted average calculated according to Eq. 3 in §63.7112	The kiln outlet PM, HCl, mercury, and Total Organic HAP, and dioxins and furans emissions (and if applicable, summed with the separate cooler <del>PM</del> PM emissions), based on the PM emissions measured using Method 5 or 5D in appendix A to part 60 of this chapter, HCl measured using Method 320 or 321 in appendix A of Part 63 of this chapter or Method 26/26A (as referenced in 40 CFR Part 60, Appendix A-8), mercury measured using Method 29 or 30B <del>5D</del> in appendix A to part 60 of this chapter, and the stone feed rate measurement over the period of initial performance test and Total Organic HAP measured using Method 18 <del>5D</del> in appendix A to part

		<p>60 of this chapter and/or Method 320 in appendix A of Part 63 of this chapter and dioxins and furans measured using Method 23 in appendix A to part 60 of this chapter, do not exceed the emission limit; if the lime kiln is controlled by an FF or ESP and you are opting to monitor PM emissions with a BLDS or PM detector, you have installed and are operating the monitoring device according to the requirements in §63.7113(d) or (e), respectively; and if the lime kiln is controlled by an FF or ESP and you are opting to monitor PM emissions using a COMS, you have installed and are operating the COMS according to the requirements in §63.7113(g). If the kiln is equipped with a dry sorbent injection system, you have a record of the dry sorbent and/or carbon injection flow rate operating parameter over the 3-hour applicable performance test during which emissions did not exceed the emissions limitation. If the kiln is equipped with a thermal oxidizer, you have a record of the combustion chamber operating temperature operating parameter over the 3-hour applicable performance test during which emissions did not exceed the emissions limitation.</p>
2. Stack emissions from all PHS operations at a new or existing affected source	PM emissions must not exceed 0.05 g/dscm	<p>The outlet PM emissions, based on Method 5 or Method 17 in appendix A to part 60 of this chapter, over the period of the initial performance test do not exceed 0.05 g/dscm; and if the emission unit is controlled with a wet scrubber, you have a record of the scrubber's pressure drop and liquid flow rate operating parameters over the 3-hour performance test during which emissions did not exceed the emissions limitation.</p>

3. Stack emissions from all PSH operations at a new or existing affected source, unless the stack emissions are discharged through a wet scrubber control device	Emissions must not exceed 7 percent opacity	Each of the thirty 6-minute opacity averages during the initial compliance period, using Method 9 in appendix A to part 60 of this chapter, does not exceed the 7 percent opacity limit. At least thirty 6-minute averages must be obtained.
4. Fugitive emissions from all PSH operations at a new or existing affected source	Emissions must not exceed 10 percent opacity	Each of the 6-minute opacity averages during the initial compliance period, using Method 9 in appendix A to part 60 of this chapter, does not exceed the 10 percent opacity limit.
5. All PSH operations at a new or existing affected source, enclosed in building	All of the individually affected PSH operations must comply with the applicable PM and opacity emission limitations for items 2 through 4 of this Table 4, or the building must comply with the following: There must be no VE from the building, except from a vent, and vent emissions must not exceed the emission limitations in items 2 and 3 of this Table 4	All the PSH operations enclosed in the building have demonstrated initial compliance according to the applicable requirements for items 2 through 4 of this Table 4; or if you are complying with the building emission limitations, there are no VE from the building according to item 18 of Table 5 to this subpart and §63.7112(k), and you demonstrate initial compliance with applicable building vent emissions limitations according to the requirements in items 2 and 3 of this Table 4.
6. Each FF that controls emissions from only an individual storage bin	Emissions must not exceed 7 percent opacity	Each of the ten 6-minute averages during the 1-hour initial compliance period, using Method 9 in appendix A to part 60 of this chapter, does not exceed the 7 percent opacity limit.
7. Each set of multiple storage bins with combined stack emissions	You must comply with emission limitations in items 2 and 3 of this Table 4	You demonstrate initial compliance according to the requirements in items 2 and 3 of this Table 4.

**Table 5 to Subpart AAAAA of Part 63—Requirements for Performance Tests**

As required in §63.7112, you must conduct each performance test in the following table that applies to you.

For . . .	You must . . .	Using . . .	According to the following requirements . . .
1. Each lime kiln and each associated lime cooler, if there is a separate exhaust to the atmosphere from the associated lime cooler	Select the location of the sampling ports and the number of traverse points	Method 1 or 1A of appendix A to part 60 of this chapter; and §63.6(d)(1)(i)	Sampling sites must be located at the outlet of the control device(s) and prior to any releases to the atmosphere.
2. Each lime kiln and each associated lime cooler, if there is a separate exhaust to the atmosphere from the associated lime cooler	Determine velocity and volumetric flow rate	Method 2, 2A, 2C, 2D, 2F, or 2G in appendix A to part 60 of this chapter	Not applicable.
3. Each lime kiln and each associated lime cooler, if there is a separate exhaust to the atmosphere from the associated lime cooler	Conduct gas molecular weight analysis	Method 3, 3A, or 3B in appendix A to part 60 of this chapter	You may use <b>manual procedures (but not instrumental procedures)</b> of ASME PTC 19.10-1981 - Part 10 (available for purchase from Three Park Avenue, New York, NY 10016-5990) as an alternative to using <del>the manual procedures (but not instrumental procedures)</del> in Method 3B.
4. Each lime kiln and each associated lime cooler, if there is a separate exhaust to the atmosphere from the associated lime cooler	Measure moisture content of the stack gas	Method 4 in appendix A to part 60 of this chapter	Not applicable.



5. Each lime kiln and each associated lime cooler, if there is a separate exhaust to the atmosphere from the associated lime cooler, and which uses a negative pressure PM control device	Measure PM emissions	Method 5 in appendix A to part 60 of this chapter	Conduct the test(s) when the source is operating at representative operating conditions in accordance with §63.7(e) before the relevant compliance date for your source as specified in §63.7083(eg) and §63.7112(b) on and after the relevant compliance date for your source as specified in §63.7083(eg); the minimum sampling volume must be 0.85 dry standard cubic meter (dscm) (30 dry standard cubic foot (dscf)); if there is a separate lime cooler exhaust to the atmosphere, you must conduct the Method 5 test of the cooler exhaust concurrently with the kiln exhaust test.
6. Each lime kiln and each associated lime cooler, if there is a separate exhaust to the atmosphere from the associated lime cooler, and which uses a positive pressure FF or ESP	Measure PM emissions	Method 5D in appendix A to part 60 of this chapter	<del>Conduct the test(s) when the source is operating at representative operating conditions in accordance with §63.7(e) before the relevant compliance date for your source as specified in §63.7083(e) and §63.7112(b) on and after the relevant compliance date for your source as specified in §63.7083(e);</del> If there is a separate lime cooler exhaust to the atmosphere, you must conduct the Method 5 test of the separate cooler exhaust concurrently with the kiln exhaust test. <a href="#">Refer to Note 1</a>

7. Each lime kiln	Determine the mass rate of stone feed to the kiln during the kiln PM emissions test	Any suitable device	Calibrate and maintain the device according to manufacturer's instructions; the measuring device used must be accurate to within $\pm 5$ percent of the mass rate of stone feed over its operating range.
8. Each lime kiln equipped with a wet scrubber	Establish the operating limit for the average gas stream pressure drop across the wet scrubber	Data for the gas stream pressure drop measurement device during the kiln <del>PM</del> PM performance test	The continuous pressure drop measurement device must be accurate within plus or minus 1 percent; you must collect the pressure drop data during the period of the performance test and determine the operating limit according to §63.7112(j).
9. Each lime kiln equipped with a wet scrubber	Establish the operating limit for the average liquid flow rate to the scrubber	Data from the liquid flow rate measurement device during the kiln <del>PM</del> PM performance test	The continuous scrubbing liquid flow rate measuring device must be accurate within plus or minus 1 percent; you must collect the flow rate data during the period of the performance test and determine the operating limit according to §63.7112(j).
10. Each lime kiln equipped with a FF or ESP that is monitored with a PM detector	Have installed and have operating the BLDS or PM detector prior to the performance test	Standard operating procedures incorporated into the OM&M plan	According to the requirements in §63.7113(d) or (e), respectively.

11. Each lime kiln equipped with a FF or ESP that is monitored with a COMS	Have installed and have operating the COMS prior to the performance test	Standard operating procedures incorporated into the OM&M plan and as required by 40 CFR part 63, subpart A, General Provisions and according to PS-1 of appendix B to part 60 of this chapter, except as specified in §63.7113(g)(2)	According to the requirements in §63.7113(g).
12. Each stack emission from a PSH operation, vent from a building enclosing a PSH operation, or set of multiple storage bins with combined stack emissions, which is subject to a PM emission limit	Measure PM emissions	Method 5 or Method 17 in appendix A to part 60 of this chapter	The sample volume must be at least 1.70 dscm (60 dscf); for Method 5, if the gas stream being sampled is at ambient temperature, the sampling probe and filter may be operated without heaters; and if the gas stream is above ambient temperature, the sampling probe and filter may be operated at a temperature high enough, but no higher than 121 °C (250 °F), to prevent water condensation on the filter (Method 17 may be used only with exhaust gas temperatures of not more than 250 °F).
13. Each stack emission from a PSH operation, vent from a building enclosing a PSH operation, or set of multiple storage bins with combined stack emissions, which is subject to an opacity limit	Conduct opacity observations	Method 9 in appendix A to part 60 of this chapter	The test duration must be for at least 3 hours and you must obtain at least thirty, 6-minute averages.
14. Each stack emissions source from a PSH operation subject to a PM or opacity	Establish the average gas stream pressure drop across the wet	Data for the gas stream pressure drop measurement device during the PSH operation stack <del>PM-</del> PM	The pressure drop measurement device must be accurate within plus or minus 1 percent; you must collect the pressure drop data during

limit, which uses a wet scrubber	scrubber	performance test	the period of the performance test and determine the operating limit according to §63.7112(j).
15. Each stack emissions source from a PSH operation subject to a PM or opacity limit, which uses a wet scrubber	Establish the operating limit for the average liquid flow rate to the scrubber	Data from the liquid flow rate measurement device during the PSH operation stack <del>PM</del> PM performance test	The continuous scrubbing liquid flow rate measuring device must be accurate within plus or minus 1 percent; you must collect the flow rate data during the period of the performance test and determine the operating limit according to §63.7112(j).
16. Each FF that controls emissions from only an individual, enclosed, new or existing storage bin	Conduct opacity observations	Method 9 in appendix A to part 60 of this chapter	The test duration must be for at least 1 hour and you must obtain ten 6-minute averages.
17. Fugitive emissions from any PSH operation subject to an opacity limit	Conduct opacity observations	Method 9 in appendix A to part 60 of this chapter	The test duration must be for at least 3 hours, but the 3-hour test may be reduced to 1 hour if, during the first 1-hour period, there are no individual readings greater than 10 percent opacity and there are no more than three readings of 10 percent during the first 1-hour period.
18. Each building enclosing any PSH operation, that is subject to a VE limit	Conduct VE check	The specifications in §63.7112(k)	The performance test must be conducted while all affected PSH operations within the building are operating; the performance test for each affected building must be at least 75 minutes, with each side of the building and roof being observed for at least 15 minutes.
19. Each major source (all kilns) <del>Each lime kiln</del>	Measure hydrochloric acid	Method 320 or 321 of appendix A of this part or ASTM 6348-12e1 (Note 1), or Method 26/26A as referenced in 40 CFR Part	The test duration must be at least one hour. For a positive pressure FF or ESP, determine the number of sampling points per the

		60, Appendix A-8.	stratification check procedures of section 8.1.2 of Method 7E using the sample points determined using the procedures of Section 8 of EPA Method 5D.
20. Each lime kiln	Measure mercury	Method 29 or 30B Appendix A to part 60 of this chapter or ASTM D6784-16	<del>The test duration must be at least two hours and</del> For Method 29 and ASTM D6784-16, the test duration must be at least two hours and the sample volume must be at least 1.70 dscm (60 dscf). For Method 30B, the test duration must be at least one hour and the sample volume at least 100 liters. For a positive pressure FF or ESP, use the procedures of Section 8 of EPA Method 5D for sampling points.
21. Each lime kiln	Measure total organic HAP <sup>2</sup>	Method 18 and/or 320 in appendix A to part 60 of this chapter and/or ASTM D6348-12e1 <sup>1</sup>	The test duration must be at least 1 hour. For EPA Method 320 and ASTM D6348-12e1, for a positive pressure FF or ESP, determine the number of sampling points per the stratification check procedures of section 8.1.2 of Method 7E using the sample points determined using the procedures of Section 8 of EPA Method 5D.
22. Each lime kiln	Measure dioxins/furans	Method 23 in Appendix A to part 60 of this chapter	The test duration must be at least 3 hours and the must be at least 3 dscm (106 dscf). For a positive pressure FF or ESP, use the procedures of Section 8 of EPA Method 5D for sampling points. When calculating TEQ, zero may be used for congeners that are below the EDL. As an alternative compliance method to the performance testing specified above, a

			source may perform annual testing for a period of three years to establish a site-specific temperature of gases entering the inlet to the air pollution control device at which the numerical standard for dioxins/furans is met. Subsequently the source may rely on parametric temperature monitoring on a 30-day rolling average, and further performance testing is not required.
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<sup>1</sup> When using ASTM D6348-12e1 (1) the test plan preparation and implementation in the Annexes to ASTM D6348-12e1, sections A1 through A8 are mandatory, (2) In ASTM D6348-12e1 Annex A5 (Analyte Spiking Technique), the percent (%) R must be determined for each target analyte (Equation A5.5). In order for the test data to be acceptable for a compound, %R must be  $70\% \leq R \leq 130\%$ . If the %R value does not meet this criterion for a target compound, the test data is not acceptable for that compound and the test must be repeated for that analyte (i.e., the sampling and/or analytical procedure should be adjusted before a retest). The %R value for each compound must be reported in the test report, and all field measurements must be corrected with the calculated %R value for that compound according to:

Reported Results = ((Measured Concentration in Stack))/(%R) x 100.

<sup>2</sup> Total Organic HAP is the sum of the concentrations of compounds of formaldehyde, acetaldehyde, toluene, benzene, m-xylene, p-xylene, o-xylene, styrene, ethyl benzene, and naphthalene.

**Table 6 to Subpart AAAAA of Part 63—Continuous Compliance With Operating Limits**

As required in §63.7121, you must demonstrate continuous compliance with each operating limit listed in Table 3 to subpart AAAAA that applies to you, according to the following table:

<b>For . . .</b>	<b>For the following operating limit . . .</b>	<b>You must demonstrate continuous compliance by . . .</b>
1. Each lime kiln controlled by a wet scrubber	Maintain the 3-hour block average exhaust gas stream pressure drop across the wet scrubber greater than or equal to the pressure drop operating limit established during the <del>PM</del> -PM performance test; and maintain the 3-hour block average scrubbing liquid flow rate greater than or equal to the flow rate operating limit established during the performance test	Collecting the wet scrubber operating data according to all applicable requirements in §63.7113 and reducing the data according to §63.7113(a); maintaining the 3-hour block average exhaust gas stream pressure drop across the wet scrubber greater than or equal to the pressure drop operating limit established during the <del>PM</del> -PM performance test; and maintaining the 3-hour block average scrubbing liquid flow rate greater than or equal to the flow rate operating limit established during the performance test (the continuous scrubbing liquid flow rate measuring device must be accurate within $\pm 1\%$ and the continuous pressure drop measurement device must be accurate within $\pm 1\%$ ).
2. Each lime kiln or lime cooler equipped with a FF and using a BLDS, and each lime kiln equipped with an ESP or FF using a PM detector	a. Maintain and operate the FF or ESP such that the bag leak or PM detector alarm, is not activated and alarm condition does not exist for more than 5 percent of the total operating time in each 6-month period	(i) Operating the FF or ESP so that the alarm on the bag leak or PM detection system is not activated and an alarm condition does not exist for more than 5 percent of the total operating time in each 6-month reporting period; and continuously recording the output from the BLD or PM detection system; and

		(ii) Each time the alarm sounds and the owner or operator initiates corrective actions within 1 hour of the alarm, 1 hour of alarm time will be counted (if the owner or operator takes longer than 1 hour to initiate corrective actions, alarm time will be counted as the actual amount of time taken by the owner or operator to initiate corrective actions); if inspection of the FF or ESP system demonstrates that no corrective actions are necessary, no alarm time will be counted.
3. Each stack emissions source from a PSH operation subject to an opacity limit, which is controlled by a wet scrubber	Maintain the 3-hour block average exhaust gas stream pressure drop across the wet scrubber greater than or equal to the pressure drop operating limit established during the <del>PM</del> PM performance test; and maintain the 3-hour block average scrubbing liquid flow rate greater than or equal to the flow rate operating limit established during the performance test	Collecting the wet scrubber operating data according to all applicable requirements in §63.7113 and reducing the data according to §63.7113(a); maintaining the 3-hour block average exhaust gas stream pressure drop across the wet scrubber greater than or equal to the pressure drop operating limit established during the <del>PM</del> PM performance test; and maintaining the 3-hour block average scrubbing liquid flow rate greater than or equal to the flow rate operating limit established during the performance test (the continuous scrubbing liquid flow rate measuring device must be accurate within $\pm 1\%$ and the continuous pressure drop measurement device must be accurate within $\pm 1\%$ ).
4. For each lime kiln or lime cooler equipped with a FF or an ESP that uses a COMS as the monitoring device	a. Maintain and operate the FF or ESP such that the average opacity for any 6-minute block period does not exceed 15 percent	i. Installing, maintaining, calibrating and operating a COMS as required by 40 CFR part 63, subpart A, General Provisions and according to PS-1 of appendix B to part 60 of this chapter, except as specified in §63.7113(g)(2); and



		ii. Collecting the COMS data at a frequency of at least once every 15 seconds, determining block averages for each 6-minute period and demonstrating for each 6-minute block period the average opacity does not exceed 15 percent.
7. Each lime kiln equipped with dry sorbent injection	Maintain the 3-hour block dry sorbent and/or activated carbon flow rate greater than or equal to the injection flow rate operating limit established during the most recent applicable performance test.	Collecting the dry sorbent and/or activated carbon injection operating data according to all applicable requirements in §63.7113 and reducing the data according to §63.7113(a); maintaining the 3-hour block average injection flow rate greater than or equal to the injection flow rate operating limit established during the performance test
8. Each lime kiln equipped with a thermal oxidizer	Maintain the 3-hour block average combustion chamber temperature greater or equal to the combustion chamber operating limit established in the most recent applicable performance test	Collecting the thermal oxidizer operating data according to all applicable requirements in §63.7113 and reducing the data according to §63.7113(a); maintaining the 3-hour block average combustion chamber temperature greater than or equal to the combustion chamber operating limit established during the performance test

**Table 7 to Subpart AAAAA of Part 63—Periodic Monitoring for Compliance With Opacity and Visible Emissions Limits**

As required in §63.7121 you must periodically demonstrate compliance with each opacity and VE limit that applies to you, according to the following table:

For . . .	For the following emission limitation . . .	You must demonstrate ongoing compliance . . .
1. Each PSH operation subject to an opacity limitation as required in Table 1 to this subpart, or any vents from buildings subject to an opacity limitation	a. 7-10 percent opacity, depending on the PSH operation, as required in Table 1 to this subpart	(i) Conducting a monthly 1-minute VE check of each emission unit in accordance with §63.7121(e); the check must be conducted while the affected source is in operation;

		(ii) If no VE are observed in 6 consecutive monthly checks for any emission unit, you may decrease the frequency of VE checking from monthly to semi-annually for that emission unit; if VE are observed during any semiannual check, you must resume VE checking of that emission unit on a monthly basis and maintain that schedule until no VE are observed in 6 consecutive monthly checks;
		(iii) If no VE are observed during the semiannual check for any emission unit, you may decrease the frequency of VE checking from semi-annually to annually for that emission unit; if VE are observed during any annual check, you must resume VE checking of that emission unit on a monthly basis and maintain that schedule until no VE are observed in 6 consecutive monthly checks; and
		(iv) If VE are observed during any VE check, you must conduct a 6-minute test of opacity in accordance with Method 9 of appendix A to part 60 of this chapter; you must begin the Method 9 test within 1 hour of any observation of VE and the 6-minute opacity reading must not exceed the applicable opacity limit.
2. Any building subject to a VE limit, according to item 8 of Table 1 to this subpart	a. No VE	(i) Conducting a monthly VE check of the building, in accordance with the specifications in §63.7112(k); the check must be conducted while all the enclosed PSH operations are operating;
		(ii) The check for each affected building must be at least 5 minutes, with each side of the building and roof being observed for at least 1 minute;
		(iii) If no VE are observed in 6 consecutive monthly checks of the building, you may decrease the frequency of checking from monthly to semi-annually for that affected source; if VE are observed during any semi-annual check, you must resume checking on a monthly basis and maintain that schedule until no VE are observed in 6 consecutive monthly checks; and

		(iv) If no VE are observed during the semi-annual check, you may decrease the frequency of checking from semi-annually to annually for that affected source; and if VE are observed during any annual check, you must resume checking of that emission unit on a monthly basis and maintain that schedule until no VE are observed in 6 consecutive monthly checks (the source is in compliance if no VE are observed during any of these checks).
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**Table 8 to Subpart AAAAA of Part 63—Requirements for Reports**

As required in §63.7131, you must submit each report in this table that applies to you.

<b>You must submit a . . .</b>	<b>The report must contain . . .</b>	<b>You must submit the report . . .</b>
1. Compliance report	a. If there are no deviations from any emission limitations (emission limit, operating limit, opacity limit, and VE limit) that applies to you, a statement that there were no deviations from the emissions limitations during the reporting period;	Semiannually according to the requirements in §63.7131(b).
	b. If there were no periods during which the CMS, including any operating parameter monitoring system, was out-of-control as specified in §63.8(c)(7), a statement that there were no periods during which the CMS was out-of-control during the reporting period;	Semiannually according to the requirements in §63.7131(b).
	c. If you have a deviation from any emission limitation (emission limit, operating limit, opacity limit, and VE limit) during the reporting period, the report must contain the information in §63.7131(d);	Semiannually according to the requirements in §63.7131(b).
	d. If there were periods during which the CMS, including any operating parameter monitoring system, was out-of-control, as specified in §63.8(c)(7), the report must contain the information in §63.7131(e); and	Semiannually according to the requirements in §63.7131(b).

	e. Before the relevant compliance date for your source as specified in §63.7083(eg), if you had a startup, shutdown or malfunction during the reporting period and you took actions consistent with your SSMP, the compliance report must include the information in §63.10(d)(5)(i). On and after the relevant compliance date for your source as specified in §63.7083(eg), if you had a startup, shutdown or malfunction during the reporting period and you failed to meet an applicable standard, the compliance report must include the information in §63.7131(c)(3).	Semiannually according to the requirements in §63.7131(b).
2. Before the relevant compliance date for your source as specified in §63.7083(eg), an immediate startup, shutdown, and malfunction report if you had a startup, shutdown, or malfunction during the reporting period that is not consistent with your SSMP	Actions taken for the event	By fax or telephone within 2 working days after starting actions inconsistent with the SSMP.
3. Before the relevant compliance date for your source as specified in §63.7083(eg), an immediate startup, shutdown, and malfunction report if you had a startup, shutdown, or malfunction during the reporting period that is not consistent with your SSMP	The information in §63.10(d)(5)(ii)	By letter within 7 working days after the end of the event unless you have made alternative arrangements with the permitting authority. See §63.10(d)(5)(ii).
(4) Performance Test Report	The information required in §63.7(g) and §63.7112(h)	According to the requirements of §63.7131

**Table 9 to Subpart AAAAA of Part 63—Emissions Averaging Emission Limits**

As required in §63.7090(d), if you are using emissions averaging for either HCl emission limits or mercury emission limits you must meet each emission limit in the following table that applies to you.

For . . .	You must meet the following emission limit
1. Existing straight rotary lime kilns and their associated coolers producing dolomitic quick lime and/or dead-burned dolomitic lime	HCl emissions must not exceed 2.1 lb/ton of lime produced.
2. Existing straight rotary lime kilns and their associated coolers producing high-calcium quick lime	HCl emissions must not exceed 0.47 lb/ton of lime produced.
3. Existing preheater rotary lime kilns and their associated coolers producing dolomitic quick lime and/or dead-burned dolomitic lime	HCl emissions must not exceed 0.36 lb/ton of lime produced.
4. Existing preheater rotary lime kilns and their associated coolers producing high-calcium quick lime	HCl emissions must not exceed 0.087 lb/ton of lime produced.
5. Existing vertical lime kilns and their associated coolers producing dolomitic quick lime and/or dead-burned dolomitic lime	HCl emissions must not exceed 0.36 lb/ton of lime produced.
6. Existing vertical lime kilns and their associated coolers producing high-calcium quick lime	HCl emissions must not exceed 0.019 lb/ton of lime produced.
7. Existing lime kilns and their associated coolers	Mercury emissions must not exceed 31 lb/MMton of lime produced.

**Table 910 9 to Subpart AAAAA of Part 63—Applicability of General Provisions to Subpart AAAAA**

As required in §63.7140, you must comply with the applicable General Provisions requirements according to the following table:

Citation	Summary of requirement	Am I subject to this requirement?	Explanations
§63.1(a)(1)-(4)	Applicability	Yes	

§63.1(a)(5)		No	
§63.1(a)(6)	Applicability	Yes	
§63.1(a)(7)-(a)(9)		No	
§63.1(a)(10)-(a)(14)	Applicability	Yes	
§63.1(b)(1)	Initial Applicability Determination	Yes	§§63.7081 and 63.7142 specify additional applicability determination requirements.
§63.1(b)(2)		No	
§63.1(b)(3)	Initial Applicability Determination	Yes	
§63.1(c)(1)	Applicability After Standard Established	Yes	
§63.1(c)(2)	Permit Requirements	No	Area sources not subject to subpart AAAAA, except all sources must make initial applicability determination.
§63.1(c)(3)-(4)		No	
§63.1(c)(5)	Area Source Becomes Major	Yes	
§63.1(c)(6)	Reclassification	Yes	
§63.1(d)		No	
§63.1(e)	Applicability of Permit Program	Yes	
§63.2	Definitions	Yes	Additional definitions in §63.7143.
§63.3(a)-(c)	Units and Abbreviations	Yes	
§63.4(a)(1)-(a)(2)	Prohibited Activities	Yes	
§63.4(a)(3)-(a)(5)		No	
§63.4(b)-(c)	Circumvention, Severability	Yes	
§63.5(a)(1)-(2)	Construction/Reconstruction	Yes	

§63.5(b)(1)	Compliance Dates	Yes	
§63.5(b)(2)		No	
§63.5(b)(3)-(4)	Construction Approval, Applicability	Yes	
§63.5(b)(5)		No	
§63.5(b)(6)	Applicability	Yes	
§63.5(c)		No	
§63.5(d)(1)-(4)	Approval of Construction/Reconstruction	Yes	
§63.5(e)	Approval of Construction/Reconstruction	Yes	
§63.5(f)(1)-(2)	Approval of Construction/Reconstruction	Yes	
§63.6(a)	Compliance for Standards and Maintenance	Yes	
§63.6(b)(1)-(5)	Compliance Dates	Yes	
§63.6(b)(6)		No	
§63.6(b)(7)	Compliance Dates	Yes	
§63.6(c)(1)-(2)	Compliance Dates	Yes	
§63.6(c)(3)-(c)(4)		No	
§63.6(c)(5)	Compliance Dates	Yes	
§63.6(d)		No	
§63.6(e)(1)(i)	General Duty to Minimize Emissions	<p>Yes before the relevant compliance date for your source as specified in §63.7083(eg)</p> <p>No on and after the relevant compliance date for your source as</p>	<p>On and after the relevant compliance date for your source as specified in §63.7083(eg), see §63.7100 for general duty requirement.</p>

		specified in §63.7083(eg)	
§63.6(e)(1)(ii)	Requirement to Correct Malfunctions ASAP	Yes before the relevant compliance date for your source as specified in §63.7083(eg)  No on and after the relevant compliance date for your source as specified in §63.7083(eg)	
§63.6(e)(1)(iii)	Operation and Maintenance Requirements	Yes	
§63.6(e)(2)		No	[Reserved]
§63.6(e)(3)	Startup, Shutdown Malfunction Plan	Yes before the relevant compliance date for your source as specified in §63.7083(eg)  No on and after the relevant compliance date for your source as specified in §63.7083(eg)	On and after the relevant compliance date for your source as specified in §63.7083(eg), the OM&M plan must address periods of startup and shutdown. See §63.7100(d).

§63.6(f)(1)	SSM exemption	No	See §63.7100. For periods of startup and shutdown, see §63.7090(c).
§63.6(f)(2)-(3)	Methods for Determining Compliance	Yes	
§63.6(g)(1)-(g)(3)	Alternative Standard	Yes	



§63.6(h)(1)	SSM exemption	No	See §63.7100. For periods of startup and shutdown, see §63.7090(c).
§63.6(h)(2)	Methods for Determining Compliance	Yes	
§63.6(h)(3)		No	
§63.6(h)(4)-(h)(5)(i)	Opacity/VE Standards	Yes	This requirement only applies to opacity and VE performance checks required in Table 5 to subpart AAAAA.
§63.6(h)(5) (ii)-(iii)	Opacity/VE Standards	No	Test durations are specified in subpart AAAAA; subpart AAAAA takes precedence.
§63.6(h)(5)(iv)	Opacity/VE Standards	No	
§63.6(h)(5)(v)	Opacity/VE Standards	Yes	
§63.6(h)(6)	Opacity/VE Standards	Yes	
§63.6(h)(7)	COM Use	Yes	
§63.6(h)(8)	Compliance with Opacity and VE	Yes	
§63.6(h)(9)	Adjustment of Opacity Limit	Yes	
§63.6(i)(1)-(i)(14)	Extension of Compliance	Yes	
§63.6(i)(15)		No	
§63.6(i)(16)	Extension of Compliance	Yes	
§63.6(j)	Exemption from Compliance	Yes	
§63.7(a)(1)-(a)(3)	Performance Testing Requirements	Yes	§63.7110 specifies deadlines; §63.7112 has additional specific requirements.
§63.7(b)	Notification	Yes	
§63.7(c)	Quality Assurance/Test Plan	Yes	
§63.7(d)	Testing Facilities	Yes	
§63.7(e)(1)	Conduct of Tests	Yes before the relevant compliance date for your source as specified in	On and after the relevant compliance date for your source as specified in §63.7083(eg), see §63.7112(b).

		§63.7083(eg)  No on and after the relevant compliance date for your source as specified in §63.7083(eg)	
§63.7(e)(2)-(4)	Conduct of Tests	Yes	
§63.7(f)	Alternative Test Method	Yes	
§63.7(g)	Data Analysis	Yes	
§63.7(h)	Waiver of Tests	Yes	
§63.8(a)(1)	Monitoring Requirements	Yes	See §63.7113.
§63.8(a)(2)	Monitoring	Yes	
§63.8(a)(3)		No	
§63.8(a)(4)	Monitoring	No	Flares not applicable.
§63.8(b)(1)-(3)	Conduct of Monitoring	Yes	
§63.8(c)(1)(i)	CMS Operation/Maintenance	Yes before the relevant compliance date for your source as specified in §63.7083(eg)  No on and after the relevant compliance date for your source as specified in §63.7083(eg)	On and after the relevant compliance date for your source as specified in §63.7083(eg), see §63.7100 for OM&M requirements.
§63.8(c)(1)(ii)	CMS Spare Parts	Yes	
§63.8(c)(1)(iii)	Requirement to Develop SSM Plan for CMS	Yes before the relevant compliance date for your source as specified in §63.7083(eg)  No on and after the relevant compliance date	On and after the relevant compliance date for your source as specified in §63.7083(eg), no longer required.

		for your source as specified in §63.7083(eg)	
§63.8(c)(2)-(3)	CMS Operation/Maintenance	Yes	
§63.8(c)(4)	CMS Requirements	No	See §63.7121.
§63.8(c)(4)(i)-(ii)	Cycle Time for COM and CEMS	Yes	No CEMS are required under subpart AAAAA; see §63.7113 for CPMS requirements.
§63.8(c)(5)	Minimum COM procedures	Yes	COM not required.
§63.8(c)(6)	CMS Requirements	No	See §63.7113.
§63.8(c)(7)-(8)	CMS Requirements	Yes	
§63.8(d)(1)-(2)	Quality Control	Yes	See also §63.7113.
§63.8(d)(3)	Quality Control	Yes before the relevant compliance date for your source as specified in §63.7083(eg)  No on and after the relevant compliance date for your source as specified in §63.7083(eg)	
§63.8(e)	Performance Evaluation for CMS	Yes	See also §63.7113
§63.8(f)(1)-(f)(5)	Alternative Monitoring Method	Yes	
§63.8(f)(6)	Alternative to Relative Accuracy Test for CEMS	No	No CEMS required in subpart AAAAA.
§63.8(g)(1)-(g)(5)	Data Reduction; Data That Cannot Be Used	No	See data reduction requirements in §§63.7120 and 63.7121.
§63.9(a)	Notification Requirements	Yes	See §63.7130.
§63.9(b)	Initial Notifications	Yes	
§63.9(c)	Request for Compliance Extension	Yes	
§63.9(d)	New Source Notification for	Yes	

	Special Compliance Requirements		
§63.9(e)	Notification of Performance Test	Yes	
§63.9(f)	Notification of VE/Opacity Test	Yes	This requirement only applies to opacity and VE performance tests required in Table 5 to subpart AAAAA. Notification not required for VE/opacity test under Table 7 to subpart AAAAA.
§63.9(g)	Additional CMS Notifications	No	Not required for operating parameter monitoring.
§63.9(h)(1)-(h)(3)	Notification of Compliance Status	Yes	
§63.9(h)(4)		No	
§63.9(h)(5)-(h)(6)	Notification of Compliance Status	Yes	
§63.9(i)	Adjustment of Deadlines	Yes	
§63.9(j)	Change in Previous Information	Yes	
§63.9(k)	Electronic reporting procedures	Yes	Only as specified in §63.9(j)
§63.10(a)	Recordkeeping/Reporting General Requirements	Yes	See §§63.7131 through 63.7133.
§63.10(b)(1)	Records	Yes	
§63.10(b)(2)(i)	Recordkeeping of Occurrence and Duration of Startups and Shutdowns	Yes before the relevant compliance date for your source as specified in §63.7083(eg)  No on and after the relevant compliance date for your source as specified in	

		§63.7083(eg)	
§63.10(b)(2)(ii)	Recordkeeping of Failures to Meet a Standard	<p>Yes before the relevant compliance date for your source as specified in §63.7083(eg)</p> <p>No on and after the relevant compliance date for your source as specified in §63.7083(eg)</p>	On and after the relevant compliance date for your source as specified in §63.7083(eg), see §63.7132 for recordkeeping of (1) date, time and duration; (2) listing of affected source or equipment, and an estimate of the quantity of each regulated pollutant emitted over the standard; and (3) actions to minimize emissions and correct the failure.
§63.10(b)(2)(iii)	Maintenance Records	Yes	
§63.10(b)(2)(iv)-(v)	Actions Taken to Minimize Emissions During SSM	<p>Yes before the relevant compliance date for your source as specified in §63.7083(eg)</p> <p>No on and after the relevant compliance date for your source as specified in §63.7083(eg)</p>	On and after the relevant compliance date for your source as specified in §63.7083(eg), see §63.7100 For OM&M requirements.
§63.10(b)(2)(vii)-(xii)	Recordkeeping for CMS	Yes	
§63.10(b)(2)(xiii)	Records for Relative Accuracy Test	No	
§63.10(b)(2)(xiv)	Records for Notification	Yes	
§63.10(b)(3)	Applicability Determinations	Yes	
§63.10(c)	Additional CMS Recordkeeping	No	See §63.7132.
§63.10(d)(1)	General Reporting Requirements	Yes	
§63.10(d)(2)	Performance Test Results	Yes	
§63.10(d)(3)	Opacity or VE Observations	Yes	For the periodic monitoring requirements in Table 7 to

			subpart AAAAA, report according to §63.10(d)(3) only if VE observed and subsequent visual opacity test is required.
§63.10(d)(4)	Progress Reports	Yes	
§63.10(d)(5)(i)	Periodic Startup, Shutdown, Malfunction Reports	Yes before the relevant compliance date for your source as specified in §63.7083(eg)  No on and after the relevant compliance date for your source as specified in §63.7083(eg)	On and after the relevant compliance date for your source as specified in §63.7083(eg), see §63.7131 for malfunction reporting requirements.
§63.10(e)	Additional CMS Reports	No	See specific requirements in subpart AAAAA, see §63.7131.
§63.10(f)	Waiver for Recordkeeping/Reporting	Yes	
§63.11(a)-(b)	Control Device and Work Practice Requirements	No	Flares not applicable.
§63.12(a)-(c)	State Authority and Delegations	Yes	
§63.13(a)-(c)	State/Regional Addresses	Yes	
§63.14(a)-(b)	Incorporation by Reference	No	
§63.15(a)-(b)	Availability of Information and Confidentiality	Yes	
§63.16	Performance Track Provisions	Yes	

Table 10 to Subpart AAAAA of Part 63—1989 Toxic Equivalency Factors (TEFs)

Dioxin/Furan	1989 TEFs
2,3,7,8-TCDD	1
1,2,3,7,8-PeCDD	0.5
1,2,3,4,7,8-HxCDD	0.1

1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
OCDD	0.001
2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDF	0.05
2,3,4,7,8-PeCDF	0.5
1,2,3,4,7,8-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
OCDF	0.001

Document type

**Report**

Date

**February 23, 2024**

Prepared for National Lime Association

# **Support for public comments relevant to the US-EPA pre- proposed health-based exposure limit for HCl**



## Support for public comments relevant to the US-EPA pre-proposed HBEL for HCl

Project name **Support for public comments relevant to the US-EPA pre-proposed health-based exposure limit for HCl**  
Recipient **National Lime Association**  
Document type **Report**  
Date **February 23, 2024**  
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## APPENDICES

### Appendix A

Summary Tables

### Appendix B

Relevant Reference List from 2022 Ramboll report

### Appendix C

Previous Ramboll 2021 Report

## ACRONYMS AND ABBREVIATIONS

APCD	air pollution control device
CI	confidence interval
ENT	ear, nose and throat
HAPs	hazardous air pollutants aka air toxics
HCl	Hydrochloric acid
HCl(aq)	aqueous form of HCl
HCl(g)	gas form of HCl
IARC	International Agency for Research on Cancer
IPCS	Programme on Chemical Safety
IRIS	Integrative Risk Information System (US-EPA)
MACT	maximum achievable control technology
NHL	non-Hodgkin's lymphoma
NTP	National Toxicology Program
OECD	Organisation for Economic Co-operation and Development
OR	odds ratio
ppm	parts per million
PubMed	a database containing 32 million citations developed by the National Library of Medicine
RR	relative risk
SIDS	Screening Information Dataset (OECD)
SMR	standardized mortality ratio
UADC	upper aerodigestive cancer
US-EPA	United States Environmental Protection Agency
WHO	World Health Organization
yr	year

## EXECUTIVE SUMMARY

Humans are exposed to approximately 4 million tons per year of HCl from natural sources (volcanoes, marine life, combustion of vegetation). It is found in household products such as cleaners and swimming pool additives and is formed during the burning of many plastics. HCl is considered one of the most important basic industrial chemicals. Mean air exposure to HCl in occupational settings has been estimated by IARC as ranging from  $<0.1 \text{ mg/m}^3$  to  $12 \text{ mg/m}^3$  during acid treatment of metals, while mean exposures during other industrial processes are estimated as  $>1 \text{ mg/m}^3$ . Ambient air levels of HCl typically remain below  $0.01 \text{ mg/m}^3$ .

IARC recognized that sulfuric acid and HCl are often found together in industrial processes. In assessing the scientific evidence for the grouping "sulfuric acid and other strong inorganic acids," IARC concluded that there was sufficient evidence associating occupational exposure to "strong-inorganic-acid mists containing sulfuric acid" with cancer. They therefore concluded that occupational exposure to strong inorganic acid mists **containing sulfuric acid** is carcinogenic to humans (i.e., a "Group 1" carcinogen). In contrast, IARC's conclusion regarding HCl was that there was **inadequate evidence** for the carcinogenicity of HCl, and they therefore assessed exposure to HCl as not classifiable as to its carcinogenicity to humans (i.e., a "Group 3").

Because of its wide uses in industry, tens of thousands of employees exposed to HCl have been studied and no clear signals of elevated cancer risks have emerged. This is despite the fact that many individuals classified as being exposed to HCl were actually exposed to mixtures that included recognized occupational carcinogens, including acid mists. When exposures are mixed, the substance contained in the mixture with the strongest relationship to the outcome (e.g., sulfuric acid in mixed acid mists) will drive the relationship for the whole mixture. Mixed exposures or chance are the likely explanations for the sporadic positive associations with cancer observed in occupational studies of mixed acids containing HCl. All occupational epidemiology studies published since the 1992 IARC determination are consistent with this conclusion.

The available toxicological evidence also is consistent with the human data, i.e., it does not indicate that HCl is carcinogenic or mutagenic, and there is no evidence that HCl causes the types of cell proliferation that are typically associated with nongenotoxic carcinogens. The only chronic exposure study reported increased incidence of hyperplasia (indicative of cell proliferation) in the larynx and trachea of rats exposed to 10 ppm HCl as compared to controls, but no excess cancer was observed. Hyperplasia would not be expected to progress to cancer at exposure concentrations below the threshold at which hyperplasia was reported. Two short term cancer studies in experimental animals reported that neither dermal nor oral exposures resulted in an increase in cancers. The available toxicology studies also did not provide evidence of genotoxicity or mutagenicity resulting from HCl exposures (as reviewed by Organization for Economic Cooperation and Development). Furthermore, in studies where HCl was administered along with formaldehyde, exposures to 10 ppm HCl neither caused serious irritating effects nor enhanced the carcinogenicity of formaldehyde.

The air modeling performed by US-EPA for their risk assessment is expected to contribute to an acceptable margin of safety. The default assumptions of the air model are expected to produce conservative air concentrations, and the definition of the receptor locations should produce reasonable exposure estimates for existing receptors. In addition, the chronic and acute toxicity reference values used for the risk assessment are based on the best available science.

HCl has not been identified as a carcinogen, despite its long history of use. Ramboll therefore recommends, as specified in 42 U.S.C. § 7412(d)(4), that the MACT standard for HCl be based on a health-based threshold, including an ample margin of safety.

## 1. INTRODUCTION

### 1.1 Hydrochloric Acid (HCl)

Hydrochloric acid is a strong corrosive acid that is formed when hydrogen chloride gas is dissolved in water (i.e., it is an aqueous solution). Hydrogen chloride gas and aqueous hydrochloric acid have the same chemical formula: HCl. The gas form may be designated as HCl(g), and the aqueous form as HCl(aq). For the purpose of this report, we refer to either of the physical states as HCl.

At room temperature, HCl is a nonflammable, colorless to slightly yellow gas with a pungent odor in moist air (IARC 1992; ATSDR 2014; National Library of Medicine (US), National Center for Biotechnology Information 2024; ATSDR 2002). On exposure to air, the gas forms dense white vapors due to condensation with atmospheric moisture. When hydrogen chloride gas comes into contact with moisture, it forms hydrochloric acid. Commercial concentrated hydrochloric acid contains 36% to 38% hydrogen chloride in water.

In the early twentieth century, hydrogen chloride was created by burning hydrogen gas. This method created a product of higher purity than that of the reaction between chloride salts and sulfuric acid or sodium hydrogen sulfate (IARC 1992). A widely used industrial chemical, HCl can also be formed as a byproduct of combustion of certain fossil fuels in industrial manufacturing processes, for example from lime kilns used for manufacture of lime (CaO and MgO) (IARC 1992; ATSDR 2014; ATSDR 2002). HCl can also be found in many everyday products, including household products such as cleaners and swimming pool additives (used to adjust the pH), and it is formed during the burning of many plastics. Industrial uses of HCl include pickling, electroplating metals, tanning leather, cleaning, and the production of a wide variety of products. HCl is also formed naturally in events like volcano eruptions. HCl is one of the most widely used chemicals in industrial processes, and the US Occupational Safety and Health Administration (OSHA) estimates that about 1,239,000 American workers are potentially exposed to HCl (as cited in IARC 1992). People are exposed to HCl in the ambient air, although concentrations are typically below 0.01 mg/m<sup>3</sup> (as cited in IARC 1992).

Based on communication with the National Lime Association (personal communication), HCl emitted from lime kilns controlled with a dry air pollution control device (APCD) is in the vapor (gas) phase. This is because the gas exit temperature (~400 degrees F) is well above any threshold where acid mist could exist<sup>1</sup>. This has been verified with industry stack test data obtained from wet chemistry and vapor phase testing, which confirm the presence of HCl as a gas in the exhaust. The vast majority of U.S. lime kilns (>95 percent) are controlled with dry APCDs. For kilns controlled with a wet scrubber, HCl emissions in the form of mists are expected to be very low due to the solubility of HCl in water.

### 1.2 Residual Risk, Technology Review, and Health-Based Exposure Limits

Under Section 112 of the Clean Air Act, the Environmental Protection Agency (US-EPA) regulates

<sup>1</sup> As we discuss later, the carcinogenicity evidence for acids involves acid mists specifically.

hazardous air pollutants (HAPs, also known as air toxics) originating from industrial facilities. There is a two-stage process for this regulation:

- In the first stage, section 112(d) requires the US-EPA to develop technology-based standards, called maximum achievable control technology (MACT) standards, for each category of sources (e.g., petroleum refineries, pulp and paper mills, etc.).<sup>2</sup>
- In the second stage, US-EPA is required under section 112(f)(2) to assess the health and environmental risks that remain after implementation of the MACT standards. If additional risk reductions are necessary to protect public health with an ample margin of safety or to prevent an adverse environmental effect, US-EPA must develop standards to address these remaining risks. This second stage of the regulatory process is known as the residual risk stage. For each source category for which US-EPA issued MACT standards, the residual risk stage must be completed within eight years of promulgation of the initial technology-based standard.

Under section 112(d)(6), US-EPA also must review each of the technology-based standards at least every eight years and revise them, as necessary, taking into account developments in practices, processes and control technologies. If appropriate based on the results of the risk and technology reviews, the US-EPA will revise the rules. For efficiency, the US-EPA includes the 112(f) and 112(d) analyses in the same regulatory package and calls the rulemakings the Risk and Technology Review.

MACT standards require the “maximum degree of [emissions] reductions” that US-EPA determines “is achievable.” The MACT standard is based on a minimum stringency requirement (a “floor”) based on emissions levels achieved by existing sources, where the floor is based on average emission limitation achieved by the best-performing 12% of existing sources (for which the Administrator has emissions information).”

As outlined in 42 U.S.C. § 7412(d)(4), the MACT standard may be based on a health-based threshold, assuming such a threshold has been established. The US-EPA will not approve a health-based threshold for a MACT standard if a HAP is a carcinogen. As part of the statutory lime manufacturing risk and technology review, US-EPA conducted an inhalation risk assessment for HAPs emitted from lime kilns, including HCl, and found no unacceptable human health risk under worst case emissions scenarios ([84 FR 48,723 \(Sep. 16, 2019\)](#)). The US-EPA risk assessment assumed HCl is a non-carcinogen, and as such used a variety of human-health risk screening benchmarks as part of risk calculations.

In its pre-proposed rule announced in the February 9, 2024 Federal Register (Vol 89, No. 28), US-EPA requested public comment on a potential health-based exposure limit (HBEL) for HCl. To regulate exposure levels using an HBEL, the chemical in question must be identified as a non-carcinogen. The specific scientific issues that the National Lime Association requested Ramboll to consider are as follows:

1. Evidence related to the potential carcinogenicity of HCl.
2. Whether the scientific community has judged there to be an established threshold for health effects associated with HCl exposure.
3. The estimated margin of safety associated with the proposed threshold.

<sup>2</sup> <https://www.epa.gov/stationary-sources-air-pollution/risk-and-technology-review-national-emissions-standards-hazardous>

## 2. METHODS

### 2.1 General approach

Ramboll reviewed and synthesized the scientific literature regarding the carcinogenicity of HCl and provided a report to NLA in June 2021. Our 2021 assessment of HCl carcinogenicity incorporated previous assessments by the World Health Organization International Agency for Research on Cancer (IARC), the Organisation for Economic Co-operation and Development (OECD), and the International Programme on Chemical Safety (IPCS) that we updated with information identified through literature searches to identify information available after the publication dates for those agency reports. We concluded that the newer evidence is consistent with the earlier body of scientific evidence, and, taking both the epidemiological and toxicological data into account, the evidence does not indicate that HCl is a carcinogen. As a follow-up to Ramboll's June 2021 report, Ramboll has undertaken the following activities:

1. To comment on the evidence related to the potential for HCl to be a carcinogen, we conducted new searches of the literature to identify any assessments of the risks associated with HCl exposure that had been conducted by authoritative bodies or that had been published in individual research studies since January 2021. This time interval deliberately overlaps with the period covered in Ramboll's previous review, in order to identify material published in early 2021 whose indexing had been delayed. We reviewed all new information to determine if it provided evidence in conflict with our prior conclusions, or if it supported our prior conclusions.
2. After incorporating new information into our prior assessment of the evidence, we abstracted all quantitative exposure data we identified to date (i.e., including sources identified for Ramboll's 2021 report) to determine if there was evidence for a threshold below which health effects were not observed (no observed adverse effect level [NOAEL]/lowest observed adverse effect level [LOAEL]). We documented this information, along with any specific health-related outcomes investigated in association with these exposure levels.
3. We developed comments on the quality, quantity, and certainty of the evidence thus summarized, and discussed the ability to consider the conclusions regarding a threshold for health effects to be "established".
4. To comment on the estimated margin of safety in US-EPA's pre-proposed rule, we reviewed US-EPA air modeling methods to verify their methods and underlying assumptions were scientifically supported. In addition, we reviewed the calculations and assumptions underlying the reference concentration values (RfC) estimated by California EPA and US-EPA to determine which approach was more appropriate.

### 2.2 Identifying Relevant Literature

We implemented the same search strategies documented in Ramboll's June 2021 report to NLA to verify that we were able to identify the same body of relevant literature cited in 2021 and to update those searches with material published between 2021 and February 2024. We enhanced both literature searches as described in section 2.2.2 and 2.2.3, below.

### **2.2.1 Updated assessments of HCl by authoritative bodies**

We checked for HCl assessments by the following authoritative bodies, focusing on material published since 2021: IARC, OECD, IPCS, the US Environmental Protection Agency (US-EPA), the National Toxicology Program (NTP), the Agency for Toxic Substances and Disease Registry (ATSDR), The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA), California Air Resources Board (CARB), The European Food Safety Authority (EFSA), and the National Institute of Health (NIH).

### **2.2.2 PubMed Search of Epidemiological Literature**

To identify studies of humans with potential occupational exposure to HCl, we searched PubMed, using combinations of the following search terms: "occupational"; "human"; "human exposure"; "hydrochloric acid"; "hydrogen chloride"; "carcinogenicity"; "carcinogen"; "cancer"; "epidemiology"; "cohort"; and "case-control". When searches included "cancer", clinical studies were filtered out of the search to remove irrelevant studies of clinical trials. We additionally searched for epidemiology studies published since 2021 that had cited any of the literature referenced in the IARC and OECD assessments that were the initial basis of Ramboll's 2021 report.

### **2.2.3 Targeted PubMed Search of Animal Toxicity Literature**

To identify relevant toxicological data, including animal studies and studies of mutagenicity, we searched PubMed using combinations of the following search terms: "hydrochloric acid"; "hydrogen chloride"; "chronic bioassay"; and "lifetime cancer risk". To enhance our searches of the toxicological literature, we included the terms "cancer", "carcinogenicity", and "malignant" combined with the chemical names, and we also constructed searches combining the chemical names with the terms "genotoxicity", "mutagenicity", "hyperplasia", and "cell proliferation".

### **2.2.4 Exclusion criteria**

We excluded publications at the screening stage if HCl was not an exposure variable assessed in the study or if HCl exposure was not assessed in human subjects (for the search targeting epidemiological studies) or if HCl was not the test material administered to animals or the study was an aquatic toxicity study (for the search targeting chronic bioassays for cancer in experimental animals).

## **3. RESULTS**

### **3.1 Evidence related to the potential carcinogenicity of HCl**

#### **3.1.1 Restatement of previous conclusions**

In our 2021 report to NLA, Ramboll concluded there was no evidence for HCl to be a carcinogen based on a review of the assessments conducted by IARC, OECD, and ICPS and incorporating information we identified in publications post-dating those assessments. Our 2021 evaluation of the evidence included investigations of potential cancer associations based on occupational epidemiology studies, and supporting evidence in the form of genotoxicity studies and studies that assessed the potential for HCl to induce cell proliferation.



The occupational epidemiology studies (summarized in Table A1, Appendix A) were methodologically limited by their exposure assessment and categorization methods that likely resulted in exposures that combined HCl with other industrial chemicals. The use of mixed exposure groups is particularly germane, as the mixtures often included sulfuric acid and other strong inorganic acid mists, which are classified as carcinogenic. By evaluating mixtures of HCl and these other acids, any apparent association between HCl and cancer would be inflated due to the carcinogenic effect of exposure to the other acids. In spite of this confounding by mixed exposures, the results did not suggest an association with cancer.

The occupational epidemiology studies were also generally limited by inadequate control for potentially confounding, non-occupational exposures, and small numbers of cases that led to low statistical power. Based on our assessment of the available evidence, Ramboll agreed with the overall conclusion by IARC that the small number of cancer cases observed in various occupational cohorts likely represent sporadic cases and/or cases due to co-exposure by probable or known carcinogens, such as sulfuric and other acid mists.

The genotoxicity studies included in Ramboll's 2021 report either indicated no genotoxic effect of HCl, or their results were deemed due to the acidic conditions of the experiments; the concentrations of HCl that produced positive findings in these studies were higher than would be found in the environment and are not relevant for the ambient air exposures that are the subject of the proposed HBEL. Furthermore, we did not find evidence that cell proliferation – which is sometimes involved in the cancer process – is associated with HCl exposure in *in vitro* genotoxicity tests.

### **3.1.2 New literature: evidence related to the carcinogenicity of HCl**

We did not find any relevant toxicology studies nor additional analyses published by authoritative bodies that were missing from Ramboll's 2021 report or that had been published since 2021. We identified three occupational epidemiology studies published in 2021 or later. Chen et al. (2021) conducted a case-control study in southern China based on self-reported data collected through in-person or telephone interviews. The study comprised 2,514 cases and 2,586 controls matched on age, sex, and location. Participants reported on work and health history and history of exposure to potentially confounding factors. All exposures to acids and alkalis were grouped together, thereby introducing confounding of any potential HCl association by exposure to known carcinogens. The main analysis, which adjusted for potential confounders including occupational exposure to other carcinogens, provided an elevated risk estimate for nasopharyngeal cancers (odds ratio (OR): 1.56; 95% confidence interval [CI] 1.30, 1.89). A sub-analysis that focused on participants categorized as ever or never exposed to sulfuric, hydrochloric and/or nitric acids adjusted for history of Epstein Barr virus infection provided an estimated OR for nasopharyngeal cancers of 1.63 (95% CI: 1.27, 2.09). Both estimates are very likely driven by the co-exposures to other acids that are classified as probable or known carcinogens.

In a study of 10,229 telecommunications workers (9,551 men) exposed to mixed acid mists, Ker et al. (2021) identified 52 deaths due to cancers of various types (31 cancers of the digestive system, 7 lung cancers, 5 nasopharyngeal cancers, and 9 miscellaneous cancers: 3 leukemias, 1 cervical cancer, 1 urinary cancer, 1 thyroid cancer, 1 non-pancreatic endocrine cancer, 1 immunological cancer, and 1 not specified). Note that cancer is not one disease - different types of cancers have different causes (American Cancer Society 2022). Standardized mortality ratios (SMR) estimated the risk of each type of cancer observed in the study population compared with the general population of Taiwan, where the study was conducted. All of the telecommunications

workers included in this study were exposed to mixed acids that had been previously designated as probable or known human carcinogens (sulfuric acid, hydrochloric acid, nitric acid). After controlling for age, sex, and calendar year, there was no evidence of an increased risk of nasopharyngeal cancer or lung cancer in the occupational cohort compared with the general population (i.e., SMRs adjusted for a five-year latency interval were 1.05 ( $p > 0.99$ ) and 0.76 ( $p = 0.59$ ), respectively). There were some types of cancers with SMRs greater than one, but each had only one to three cases and none of these associations were statistically significant; these are likely to represent chance findings.

Moayedi-Nia et al.(2022) published a case-control study of lung cancer nested in the Canadian CARTaGENE cohort. The authors identified 147 lung cancer cases diagnosed between 2009 and 2016 and compared their exposure histories to the exposures reported by 1,032 non-cancer controls based on the longest job held. Data were collected through telephone interviews and evaluated using CANJEM, the Canadian Job Exposure Matrix, to identify those who had no chance of exposure (never exposed), up to 25% certainty of exposure (ever), and at least 25% certainty of exposure (ever) to HCl based on job categories. After adjusting for age, smoking status, environmental tobacco smoke exposure, family history, and ever/never exposure to all other occupational lung carcinogens identified through CANJEM, participants ever occupationally exposed to HCl with at least 25% certainty had an OR of 3.79 (95% CI 1.07 – 13.41) for lung cancer compared to unexposed subjects, based on only five exposed cases (2 women and 3 men). The association was no longer statistically significant after adjustment for multiple comparisons to account for the many different potential health outcomes included in this analysis, suggesting it may have been a chance finding. There were too few cases to complete sex-stratified analyses.

### **3.1.3 Incorporating new information into previous conclusions for an overall assessment of evidence related to carcinogenicity of HCl**

Combining the results of literature that we reviewed for Ramboll's 2021 report and this one, we found a total of 22 occupational epidemiology studies. The information included in the three occupational epidemiology studies that we identified with publication dates in 2021 or later does not alter the conclusions we reached in 2021. Taken together, the results of the available literature did not suggest that occupational exposure to HCl increased the risk of cancer.

Two of the occupational epidemiology studies provided quantitative exposure data. Bond et al. (1991) estimated cumulative and maximum average HCl exposures for subjects in a nested case-control study concerning lung cancer mortality. Compared to subjects with no estimated exposure, subjects with 2 ppm-years to 3.9 ppm-years ( $0.15$  to  $5.81$   $\text{mg}/\text{m}^3\text{-year}$ )<sup>3</sup>, 4.0 to 12.4 ppm-years ( $5.96$ ,  $18.48$   $\text{mg}/\text{m}^3\text{-year}$ ), and 12.5 ppm-years ( $18.63$   $\text{mg}/\text{m}^3\text{-year}$ ) or greater showed non-statistically significant risk ratios of 0.9 (95% confidence interval 0.6 ,1.3), 1.2 (95% CI: 0.8,1.9), and 1.0 (95% CI 0.6, 1.8), respectively. There was no evidence of a trend across these groups ( $\chi^2 = 0.14$ ,  $p = 0.35$ ). When categorized according to maximum average exposures, compared to unexposed subjects, subjects with a maximum of less than 2 ppm ( $2.98$   $\text{mg}/\text{m}^3$ \*) showed a risk ratio of 0.8 (95% CI: 0.5, 1.2) and subjects with a maximum of greater than or equal to 2 ppm ( $2.98$   $\text{mg}/\text{m}^3$ \*) showed a risk ratio of 1.2 (95% CI: 0.8,1.6). Neither cumulative exposures nor maximum average exposures yielded statistically significant results for any exposure level.

<sup>3</sup> Here and elsewhere, conversions from ppm to  $\text{mg}/\text{m}^3$  assumed a molecular weight of 36.5 and  $25^\circ\text{C}$ , 1 atmosphere.

Coggon et al. (1996) reported non-statistically significant results when analyzing aerodigestive cancer mortality and maximum acid mist exposure levels. Compared to unexposed subjects, subjects ever exposed to less than 1 mg/m<sup>3</sup> showed an odds ratio of 1.9 (95% CI: 0.2, 15.8), and subjects exposed to 1 mg/m<sup>3</sup> or greater showed an odds ratio of 1.3 (95% CI: 0.3, 5.7). Notably, the maximum exposures include sulfuric acid or HCl mists rather than HCl exclusively, which is an important distinction because IARC concluded that HCl exposures other than mists were not carcinogenic. Despite this mixed exposure (mixed acid mists), the odds ratios reported by Coggon et al. (1996) were not statistically significant.

The effects of HCl exposure have also been investigated in animal studies (see Appendix, Table A2). The carcinogenicity of HCl was examined in groups of 100 Sprague-Dawley rats exposed by inhalation to either gaseous HCl, formaldehyde, two types of combinations of HCl and formaldehyde, or a control group of air alone for 6 hours per day, 5 days per week over 122 weeks (Albert et al. 1982; Sellakumar 1985). Results were also compared to those for unexposed control animals. HCl concentrations were 10 ppm (14.9 mg/m<sup>3</sup>)<sup>4</sup> in the HCl-only exposure. Following sacrifice, animals were examined for tissue abnormalities, including cancer, with special attention to the respiratory tract. Results of the study indicated increased incidence of hyperplasia (indicative of cell proliferation) in the larynx and trachea of animals exposed to HCl alone as compared to air controls or colony controls, but no excess cancer was observed.

Other cancer studies in experimental animals were reported by OECD (Organization for Economic Cooperation and Development 2002) – a dermal exposure study (Narat, 1925 as cited by Organization for Economic Cooperation and Development 2002) and an oral exposure study (Dyer et al. 1946 as cited by Organization for Economic Cooperation and Development 2002). No malignant tumors were reported in 99 mice dermally exposed to an unknown volume of solutions containing 3-5% HCl every 1-2 days, and then weekly for 4-6 additional weeks (total exposure duration 25-46 weeks) (Narat, 1925 as cited by Organization for Economic Cooperation and Development 2002).

Dyer et al. (1946, as cited by Organization for Economic Cooperation and Development 2002) orally exposed groups of mice to a combination of HCl (1-2.5 moles per liter) and either a “control emission” (58 mice) or HCl and 1,2,5,6-dibenzanthracene (40 mice) and reported no excess cancer or pre-cancerous lesions observed in the stomachs of animals from either group exposed to HCl. OECD concluded neither study was appropriate for the assessment of carcinogenicity because of the shortcomings of the study design.

An important consideration when determining carcinogenicity is the ability of a chemical to induce genotoxicity or mutagenicity. Genotoxic and mutagenic chemicals typically are not considered to have a threshold for their effects to occur. HCl did not induce mutations in six bacterial mutation assays nor in one mutation assay in yeast cells (reviewed by IARC 1992; Organization for Economic Cooperation and Development 2002). A qualitative predictive assay that examines cell survival in strains that have or lack the ability to repair damaged DNA had mixed results in two assays, but OECD concluded the positive finding was unrelated to DNA damage (reviewed by Organization for Economic Cooperation and Development 2002). A weakly positive response for mutations was observed in a mouse lymphoma cell assay; these results are interpreted as being an artifact of acidic conditions (pH 6.3 in buffered cell culture medium), which itself related to cell death. Other mutation assays in mammalian cell cultures were negative (IARC 1992; Organization for Economic Cooperation and Development 2002). HCl induced chromosome

<sup>4</sup> Here and elsewhere, conversions from ppm to mg/m<sup>3</sup> assumed a molecular weight of 36.5 and 25°C, 1 atmosphere.

aberrations in mammalian cells in culture at concentrations in excess of 10 mM in the cell culture media (leading to an acidic environment with a pH of 5.8) and in a handful of studies in Chinese hamster ovary cells, mouse lymphoma cells, and in insect and plant cells. IARC (1992) and OECD (2002) found that the acidic pH is the responsible factor for these responses and that similar responses are observed for other inorganic acids and with acetic acid. These concentrations would not be found environmentally and are thus not relevant for ambient air exposures to HCl.

As shown in Table A1 in the Appendix, tens of thousands of employees exposed to HCl have been studied, and very small numbers of cases of various types of cancers, which are expected to have different causes and risk factors, have been identified. This is in spite of the high likelihood that individuals classified as being exposed to HCl were actually exposed to mixtures that included recognized occupational carcinogens, including acid mists. Such mixed exposure groups would incorrectly assign risk to HCl if the risk were actually due to exposure to the other chemicals that co-occurred with HCl. The small numbers of cases have resulted in very unstable risks estimated with a high degree of uncertainty; in addition to the confounding effects of other exposures, chance cannot be ruled out as the cause of those findings.

HCl is a commonly used industrial chemical with a long history of use (IARC 1992). Had there been a causal association between HCl exposure and cancer, it is likely that concerns would have been raised and any potential association would have been more fully investigated. The small number of cases that have been detected in the existing research base implies HCl is likely not a carcinogen; the cases were most probably caused by co-exposures to known occupational carcinogens and/or to uncontrolled confounding by non-occupational carcinogenic exposures, such as cigarette smoking.

### **3.2 Has the scientific community judged there to be a threshold for health effects associated with HCl exposure?**

It is logically impossible to prove a negative, i.e., that HCl does not cause cancer.

HCl currently has many industrial uses, in the production of chlorides, fertilizers, and dyes, in the steel, textile and rubber industries, in the production of numerous chemicals, making it one of the most widely used chemicals in industrial processes (IARC 1992). Given its wide use in industry, it can be inferred logically that occupational exposure to this chemical is common. Very little research on its carcinogenicity has been carried out, however, suggesting that no or few signals have emerged to indicate an elevated cancer risk associated with occupational exposure to HCl. This inference is borne out by the small numbers of cancer cases identified among the thousands of occupationally exposed individuals included in the studies we identified (Table A1 in Appendix A) and is supported by toxicological evidence indicating a lack of mutagenic or carcinogenic activity by HCl.

Some substances may produce tumors through a nonmutagenic mechanism, often by inducing extensive cell turnover which leads to the possibility of replication errors leading to mutations. However, such mechanisms are believed to have a threshold concentration below which no effects are seen. In the case of HCl, results from carcinogenicity studies in animals showed increased cell proliferation in the form of hyperplasia in the respiratory tract; however, there was no evidence of carcinogenicity (Sellakumar 1985). Furthermore, in studies where HCl was administered along with formaldehyde (Albert et al. 1982), exposures to 10 ppm (14.9 mg/m<sup>3</sup>) HCl neither caused serious irritating effects nor enhanced the carcinogenicity of formaldehyde.

In conclusion, the available toxicological and epidemiological evidence does not indicate HCl is mutagenic or carcinogenic and there is no evidence that HCl causes the types of cell proliferation that are typically associated with nongenotoxic carcinogens. While the evidence from animal studies indicated chronic HCl exposure to 10 ppm (14.9 mg/m<sup>3</sup>) led to increased incidence of hyperplasia, hyperplasia would not be expected to progress to cancer at exposure concentrations below the threshold at which hyperplasia was reported.

### 3.3 Proposed margin of safety

The US-EPA has derived a RfC for HCl of 0.2 mg/m<sup>3</sup> (Table 1) based on the lowest adverse effect level (LOAEL) of 10 ppm (14.9 mg/m<sup>3</sup>\*) reported by Sellakumar et al. (1985). The LOAEL is based on the incidence of hyperplasia reported in rats chronically exposed to HCl via inhalation, and the assumption that a threshold concentration exists below which no effects would be seen following HCl exposure. US-EPA has designated "low confidence" in the current RfC based on the study used as the basis for the RfC and the sparsity of the overall database for HCl (animal and human toxicity data). The study that serves as the basis for the RfC (Sellakumar 1985) includes only one treatment group and a control group. In addition, the supporting toxicity data includes only subchronic toxicity studies with no additional chronic or reproductive toxicity data. Based on the research completed for Ramboll's 2021 report and the review of both toxicology and epidemiology data completed from 2021 to the present, there are no additional data that could be considered by US-EPA that could increase the confidence in the RfC at this time. More studies would have to be conducted in order to increase confidence in the RfC, and they should include chronic exposures and reproductive endpoints.

The chronic REL (CREL) developed by the California Environmental Protection Agency (CalEPA), of 0.009 mg/m<sup>3</sup> (Table 1) is also based on the same chronic toxicity study (Sellakumar 1985) that serves as the basis for the RfC derived by US-EPA. While both the US-EPA and CalEPA toxicity values are based on the same underlying animal toxicity data and derived using similar methodologies there are significant differences in the two toxicity values with the CalEPA CREL being lower than US-EPA's RfC (RfC of 0.2 mg/m<sup>3</sup> vs. CREL of 0.009 mg/m<sup>3</sup>). The difference in the values is related to the use of US-EPA's guidance on the dosimetry adjustment of inhalation of gases (US-EPA 1994). The dosimetric adjustment equation considers the surface area all regions of the respiratory tract that are affected (i.e., extrathoracic, tracheobronchial and pulmonary). When conducting the dosimetry adjustment, CalEPA only considered the extrathoracic surface area. However, consistent with the results reported by Sellakumar et al. (1985) of increased hyperplasia in both the larynx and the trachea, US-EPA included the surface area of both the extrathoracic and tracheobronchial respiratory region. CalEPA notes that while extrathoracic and tracheobronchial effects were reported in rats following exposures to hydrogen chloride, the REL was based on extrathoracic effects because humans are predicted to be relatively more susceptible to the effects of hydrogen chloride in that region. However, no basis for this prediction was presented by CalEPA. The US-EPA guidelines recommend that when effects are observed in the mid-respiratory tract (tracheobronchial), this region should also be considered in the dosimetry adjustment calculations. Therefore, US-EPA's approach for the derivation of the RfC aligns with the guidelines for dosimetric adjustments following inhalation of gases and better represents the observed respiratory effects reported in the scientific literature.

US-EPA conducted a risk assessment to determine an HBEL for HCl for the Lime Manufacturing source category. The purpose of the assessment was to determine the level of HCl emissions that would ensure health thresholds are not exceeded with an ample margin of safety. Unit emissions

of one ton per year of HCl along with emission release parameters for each facility were used to estimate the HBEL. Inhalation exposure concentrations and potential health risks were estimated using US-EPA's Human Exposure Model (HEM4), which incorporates the American Meteorological Society/US-EPA Regulatory Model (AERMOD) dispersion modeling system (AERMOD version 22112), a Gaussian plume dispersion model for modeling point, area, and volume sources of continuous air emissions (USEPA 2005).

US-EPA provides details of the risk assessment and HBEL estimation in a memo, "Risk Approach to Assess a Health-Based Emission Limitation for Hydrochloric Acid for the Lime Manufacturing Source Category" (US-EPA Docket: EPA-HQ-OAR-2017-0015). The reported inputs for the air modeling were conservative. Unit emissions of 1 ton per year (tpy) of HCl assigned to each facility were used as input into HEM4 to estimate the maximum ambient chronic concentration, which were then scaled up by a factor of 300 to assess chronic and acute risks. A default hourly acute emissions multiplier of 10 was applied to reflect 1-hour emissions ten times the annual emissions level divided by 8,760 hours per year. Annual concentrations were estimated to assess chronic health impacts and 1-hour concentrations were estimated to assess acute health impacts.

In assessing the margin of safety for environmental HCl exposure, US-EPA calculated the chronic noncancer health hazard based on a hazard quotient (HQ), which is the estimated exposure at a location divided by a reference level (e.g., the RfC). HQs of  $\leq 1$  are not likely to cause adverse health effects, and as exposures increase above the reference level resulting in HQs  $> 1$ , the potential for adverse effects increases. For assessing acute risks US-EPA performed a screening assessment using conservative assumptions combined with reasonable worst-case exposure. This screening process results in the facility being determined to pose no potential acute health risks (i.e., it "screens out"), or the facility requires further assessment. The toxicity reference values used for the risk assessment of chronic exposure were based on recommendations for HAPS (USEPA 2018). The toxicity reference values recommended by HAPs in order of priority are US-EPA RfC's and CalEPA's REL (Table 1). US-EPA's dose-response assessment for acute exposure to HCl was also based on the existing recommendations of HAPs. The results from screening acute assessments were compared to CalEPA's Acute Reference Exposure Levels (ARELs), Acute Exposure Guideline Levels (AEGLs) and Emergency Response Planning Guidelines (ERPGs) (Table 1).

Based on conservative air modeling assumptions and toxicity reference values based on the best available science and methodologies, US-EPA derived a HBEL emission level of 300 tpy of HCl. Results of the risk assessment indicated the maximum chronic non-cancer hazard from HCl emissions for this source category resulted in an HQ equal to 0.2, which is 5 times below a HQ of 1 indicating adverse chronic health effects are not likely to occur. For the acute assessment, three facilities had acute screening HQ values equaling or approaching a value of 1. EPA reported that an examination of aerial imagery of the facilities showed maximum acute off-site HQ equal to 0.6.

Overall, the air modeling performed by US-EPA for this assessment should contribute to an acceptable margin of safety. The default assumptions of the air model are expected to produce conservative air concentrations, and the definition of the receptor locations should produce reasonable exposure estimates for existing receptors. In addition, the chronic and acute toxicity reference values used for the risk assessment are based on the best available science.

## 4. SUMMARY AND CONCLUSIONS

Humans are exposed to approximately 4 million tons per year of HCl from natural sources (volcanoes, marine life, combustion of vegetation), as well as industrial sources, HCl is one of the most important basic industrial chemicals IARC (1992) summarized estimated mean air concentrations of HCl in occupational settings ranging from  $<0.1 \text{ mg/m}^3$  to  $12 \text{ mg/m}^3$  during acid treatment of metals. Mean exposures during other industrial processes are estimated as  $>1 \text{ mg/m}^3$ . HCl is also found in household products such as cleaners and swimming pool additives and is formed during the burning of many plastics. IARC (1992) reported that ambient air levels of HCl typically remain below  $0.01 \text{ mg/m}^3$ .

As shown in Table A1 in the Appendix, tens of thousands of employees exposed to HCl have been studied with no clear signals of elevated cancer risks emerging. This is in spite of the high likelihood that individuals classified as being exposed to HCl were actually exposed to mixtures that included recognized occupational carcinogens, including acid mists. Had there been a causal association between HCl exposure and cancer, it is likely that concerns would have been raised and any potential association would have been more fully investigated.

IARC (1992) recognized that sulfuric acid and HCl are often found together in industrial processes. In assessing the scientific evidence for the grouping "sulfuric acid and other strong inorganic acids," IARC concluded that there was sufficient evidence associating occupational exposure to "strong-inorganic-acid mists containing sulfuric acid" with cancer. They therefore concluded that occupational exposure to strong inorganic acid mists **containing sulfuric acid** is carcinogenic to humans (i.e., a "Group 1" carcinogen) (IARC 1992). In contrast, IARC's conclusion regarding HCl was that there was **inadequate evidence** for the carcinogenicity of HCl, and they therefore assessed exposure to HCl as not classifiable as to its carcinogenicity to humans (i.e., a "Group 3"). This is relevant because the conclusion regarding acid mists is based on exposure to mixtures that must include sulfuric acid. While sulfuric acid and HCl often are found together in mixed acid exposures, the exposure contained in the mixture with the strongest relationship to the outcome (in this case, sulfuric acid) will drive the relationship for the whole mixture. This is likely the explanation for the sporadic, positive associations observed in occupational studies of mixed acids containing HCl. All occupational epidemiology studies published since the 1992 IARC determination are consistent with this conclusion.

As shown in Table A2 in the Appendix, the effects of HCl exposure have also been investigated in animal studies. Results of the only chronic exposure study indicated increased incidence of hyperplasia (indicative of cell proliferation) in the larynx and trachea of rats exposed to HCl alone as compared to air controls or colony controls, but no excess cancer was observed (Sellakumar 1985). Two short term cancer studies in experimental animals were reported by OECD (Organization for Economic Cooperation and Development 2002): Neither the dermal exposure study (Narat, 1925 as cited by Organization for Economic Cooperation and Development 2002) nor the oral exposure study (Dyer et al. 1946 as cited by Organization for Economic Cooperation and Development 2002) reported any increase in cancer occurrence.

Some substances may produce tumors through a nonmutagenic mechanism, often by inducing extensive cell turnover which leads to the possibility of replication errors leading to mutations. However, such mechanisms are believed to have a threshold concentration below which no effects are seen. In the case of HCl, results from carcinogenicity studies in animals showed increased cell proliferation in the form of hyperplasia in the respiratory tract; however, there was

no evidence of carcinogenicity (Sellakumar 1985) and there was no evidence of genotoxicity or cell proliferation resulting from HCl exposures (reviewed by OECD). Furthermore, in studies where HCl was administered along with formaldehyde (Albert et al. 1982), exposures to 10 ppm HCl neither caused serious irritating effects nor enhanced the carcinogenicity of formaldehyde.

The available toxicological and epidemiological evidence does not indicate HCl is mutagenic or carcinogenic and there is no evidence that HCl causes the types of cell proliferation that are typically associated with nongenotoxic carcinogens. While the evidence from animal studies indicated chronic HCl exposure to 10 ppm led to increased incidence of hyperplasia, hyperplasia would not be expected to progress to cancer at exposure concentrations below the threshold at which hyperplasia was reported.

The air modeling performed by US-EPA for this assessment should contribute to an acceptable margin of safety. The default assumptions of the air model are expected to produce conservative air concentrations, and the definition of the receptor locations should produce reasonable exposure estimates for existing receptors. In addition, the chronic and acute toxicity reference values used for the risk assessment are based on the best available science.

HCl has not been identified as a carcinogen, despite its long history of use. Ramboll therefore recommends, as specified in 42 U.S.C. § 7412(d)(4), that the MACT standard for HCl be based on a health-based threshold, including an ample margin of safety.

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<b>Table 1 – Toxicity Reference Values</b>		
<b>Toxicity Reference Value</b>	<b>ppm</b>	<b>mg/m<sup>3</sup></b>
<b>Chronic</b>		
USEPA RfC	0.013*	0.02
CalEPA CREL	0.006	0.009
Michigan EGLE ITSL	0.013*	0.02
<b>Acute</b>		
AEGL-1 (1-hour)	1.8	2.7
AEGL-2 (1-hour)	22	33
ERPG-1	3	4.5
ERPG-2	20	30
CalEPA REL	1.4*	2.1
Michigan EGLE ITSL	1.4*	2.1
ACGIH TLV – Ceiling	2	3*
OSHA PEL - Ceiling	5	7
Cal/OSHA PEL – Ceiling	2	3*
Cal/OSHA PEL – 8-hour TWA	0.3	0.45

\*Value was calculated based on a molecular weight of 36.5, 25°C, and 1 atmosphere.

**USEPA IRIS** – US Environmental Protection Agency Integrated Risk Information System

**RfC** – inhalation reference concentration

**CalEPA (OEHHA)** - the California Environmental Protection Agency's Office of Environmental health hazard Assessment

**CREL** – Chronic Reference Exposure Level

**AEGL** - Acute Exposure Guideline Levels

**AEGL-1** is the airborne concentration (expressed as ppm or mg/m<sup>3</sup>) of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

**AEGL-2** is the airborne concentration (expressed as ppm or mg/m<sup>3</sup>) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

**ERPG** - Emergency Response Planning Guidelines

**ERPG-1** is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or without perceiving a clearly defined, objectionable odor.

**ERPG-2** is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

**ITSL** - Initial Threshold Screening Level

**OSHA** - Occupational Safety and Health Association

**PEL** - Permissible Exposure Limit

**ACGIH** - American Conference of Governmental Industrial Hygienists

**TLV** - Threshold Limit Value

**TWA** - Time Weighted Average

## **APPENDIX A**

### **SUMMARY TABLES**

Table A1: Summary of Epidemiology Studies

Table A2: Summary of Toxicology Studies

**Table A1. Summary of Epidemiology Studies**

Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Beaumont et al. 1987	Steel pickling	Cohort	1,165 (1,156 men; 9 women)	Lung cancer (mortality)	Sulfuric acid and other acid mists (primarily HCl)	Group 1: any acid (entire cohort)	Dose was not quantified. Dose-response relationship was based on length of employment	28	SMR: 1.35	0.92	1.97	Referent group: US general population; US steel workers  Two of the three facilities had consistent trends; the third facility had a small sample size and no lung cancer deaths observed.
						Group 2: sulfuric acid only		13	SMR: 1.06	0.59	1.9	Exposure categorization was based on job category and not specific measurements of exposure level.
						Group 3: sulfuric acid only, probable daily exposure (subset of Group 2)		12	SMR: 1.23	0.68	2.2	Did not control for smoking or exposure to other potential lung carcinogens (besides coke operations).

**Table A1. Summary of Epidemiology Studies**

Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Beaumont et al. 1987	Steel pickling	Cohort	1,165 (1,156 men; 9 women)	Lung cancer (mortality)	Sulfuric acid and other acid mists (primarily HCl)	Group 4: other acid only	Dose was not quantified. Dose-response relationship was based on length of employment	9	SMR: 2.00 (compared to other steel workers)	1.06	3.78	In this cohort, 2 deaths from laryngeal cancer were detected (not statistically significant)
									SMR: 2.24 (compared to US population)	1.02	4.26	
						Group 5: sulfuric acid and other acid		6	SMR: 1.49	0.54	3.86	

Table A1. Summary of Epidemiology Studies												
Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Steenland et al. 1988	Steel pickling	Cohort	879 men	Laryngeal cancer (diagnosis)	Sulfuric acid and other acid mists	Overall analysis	Dose not quantified	9 (4 sulfuric acid only; 2 other acids only; 3 mix of sulfuric acid and other acid)	SIR (observed/expected): 2.3	--	--	Referent groups: US population and other steel workers.  None of these associations were statistically significant  Insufficient power to detect statistically significant changes
						<5 years exposure			SIR: 1.70	--	--	
						>5 years exposure			SIR: 2.76	--	--	No dose-response relationship shown
						<20 years since first exposure			SIR: 3.27	--	--	
						>20 years since first exposure			SIR: 2.03	--	--	IARC (1992) notes confounding by exposure to sulfuric acid could not be ruled out.

**Table A1. Summary of Epidemiology Studies**

Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Collins et al. 1989	Acrylamide workers	Cohort	8,854 men (2,293 exposed to acrylamide)	Respiratory cancers mortality (lung or larynx)	Hydrochloric acid	Acrylamide (Not exposed: <0.001 mg-m3-years vs exposed >0.001 mg-m3-years (cumulative exposure for acrylamide based on (number of days in the job * estimated daily exposure) divided by 365).	Dose not quantified for HCL	63 in group exposed to <0.001 mg/m3-years acrylamide (11 in a department using HCl)	No quantitative risk estimate presented for workers exposed to HCl	--	--	Subject of paper is exposure to acrylamide. It contains mention of workers in a unit with HCl exposure. Subsequent discussion by IARC (1992) notes the expected numbers for that facility were not provided.

<b>Table A1. Summary of Epidemiology Studies</b>												
<b>Citation</b>	<b>Industry</b>	<b>Study design</b>	<b>Pop. Size</b>	<b>Outcome</b>	<b>Exposure</b>	<b>Exposure Groups</b>	<b>Exposure Levels</b>	<b># Cases</b>	<b>Risk Estimate</b>	<b>Lower 95%<sup>a</sup> CI</b>	<b>Upper 95%<sup>a</sup> CI</b>	<b>Comments (focus on potential causes of bias and/or confounding)</b>
Marsh et al. 1999	Acrylamide workers	Cohort	8508 workers	Respiratory cancers mortality	Hydrochloric acid	Duration of exposure (yr) : Mean (SD) - 0.08 (1.02), Max-26.53	Dose not quantified for HCL	276 cases (16 exposed to HCL)	OR:1.50	0.86	2.59	The findings may be confounded by smoking as complete smoking data was not available for this subgroup exposed to HCL.
Bond et al. 1983	Chemical workers (TX)	Case-control	19,608	Brain cancer mortality	Hydrogen chloride	Hydrogen chloride and 10 other chemical categories	Dose not quantified.	28 (13 exposed to HCl)	Compared to control group A (110; 42 exposed to HCl)  OR: 1.40	0.70*	2.80*	Exposure categories based on employment records and some job titles; categories were nonspecific. Exposure misclassification was possible due to lack of records in early years of company operations. Small number of cases



Table A1. Summary of Epidemiology Studies												
Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Bond et al. 1983	Chemical workers (TX)	Case-control	19,608	Brain cancer mortality	Hydrogen chloride	Hydrogen chloride and 10 other chemical categories	Dose not quantified.	28 (13 exposed to HCl)	Sample-based control group B (111; 51 exposed to HCl) OR: 1.02	0.81*	1.29*	Exposure categories based on employment records and some job titles; categories were nonspecific. Exposure misclassification was possible due to lack of records in early years of company operations. Small number of cases

**Table A1. Summary of Epidemiology Studies**

Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Bond et al. 1983	Chemical workers (TX)	Case-control	19,608	Brain cancer mortality	Hydrogen chloride	Hydrogen chloride and 10 other chemical categories	Dose not quantified.	28 (13 exposed to HCl)	Cases employed 1 to 4 years with matched group B controls (5 cases, 15 controls exposed) OR: 2.02	0.5*	8.1*	Exposure categories based on employment records and some job titles; categories were nonspecific. Exposure misclassification was possible due to lack of records in early years of company operations. Small number of cases

**Table A1. Summary of Epidemiology Studies**

Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Bond et al. 1985	Chemical workers (TX)	Case control	19,608	Renal cancer mortality	Hydrogen chloride	Hydrogen chloride and other chemical agents	Dose was not quantified	26 (12 exposed to HCl)	Compared to group A (92; 44 exposed to HCl) OR: 0.90	0.44*	1.83*	Potential unaccounted lifestyle confounders Exposure classification was based on job category and company work histories
									Compared to Group B (98; 50 exposed to HCl) OR: 0.86	0.40*	1.86*	

**Table A1. Summary of Epidemiology Studies**

Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Bond et al. 1986	Chemical workers (TX)	Nested case-Control	19,608	Lung cancer mortality	Hydrogen chloride	Hydrogen chloride and other chemical agents	Dose was not quantified. Exposure level based on ranking-low, moderate, high according to job assignment	308 (237 exposed to HCl)	Without regard for interval prior to death: OR: 1.02	0.77	1.35	Exposure measurements were not available. Possible random misclassification of employee exposures Possible chance variation
								616 comparison workers, (463 exposed to HCl)	Excluding exposures occurring within 15 years of death OR: 0.92	0.68	1.24	Possible protective role for one or more chemicals

**Table A1. Summary of Epidemiology Studies**

Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Bond et al. 1991	Chemical workers (TX)	Nested case-Control	19,608	Lung, trachea, bronchus cancer mortality (note, results only presented for lung cancer)	Hydrogen chloride	HCl calculated by time spent on jobs and cumulative exposure score		308	All dates RR: 1.0	0.8	1.3	Exposure was determined by job category. Differences in respirator policies at plant
								616 comparison workers from 2 control groups (308 each, pooled)				
									Excluding exposures occurring within 15 years of death RR: 0.9	0.7	1.2	
							Cumulative Exposure (ppm-yr): 0.1-3.9 (0.15-5.81)	62	Adj RR = 0.9	0.6	1.3	0.15-0.58

Table A1. Summary of Epidemiology Studies												
Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
							mg/m <sup>3</sup> -yr)					
Bond et al. 1991	Chemical workers (TX)	Nested case-Control	19,608	Lung, trachea, bronchus cancer mortality (note, results only presented for lung cancer)	Hydrogen chloride	HCl calculated by time spent on jobs and cumulative exposure score	4.0-12.4 (5.96-18.48 mg/m <sup>3</sup> -yr)	45	Adj RR = 1.2	0.8	1.9	
							>12.5 (18.63 mg/m <sup>3</sup> -yr)	22	Adj RR = 1.0	0.6	1.8	
Chen et al. 2021	Population based (residents of Guangdong and Guangxi, China)	Case-control	2,514 cases, 2,586 controls	Nasopharyngeal cancer incidence	Mixed acids and alkalis (sulfuric acid, hydrochloric acid, nitric acid, concentrated alkali, ammonia)	Ever exposed	Dose not quantified.	311	OR = 1.38	1.03	1.85	Does not consider exposure to HCl alone- only as part of a mixed acid exposure  Risk estimate is no longer significant when analyzed across different dose levels No quantitative measurements of exposure

Table A1. Summary of Epidemiology Studies												
Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
												Self-reported exposures are liable to recall bias
Chen et al. 2021	Population based (residents of Guangdong and Guangxi, China)	Case-control	2,514 cases, 2,586 controls	Nasopharyngeal cancer incidence	Mixed acids and alkalis (sulfuric acid, hydrochloric acid, nitric acid, concentrated alkali, ammonia)	<8 years exposure	Dose not quantified.	109	OR = 1.53	0.89	2.64	Unclear if overlap between exposures of interest was accounted for
						8-22 years exposure		91	OR = 1.09	0.68	1.77	
						>=23 years exposure		111	OR = 1.56	0.99	2.45	
						First exposed aged >=23		101	OR = 1.37	0.84	2.25	
						First exposed aged 18-22		86	OR = 1.19	0.71	1.97	
						First exposed aged <18		124	OR = 1.56	0.99	2.47	
					Mixed acids (sulfuric acid, hydrochloric acid,	Ever exposed		176	OR = 1.63	1.27	2.09	

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<b>Citation</b>	<b>Industry</b>	<b>Study design</b>	<b>Pop. Size</b>	<b>Outcome</b>	<b>Exposure</b>	<b>Exposure Groups</b>	<b>Exposure Levels</b>	<b># Cases</b>	<b>Risk Estimate</b>	<b>Lower 95%<sup>a</sup> CI</b>	<b>Upper 95%<sup>a</sup> CI</b>	<b>Comments (focus on potential causes of bias and/or confounding)</b>
					nitric acid)							
Coggon et al. 1996	Steel and battery manufacture workers	Nested case-control	4403	Upper aerodigestive cancer (UADC) mortality	Maximum exposure to acid mists (hydrochloric or sulfuric acid)	No exposure	Zero	3 exposed cases; 18 exposed controls	OR: 1.0	--	--	Estimates based on a small number of cases
						Low exposure	<1 mg/m <sup>3</sup> sulfuric or hydrochloric acid	2 exposed cases; 7 exposed controls	OR: 1.9	0.2	15.8	Potential non-occupational and occupational confounders (tobacco, alcohol)
						High exposure	>1 mg/m <sup>3</sup> sulfuric or hydrochloric acid	9 exposed cases; 43 exposed controls	OR: 1.3	0.3	5.7	SMRs compare mortality in the worker population with mortality in the general US population.



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<b>Citation</b>	<b>Industry</b>	<b>Study design</b>	<b>Pop. Size</b>	<b>Outcome</b>	<b>Exposure</b>	<b>Exposure Groups</b>	<b>Exposure Levels</b>	<b># Cases</b>	<b>Risk Estimate</b>	<b>Lower 95%<sup>a</sup> CI</b>	<b>Upper 95%<sup>a</sup> CI</b>	<b>Comments (focus on potential causes of bias and/or confounding)</b>
						Uncertain	NA	1 case exposed; 5 controls exposed	OR: 1.0	0.1	12	
Coggon et al. 1996	Steel and battery manufacture workers	Nested case-control	4403	Upper aerodigestive cancer (UADC) mortality	Cumulative exposure to acid mists (hydrochloric or sulfuric acid)	No exposure	Dose not quantified.	3 exposed cases; 18 exposed controls	OR: 1.0	--	--	Estimates based on a small number of cases
						Intermediate or uncertain cumulative exposure		5 exposed cases; 32 exposed controls	OR: 1.0	0.2	4.6	Potential non-occupational and occupational confounders (tobacco, alcohol)
						At least 5 years high cumulative exposure		7 exposed cases; 23 exposed controls	OR: 2.0	0.4	10	SMRs compare mortality in the worker population with mortality in the general US population.
		Cohort		All cancer mortality	Acid mists	Full cohort (possibly	Dose not quantified.	324	SMR: 0.88	0.79	0.98	

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<b>Citation</b>	<b>Industry</b>	<b>Study design</b>	<b>Pop. Size</b>	<b>Outcome</b>	<b>Exposure</b>	<b>Exposure Groups</b>	<b>Exposure Levels</b>	<b># Cases</b>	<b>Risk Estimate</b>	<b>Lower 95%<sup>a</sup> CI</b>	<b>Upper 95%<sup>a</sup> CI</b>	<b>Comments (focus on potential causes of bias and/or confounding)</b>
					(hydrochloric or sulfuric acid)	exposed, never exposed, and definitely exposed)						
Coggon et al. 1996	Steel and battery manufacture workers	Cohort	4403	All cancer mortality	Acid mists (hydrochloric or sulfuric acid)	Never exposed to acid mists	Dose not quantified.	88	SMR: 0.74	0.59	0.91	
						Definitely exposed		199	SMR: 0.92	0.79	1.05	
Ker et al. 2021	Office workers at a telecommunication company	cohort	10,229 workers compared to the general population of Taiwan	All cancer mortality	Mixed acids (sulfuric acid, hydrochloric acid, nitric acid)	All workers compared to the general population	Dose not quantified	All cancer: 42	SMR = 0.68	P < 0.01		Comparing to a general population rather than a traditional control group opens the possibility of confounding by any unknown co-exposures than telecommunication employees are likely to encounter
									SPMR = 1.47	P 0.03		

Table A1. Summary of Epidemiology Studies												
Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Ker et al. 2021	Office workers at a telecommunication company	cohort	10,229 workers compared to the general population of Taiwan	All cancer mortality	Mixed acids (sulfuric acid, hydrochloric acid, nitric acid)	All workers compared to the general population	Dose not quantified	Lip, oral cavity, pharynx: 5	SMR = 0.50	P 0.13		All employees had employer-provided medical insurance and it is possible cancer in this population was more likely to receive a diagnosis than cancer in the general population- cancer in the general population may be underestimated by comparison
									SPMR = 1.18	P 0.83		
								Combined nasopharynx: 5	SMR = 1.05	P >0.99		Significant results are only seen for all cancers combined and not for any specific sites.
									SPMR = 2.49	P 0.11		

Table A1. Summary of Epidemiology Studies												
Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Ker et al. 2021	Office workers at a telecommunication company	cohort	10,229 workers compared to the general population of Taiwan	All cancer mortality	Mixed acids (sulfuric acid, hydrochloric acid, nitric acid)	All workers compared to the general population	Dose not quantified	Combined digestive system: 23	SMR = 0.69	P 0.07		No measurements of exposure- all employees are assumed to have had the same exposure and there is no information on intensity or duration
								Combined digestive system: 23	SPMR = 1.48	P 0.09		No measurements of exposure- all employees are assumed to have had the same exposure and there is no information on intensity or duration
								Stomach: 7	SMR = 1.64	P 0.28		Few cancer cases observed, limits statistical power
									SPMR = 3.24	P 0.01		

**Table A1. Summary of Epidemiology Studies**

Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Ker et al. 2021	Office workers at a telecommunication company	cohort	10,229 workers compared to the general population of Taiwan	All cancer mortality	Mixed acids (sulfuric acid, hydrochloric acid, nitric acid)	All workers compared to the general population	Dose not quantified	Colon 2	SMR = 0.80	P > 0.99		This article is more concerned with demonstrating the differences between an SMR and an SPMR and less concerned with investigating a specific health effect.
									SPMR = 1.66	P 0.68		
								Rectum: 2	SMR = 1.24	P 0.96		
									SPMR = 2.59	P 0.36		
								Liver: 10	SMR = 0.49	P 0.02		
									SPMR = 1.07	P 0.87		
								Gallbladder : 1	SMR = 1.33	P > 0.99		
									SPMR = 2.79	P 0.60		
								Pancreas: 1	SMR = 0.77	P > 0.99		
									SPMR = 0.57	P 0.94		

**Table A1. Summary of Epidemiology Studies**

Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Ker et al. 2021	Office workers at a telecommunication company	cohort	10,229 workers compared to the general population of Taiwan	All cancer mortality	Mixed acids (sulfuric acid, hydrochloric acid, nitric acid)	All workers compared to the general population	Dose not quantified	Combined respiratory system: 7	SMR = 0.76	P 0.59		
									SPMR = 1.46	P 0.41		
								Cervix: 1	SMR = 5.77	P 0.32		
									SPMR = 10.79	P 0.18		
								Urinary: 1	SMR = 1.61	P 0.92		
									SPMR = 3.26	P 0.53		
								Thyroid: 1	SMR = 9.49	P 0.20		
									SPMR = 19.38	P 0.10		
								Non-pancreatic endocrine system: 1	SMR = 9.92	P 0.19		
Ker et al. 2021	Office workers at	cohort	10,229 workers	All cancer mortality	Mixed acids	All workers compared	Dose not quantified	Non-pancreatic	SPMR = 21.87	P 0.09		

Table A1. Summary of Epidemiology Studies												
Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
	a telecommunication company		compared to the general population of Taiwan		(sulfuric acid, hydrochloric acid, nitric acid)	to the general population		endocrine system: 1				
								Unspecified site: 1	SMR = 9.77	P 0.19		
									SPMR = 22.79	P 0.09		
								Myeloid leukemia: 1	SMR = 1.16	P >0.99		
									SPMR = 2.67	P 0.62		
								Unspecified leukemia: 1	SMR = 1.44	P >0.99		
									SPMR = 3.33	P 0.52		
Moayad-Nia et al. 2022	Population-based (residents of Quebec, Canada)	Case-cohort	1179	Lung cancer incidence	Hydrogen chloride	Exposed, low certainty (0-25% chance of exposure)	Dose not quantified.	81	OR = 0.75	0.51	1.09	Only the higher certainty category shows significant results but it is driven by a small number of cases.

Moayadi-Nia et al. 2022	Population-based (residents of Quebec, Canada)	Case-cohort	1179	Lung cancer incidence	Hydrogen chloride	Exposed, high certainty ( $\geq 25\%$ chance of exposure)	Dose not quantified.	5	OR = 3.79	1.07	13.41	<p>No information on intensity or duration of exposure, or other quantitative measurements</p> <p>Linking in the job exposure matrix is described as "low resolution" and could only connect subjects to broad categories rather than specific jobs.</p> <p>The higher exposure group includes individuals with exposure certainty as low as 25%- potential for misclassification across all groups.</p> <p>Does not appear to have controlled for co-exposures of interest.</p> <p>Does not control for indoor or outdoor air pollution</p>
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Moayadi-Nia et al. 2022	Population-based (residents of Quebec, Canada)	Case-cohort	1179	Lung cancer incidence	Hydrogen chloride	Exposed, low certainty (5-25% chance of exposure)	Dose not quantified.	13	OR = 1.08	0.56	2.05	Controls for past exposure to known lung carcinogens (such as asbestos) as a binary variable- does not take into account intensity of past exposure or if the subject was exposed to multiple known carcinogens
						Exposed, high certainty ( $\geq 25\%$ chance of exposure)		5	OR = 4.67	1.34	16.2	
Soskolne et al. 2011	Male and females in Toronto, CA	Population based case-control	772	Lung cancer	10 acid categories including hydrochloric acid	Any exposure to HCl	Dose not quantified.	178 cases; 167 controls	OR: 0.98	0.71	1.35	Did not account for family history as a confounder.
						Low exposure to HCl	Dose not quantified.	95 cases; 106 controls	OR: 0.80	0.53	1.22	Exposure classification
						High exposure to HCl	Dose not quantified.	83 cases; 61 controls	OR: 1.24	0.79	1.96	
Siemiatycki 1991	Population-based (residents of	Case control	3730 cancer patients	11 cancers	Hydrogen chloride	Any exposure	Dose not quantified.	Esophagus (8)	OR: 1.2	0.6*	2.3*	French Canadian population to avoid confounding from ethnicity

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<b>Citation</b>	<b>Industry</b>	<b>Study design</b>	<b>Pop. Size</b>	<b>Outcome</b>	<b>Exposure</b>	<b>Exposure Groups</b>	<b>Exposure Levels</b>	<b># Cases</b>	<b>Risk Estimate</b>	<b>Lower 95%<sup>a</sup> CI</b>	<b>Upper 95%<sup>a</sup> CI</b>	<b>Comments (focus on potential causes of bias and/or confounding)</b>
	Montreal, Canada)							Stomach (18)	OR: 1.1	0.7*	1.6*	
								Colon (28)	OR: 0.9	0.6*	1.2*	Did not carry out the analyses to rule out confounding co-exposures or occupational exposures associated with certain cancer types
								Rectum (21)	OR: 1.1	0.7*	1.6*	
								Pancreas (9)	OR: 1.2	0.7*	2.2*	Potential for exposure misclassification based on interviews
								Lung (59)	OR: 0.9	0.7*	1.2*	
								Prostate (25)	OR: 0.8	0.5*	1.2*	
								Bladder (34)	OR: 1.1	0.8*	1.5*	
								Kidney (12)	OR: 1.0	0.6*	1.6*	
Siemiatycki 1991	Population-based (residents of	Case control	3730 cancer patients	11 cancers	Hydrogen chloride	Any exposure	Dose not quantified.	Skin melanoma (5) <sup>b</sup>	OR: 0.7	0.3*	1.6*	
								NHL (22)	OR: 1.5	1.0*	2.2*	

<b>Table A1. Summary of Epidemiology Studies</b>												
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	Montreal, Canada)					Substantial exposure	Dose not quantified.	Esophagus (2)	OR: 1.1	0.3*	3.8*	
								Stomach (5)	OR: 0.9	0.4*	1.9*	
								Colon (15)	OR: 1.5	0.9*	2.4*	
								Rectum (6)	OR: 0.9	0.4*	2.0*	
								Pancreas (2)	OR: 0.7	0.2*	2.4*	
								Lung (20)	OR: 0.9	0.5*	1.5*	
								Prostate (11)	OR: 1.1	0.6*	2.0*	
								Bladder (13)	OR: 1.0	0.6*	1.8*	
								Kidney (3)	OR: 0.7	0.3*	1.8*	
								Skin melanoma (1)	OR: 0.4	0.1*	2.3*	
								NHL (6)	OR: 1.1	0.5*	2.3*	
Siemiatycki 1991	Population-based (residents of Montreal, Canada)	Case control	3730 cancer patients	11 cancers	Hydrogen chloride	Subset analysis for these three cancer sites: Any exposure	Dose not quantified.	Rectum (18)	OR: 1.9	1.1*	3.4*	
								Lung-ovary cell (19)	OR: 1.6	1.0*	2.6*	
								NHL (18)	OR: 1.6	1.0*	2.5*	

Table A1. Summary of Epidemiology Studies												
Citation	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	Exposure Levels	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
						Subset analysis for these three cancer sites: Substantial exposure	Dose not quantified.	Rectum (5)	OR: 1.5	0.5*	3.8*	
								Lung-oat cell (8)	OR: 2.1	1.0*	4.5*	
								NHL (6)	OR: 1.5	0.7*	3.2*	
Fritschi and Siemiatycki 1996a	Population-based (residents of Montreal, Canada)	Case control	3730 cancer patients	Lymphoma and myeloma	Hydrogen chloride	Substantial exposure (those defined as probable or definite exposure and that had more than 5 years of exposure at a high frequency concentration)	Dose not quantified.	6	1.3	0.5	3.4	French Canadian population to avoid confounding from ethnicity.  Not adjusted for other occupational exposures
						Non-substantial exposure (others not)	Dose not quantified.	16	1.6	0.9	3	Potential for exposure misclassification based on interviews

<b>Table A1. Summary of Epidemiology Studies</b>												
<b>Citation</b>	<b>Industry</b>	<b>Study design</b>	<b>Pop. Size</b>	<b>Outcome</b>	<b>Exposure</b>	<b>Exposure Groups</b>	<b>Exposure Levels</b>	<b># Cases</b>	<b>Risk Estimate</b>	<b>Lower 95%<sup>a</sup> CI</b>	<b>Upper 95%<sup>a</sup> CI</b>	<b>Comments (focus on potential causes of bias and/or confounding)</b>
						included above)						
Farrow et al. 1989	Population-based (Wales, UK)	Pilot case-control study	63	Myelodysplastic syndrome (MDS)	HCl exposure	Any HCl exposure	Dose not quantified.	5 exposed cases	--	--	--	Study did not report an odds ratio. This was just an analysis to determine whether exposure was different between cases and controls based on p-value.
								4 exposed controls				The number of cases and controls were small and equal in the two groups. Exposure measurements were not available

<sup>a</sup> 95% CI unless otherwise noted.

<sup>b</sup> An additional set of analyses was conducted (Fritschi and Siemiatycki 1996b) to expand on results and adjust for additional confounders. Authors did not present risk results for HCl and melanoma, however it was noted that HCl was not associated with melanoma in any multivariate analyses conducted.

\*90% Confidence Interval

Highlighted rows indicate the same cohort

Abbreviations: CI = confidence interval; HCl = hydrochloric acid; NHL = non-Hodgkin's lymphoma OR = odds ratio; ppm = parts per million; RR = relative risk; SIR = Standardized Infection Ratio; SMR = standardized mortality ratio; UADC = upper aerodigestive cancer; yr = year

Ramboll - Support for public comments relevant to the US-EPA pre-proposed HBEL for HCl

<b>Table A2 – Summary of Toxicology Studies</b>								
<b>Citation</b>	<b>Animal species</b>	<b>Exposure Route</b>	<b>Exposure Duration</b>	<b>Exposure levels</b>	<b>NOAEL</b>	<b>LOAEL</b>	<b>Endpoint</b>	<b>Comments</b>
Sellakumar et al. 1985 and Albert et al. 1982	Rat	inhalation	6 hours/day, 5 days/week, for 122 weeks	0 or 10 ppm (14.9 mg/m <sup>3</sup> )	None	10 ppm	Hyperplasia in the larynx and trachea. No malignant tumors reported.	Albert et al. 1982 reports interim results at 84 weeks and Sellakumar et al. 1985 reports full study results.
Narat 1925	Mice	dermal	Every 1-2 days until skin lesions occurred then weekly for 4-6 weeks; total exposure duration was 25-46 weeks.	unknown volume of solutions containing 3-5% HCl	NA	NA	No malignant tumors reported	OECD concluded the study was not appropriate for the assessment of carcinogenicity due to lack of negative controls and brief exposure period.
Dyer et al. 1946	Mice	oral	Unknown	0 or 1-2.5 moles per liter HCl	NA	NA	No cancer or pre-cancerous lesions observed in the stomach of animals	OECD concluded the study was not appropriate for the assessment of carcinogenicity due to lack of inconsistent strain, short exposure duration, and single exposure concentration.

NOAEL, no observed adverse effect level; LOAEL, lowest observed adverse effect; NA – Not applicable

## **APPENDIX B**

### **RELEVANT REFERENCE LIST FROM 2022 RAMBOLL REPORT**



## Relevant Reference List

### Reviews and Assessments

International Agency for Research on Cancer (IARC). 1992. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 54: Occupational Exposures to Mists and Vapours from Strong Inorganic Acids; and Other Industrial Chemicals. World Health Organization, Lyon.

The International Programme on Chemical Safety (IPCS). 1982. Environmental Health Criteria 21: Chlorine and Hydrogen Chloride. World Health Organization, Geneva, 1982.

Organisation for Economic Co-operation and Development (OECD). 2002. Screening Information Dataset (SIDS) Initial Assessment Profile for SIAM 15: Hydrogen Chloride. Downloaded from <https://hvpchemicals.oecd.org/UI/handler.axd?id=e1fe4ef3-e3d4-4f3d-9a58-8bf2f8296b61>. Accessed February 10, 2021.

US EPA 2005. Guidelines for Carcinogen Risk Assessment. US Environmental Protection Agency, Washington DC Downloaded from [https://www.epa.gov/sites/production/files/2013-09/documents/cancer\\_guidelines\\_final\\_3-25-05.pdf](https://www.epa.gov/sites/production/files/2013-09/documents/cancer_guidelines_final_3-25-05.pdf)

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Beaumont JJ, Leveton J, Knox K, Bloom T, McQuiston T, Young M, Goldsmith R, Steenland NK, Brown DP, Halperin WE. 1987. Lung cancer mortality in workers exposed to sulfuric acid mist and other acid mists. *Journal of the National Cancer Institute*, 79(5): 911-921.

Bond GG, Cook RR, Wight PC, Flores GH. 1983. A case-control study of brain tumor mortality at a Texas Chemical plant. *Journal of Occupational Medicine*, 25(5): 377-386.

Bond GG, Shellenberger RJ, Flores GH, Cook RR, Fishbeck WA. 1985. A case-control study of renal cancer mortality at a texas chemical plant. *American Journal of Industrial Medicine*, 7(2): 123-139.

Bond GG, Flores GH, Shellenberger RJ, Cartmill JB, Fishbeck WA, Cook RR. 1986. Nested case-control study of lung cancer among chemical workers. *American Journal of Epidemiology*, 124(1): 53-66.

Bond GG, Flores GH, Stafford BA, Olsen GW. 1991. Lung cancer and hydrogen chloride exposure: results from a nested case-control study of chemical workers. *Journal of Occupational Medicine*, 33(9): 958-961.

Collins JJ, Swaen GM, Marsh GM, Utidjian HM, Caporossi JC, Lucas LJ. 1989. Mortality patterns among workers exposed to acrylamide. *Journal of Occupational Medicine*, 31(7): 614-617.

Sellakumar AR, Snyder CA, Solomon JJ, Albert RE. 1985. Carcinogenicity of formaldehyde and hydrogen chloride in rats. *Toxicology and Applied Pharmacology*, 81(3): 401-406.

Siemiatycki J. 1991. Risk Factors for Cancer in the Workplace. Boca Raton, FL. CRC Press.

Steenland K, Schnorr T, Beaumont J, Halperin W, Bloom T. 1988. Incidence of laryngeal cancer and exposure to acid mists. *Occupational and Environmental Medicine*, 45(11): 766-776.

### Publications Identified by OECD (10) (4 unique)

Albert RE, Sellakumar AR, Laskin S, Kuschner M, Nelson N, Snyder CA. 1982. Gaseous formaldehyde and hydrogen chloride induction of nasal cancer in the rat. *Journal of the National Cancer Institute*, 68(4): 597-603.

<sup>1</sup>ANON, ed. 1987. *Pestic. Toxic. Chem. News.*, 15(43): 6.

<sup>1</sup> Cannot obtain; not included in the counts

- Beaumont JJ, Leveton J, Knox K, Bloom T, McQuiston T, Young M, Goldsmith R, Steenland NK, Brown DP, Halperin WE. 1987. Lung cancer mortality in workers exposed to sulfuric acid mist and other acid mists. *Journal of the National Cancer Institute*, 79(5): 911-921.
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- Sellakumar AR, Snyder CA, Solomon JJ, Albert RE. 1985. Carcinogenicity of formaldehyde and hydrogen chloride in rats. *Toxicology and Applied Pharmacology*, 81(3): 401-406.

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- Coggon D, Pannett B, Wield G. 1996. Upper aerodigestive cancer in battery manufacturers and steel workers exposed to mineral acid mists. *Occupational and Environmental Medicine*, 53(7): 445-449.
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- Fritschi L, Siemiatycki J., 1996b. Melanoma and occupation: Results of a case-control study. *Occupational and Environmental Medicine*, 53(3): 168-173.
- <sup>2</sup>Hathaway JA. 1997. Upper aerodigestive cancer in battery manufacturers and steel workers exposed to mineral acid mists. *Occupational and Environmental Medicine*, 54(2): 141.
- Soskolne CL, Jhangri GS, Scott HM, Brenner DR, Siemiatycki J, Lakhani R, Gérin M, Dewar R, Miller AB, Risch HA. 2011. A population-based case-control study of occupational exposure to acids and the risk of lung cancer: evidence for specificity of association. *International Journal of Occupational and Environmental Health*, 17(1): 1-8.

#### **Additional Publications from PubMed Searches (5) (1 unique)**

- Albert RE, Sellakumar AR, Laskin S, Kuschner M, Nelson N, Snyder CA. 1982. Gaseous formaldehyde and hydrogen chloride induction of nasal cancer in the rat. *Journal of the National Cancer Institute*, 68(4): 597-603.

Bond GG, Flores GH, Stafford BA, Olsen GW. 1991. Lung cancer and hydrogen chloride exposure: results from a nested case-control study of chemical workers. *Journal of Occupational Medicine*, 33(9): 958-961

International Agency for Research on Cancer (IARC). 1992. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 54: Occupational Exposures to Mists and Vapours from Strong Inorganic Acids; and Other Industrial Chemicals. World Health Organization, Lyon.

Soskolne CL, Jhangri GS, Scott HM, Brenner DR, Siemiatycki J, Lakhani R, Gérin M, Dewar R, Miller AB, Risch HA. 2011. A population-based case-control study of occupational exposure to acids and the risk of lung cancer: evidence for specificity of association. *International Journal of Occupational and Environmental Health*, 17(1): 1-8.

<sup>3</sup>Tsai WT. 2016. Current status of air toxics management and its strategies for controlling emissions in Taiwan. *Toxics*, 4(2): 8-15.

<sup>3</sup> Review; no new data

## **APPENDIX C**

### **PREVIOUS RAMBOLL 2021 REPORT**

Evaluation of the Carcinogenicity of Hydrochloric Acid (HCl) and HCl mist

**Report**

**June 11, 2021**

**Prepared for National Lime Association**

# **EVALUATION OF THE CARCINOGENICITY OF HYDROCHLORIC ACID (HCl) AND HCl MIST**

## **EVALUATION OF THE CARCINOGENICITY OF HYDROCHLORIC ACID (HCl) AND HCl MIST**

Project name **Ramboll Report on the Carcinogenicity of Hydrochloric acid (HCl) and HCl Mist**  
Recipient **National Lime Association**  
Document type **Report**  
Date **June 11, 2021**  
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## APPENDICES

### Appendix A

Relevant Reference List

### Appendix B

Summary of Epidemiological Evidence

## ACRONYMS AND ABBREVIATIONS

APCD	air pollution control device
CI	confidence interval
ENT	ear, nose and throat
HAPs	hazardous air pollutants aka air toxics
HCl	Hydrochloric acid
HCl(aq)	aqueous form of HCl
HCl(g)	gas form of HCl
IARC	International Agency for Research on Cancer
IPCS	Programme on Chemical Safety
IRIS	Integrative Risk Information System (US EPA)
MACT	maximum achievable control technology
NHL	non-Hodgkin's lymphoma
NTP	National Toxicology Program
OECD	Organisation for Economic Co-operation and Development
OR	odds ratio
ppm	parts per million
PubMed	a database containing 32 million citations developed by the National Library of Medicine
RR	relative risk
SIDS	Screening Information Dataset (OECD)
SMR	standardized mortality ratio
UADC	upper aerodigestive cancer
US EPA	United States Environmental Protection Agency
WHO	World Health Organization
yr	year



## EXECUTIVE SUMMARY

Hydrogen chloride (HCl), either as a gas or dissolved in water (hydrochloric acid), is a strong corrosive acid historically used in many industrial processes. HCl has been known since the Middle Ages, and was first commercially produced in the early 1800's. Because of its many industrial uses, occupational exposure to HCl is common.

HCl has been the subject of toxicity studies in experimental animals and epidemiological studies in exposed workers. Several authoritative groups (including the World Health Organization's International Agency for Research on Cancer [IARC], the International Programme on Chemical Safety [IPCS], and the international Organisation for Economic Co-operation and Development [OECD]), have conducted evaluations of the carcinogenic potential of HCl. None of these groups have concluded that HCl is a carcinogen. Other authoritative bodies (including the US Environmental Protection Agency and the US National Toxicology Program) have chosen not to evaluate the carcinogenicity of HCl, estimating that carcinogenicity is unlikely based on its physical, chemical, and corrosive properties and the lack of evidence suggesting an association with cancer.

Ramboll US Consulting, Inc. (Ramboll) was asked by the National Lime Association to investigate the potential carcinogenicity of HCl in order to determine whether it is appropriate for US EPA to regulate HCl as a non-carcinogen by using an established health based threshold consistent with Clean Air Act § 112(d)(4). In addition to relying upon previous authoritative reviews, Ramboll did a series of additional literature searches for any new studies which might indicate HCl is a carcinogen. We employed several search strategies to make sure we uncovered any new scientific evidence that may not have been considered by previous assessments. Despite this broad search, we identified only six additional publications. This newer evidence is consistent with the earlier body of scientific evidence. In addition to direct studies of cancer associations, we also examined other supporting evidence in the form of genotoxicity studies or potential to induce cell proliferation. Taking both the epidemiological and toxicological data into account, the evidence does not indicate that HCl is a carcinogen.

IARC recognized that sulfuric acid and HCl are often found together in industrial processes. In assessing the scientific evidence for the grouping "sulfuric acid and other strong inorganic acids," IARC concluded that there was sufficient evidence associating occupational exposure to "strong-inorganic-acid mists containing sulfuric acid" with cancer. They therefore concluded that occupational exposure to strong inorganic acid mists **containing sulfuric acid** is carcinogenic to humans (i.e., a "Group 1" carcinogen) (IARC 1992). In contrast, IARC's conclusion regarding HCl was that there was **inadequate evidence** for the carcinogenicity of HCl, and they therefore assessed exposure to HCl as not classifiable as to its carcinogenicity to humans (i.e., a "Group 3"). This is relevant because the conclusion regarding acid mists is based on exposure to mixtures that must include sulfuric acid. While sulfuric acid and HCl often are found together in mixed acid exposures, the exposure contained in the mixture with the strongest relationship to the outcome (in this case, sulfuric acid) will drive the relationship for the whole mixture. This is likely the explanation for the sporadic, positive associations observed in occupational studies of mixed acids containing HCl.

HCl has not been identified as a carcinogen, either by authoritative reviews or Ramboll's own search of the scientific literature, despite its long history of use. Ramboll therefore recommends that based on our review of the science and the criteria in 42 U.S.C. § 7412(d), it would be

entirely appropriate for EPA to base its standard for HCl on a health-based threshold, including an ample margin of safety.

# 1. INTRODUCTION

## 1.1 Hydrochloric Acid (HCl)

Hydrochloric acid is a strong corrosive acid that is formed when hydrogen chloride gas is dissolved in water (also known as an aqueous solution). Hydrogen chloride gas and aqueous hydrochloric acid have the same chemical formula: HCl. Chemists will designate the gas form as HCl(g) and the aqueous form as HCl(aq). For the purpose of this report, we refer to either of the physical states as HCl.

HCl is used in the production of chlorides, fertilizers, and dyes, as well as in the textile and rubber industries.<sup>1</sup> Commercial concentrated hydrochloric acid contains 36% to 38% hydrogen chloride in water. HCl can also be formed as a byproduct of combustion of certain fossil fuels in industrial manufacturing processes, for example from lime kilns used for manufacture of lime (CaO and MgO).

At room temperature, HCl is a nonflammable, colorless to slightly yellow gas with a pungent odor in moist air.<sup>2,3</sup> On exposure to air, the gas forms dense white vapors due to condensation with atmospheric moisture. When hydrogen chloride gas comes into contact with moisture, it forms hydrochloric acid. In the early twentieth century, hydrogen chloride was created by burning hydrogen gas. This method created a product of higher purity than that of the reaction between chloride salts and sulfuric acid or sodium hydrogen sulfate (IARC, 1992).

## 1.2 Residual Risk and Technology Review

Under Section 112 of the Clean Air Act, the Environmental Protection Agency (US EPA) regulates hazardous air pollutants (HAPs, also known as air toxics) originating from industrial facilities. There is a two-stage process for this regulation:

- In the first stage, section 112(d) requires the US EPA to develop technology-based standards, called maximum achievable control technology (MACT) standards, for each category of sources (e.g., petroleum refineries, pulp and paper mills, etc.).<sup>4</sup>
- In the second stage, US EPA is required under section 112(f)(2) to assess the health and environmental risks that remain after implementation of the MACT standards. If additional risk reductions are necessary to protect public health with an ample margin of safety or to prevent an adverse environmental effect, US EPA must develop standards to address these remaining risks. This second stage of the regulatory process is known as the residual risk stage. For each source category for which US EPA issued MACT standards, the residual risk stage must be completed within eight years of promulgation of the initial technology-based standard.

Also, under section 112(d)(6), US EPA must review each of the technology-based standards at least every eight years and revise it, as necessary, taking into account developments in practices, processes and control technologies. If appropriate based on the results of the risk and technology reviews, the US EPA will revise the rule. For efficiency, the US EPA includes the 112(f)

<sup>1</sup> <https://www.epa.gov/sites/production/files/2016-09/documents/hydrochloric-acid.pdf>

<sup>2</sup> <https://www.atsdr.cdc.gov/MHMI/mmg173.pdf>

<sup>3</sup> <https://pubchem.ncbi.nlm.nih.gov/compound/Hydrochloric-acid#section=Solubility>

<sup>4</sup> <https://www.epa.gov/stationary-sources-air-pollution/risk-and-technology-review-national-emissions-standards-hazardous>

and 112(d) analyses in the same regulatory package and calls the rulemakings the Risk and Technology Review.

MACT standards require the “maximum degree of [emissions] reductions” that US EPA determines “is achievable.” The MACT standard is based on a minimum stringency requirement (a “floor”) based on emissions levels achieved by existing sources, where the floor is based on average emission limitation achieved by the best-performing 12% of existing sources (for which the Administrator has emissions information).” Alternatively, as outlined in 42 U.S.C. § 7412(d)(4), the MACT standard may be based on a health-based threshold, assuming such a threshold has been established. This health-based threshold must include an ample margin of safety. The US EPA will not approve a health-based threshold for a MACT standard if a HAP is a carcinogen. As part of the statutory lime manufacturing risk and technology review, EPA conducted an inhalation risk assessment for HAPs emitted from lime kilns, including HCl, and found no unacceptable human health risk under worst case emissions scenarios ([84 FR 48,723 \(Sep. 16, 2019\)](#)). The EPA risk assessment assumed HCl is a non-carcinogen, and as such used a variety of human-health risk screening benchmarks as part of risk calculations. Ramboll therefore has undertaken this review to confirm the status of HCl as a non-carcinogen, and validate EPA’s risk assessment approach.

Based on communication with the National Lime Association (via email), the gas temperature at the inlet to the air pollution control device (APCDs) is typically above 400 degrees F for most straight rotary and preheater lime kilns, and roughly 275 degrees for vertical kilns. These elevated temperatures are well above the acid dew point for HCl (typically about 130 degrees F).

Stack test data obtained from wet chemistry and vapor phase testing have also confirmed the presence of HCl as a gas in the exhaust. The vast majority of U.S. lime kilns (>95 percent) are controlled with dry APCDs. For kilns controlled with a wet scrubber, HCl emissions as mist are expected to be very low due to the solubility of HCl in water, i.e., the gas is readily absorbed in water.

### **1.3 Objective of this report**

The objective of this report is to review and synthesize the scientific literature regarding the carcinogenicity of HCl. Ramboll based this assessment on a combination of previous assessments by authoritative bodies, as well as our own literature search.

### **1.4 Previous assessments of HCl carcinogenicity**

HCl has been evaluated for carcinogenicity by several authoritative agencies or groups, including the World Health Organization International Agency for Research on Cancer (IARC), the Organisation for Economic Co-operation and Development (OECD), and the International Programme on Chemical Safety (IPCS). Neither the National Toxicology Program’s (NTP) Report on Carcinogen (NTP, 2016) nor the US EPA’s Integrative Risk Information System (IRIS) program have assessed the carcinogenicity of HCl, and neither Agency is currently evaluating the chemical (US EPA 2021a<sup>5</sup>; NTP, 2019<sup>6</sup>). For a common chemical such as HCl, this usually means that the relevant agency does not consider the evidence compelling enough to undertake a major review

<sup>5</sup> [https://www.epa.gov/sites/production/files/2021-03/documents/iris\\_program\\_outlook\\_mar2021.pdf](https://www.epa.gov/sites/production/files/2021-03/documents/iris_program_outlook_mar2021.pdf)

<sup>6</sup> <https://ntp.niehs.nih.gov/whatwestudy/assessments/cancer/ongoing/index.html>

effort (US EPA, 2021b<sup>7</sup>; NTP, 2016a<sup>8</sup>; NTP 2016b).

The stated purpose of IARC reviews, published in monographs, is to identify cancer hazards, i.e., agents that are capable of causing cancer. IARC is explicit that hazards are separate from actual risks, with the latter depending on factors including exposure duration and concentration. Substances are raised for review by IARC every five years by an Advisory Group that makes its recommendations from nominations submitted by scientists and regulatory agencies. The selection is based on the availability of data and current public health priorities, as well as the existence of signals that the substance may pose a cancer hazard<sup>9</sup>. IARC convened a working group of experts to evaluate HCl in October 1991 and published their findings in a monograph (IARC 1992). Based on their evaluation of the occupational cohort and case-control studies and toxicological data available in 1991 (see section 2.1 for discussion of these studies), IARC concluded that there was *inadequate evidence* for the carcinogenicity of HCl in humans and that there was *inadequate evidence* for the carcinogenicity of HCl in animals. Based on these findings, IARC concluded that HCl is *not classifiable* as to its carcinogenicity in humans (Group 3). This category is used for agents, mixtures, and exposure circumstances which IARC has evaluated and found that “the evidence of carcinogenicity is inadequate in humans and inadequate or limited in experimental animals.” If IARC finds *evidence suggesting lack of carcinogenicity*, “...the Working Group may add a sentence to the evaluation to characterize the agent as well-studied and without evidence of carcinogenicity.” The other classifications used by IARC are *carcinogenic to humans* (Group 1); *probably carcinogenic to humans* (Group 2A) and *possibly carcinogenic to humans* (Group 2B)<sup>9</sup>. In its history, IARC classified only one chemical as *probably not carcinogenic to humans* (Group 4), and the Agency eliminated this category in 2019; more than half of the 1,090 chemicals it has reviewed have been classified as Group 3.<sup>10 11</sup>

IARC also reviewed other inorganic acids in the same monograph, including “sulfuric acid and other strong inorganic acids” (IARC 1992). In contrast to their conclusion for HCl, their conclusion for sulfuric acid and other strong inorganic acids was that “There is *sufficient evidence* that occupational exposure to strong-inorganic-acid mists containing sulfuric acid is carcinogenic.” IARC’s overall evaluation was that “Occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans (Group 1)” (IARC 1992). This is relevant because the conclusion is based on exposure to acid mists that must include sulfuric acid. While sulfuric acid and HCl often are found together in mixed acid exposures, the exposure contained in the mixture with the strongest relationship to the outcome (in this case, sulfuric acid) will drive the relationship for the whole mixture. This is likely the explanation for the sporadic effects observed in occupational studies of mixed acids containing HCl.

The Organisation for Economic Co-operation and Development (OECD) Screening Information Dataset (SIDS) Initial Assessment Profile (2002) evaluated the scientific literature concerning evidence for the carcinogenicity of HCl and concluded that “In humans, no association between hydrogen chloride exposure and tumor incidence was observed.” Their assessment is based on studies finding no association between HCl exposure and cancer (Albert et al., 1982; Farrow et al., 1989; Bond et al., 1986; Bond et al., 1991; Bond et al., 1993; Bond et al., 1995). OECD

<sup>7</sup> <https://www.epa.gov/iris/basic-information-about-integrated-risk-information-system#cancer>

<sup>8</sup> [https://ntp.niehs.nih.gov/ntp/roc/process/process\\_508.pdf](https://ntp.niehs.nih.gov/ntp/roc/process/process_508.pdf)

<sup>9</sup> <https://monographs.iarc.who.int/wp-content/uploads/2019/01/Preamble-2019.pdf>

<sup>10</sup> <https://msc.ul.com/en/resources/article/iarc-revises-preamble-and-eliminates-group-4-classification/>

<sup>11</sup> Discussed in <https://foodinsight.org/what-is->

[iarc/#:~:text=Of%20the%20more%20than%20900%20substances%20classified%20by,received%20a%20classification%20of%20Group%202B%20or%20higher.](https://foodinsight.org/what-is-iarc/#:~:text=Of%20the%20more%20than%20900%20substances%20classified%20by,received%20a%20classification%20of%20Group%202B%20or%20higher.)

stated that studies reporting associations between HCl exposures and increased risk of respiratory cancer or lung cancer could not rule out the effect of exposure to other acids or smoking habits as alternative explanations.

The International Programme on Chemical Safety (IPCS) concluded that exposure of the general population to HCl, other than during accidental releases, is minimal and almost unmeasurable (IPCS, 1982). They further stated that, on the basis of the limited information available from industrial survey data, and from the observations of controlled exposure studies, it is most unlikely that the general population is exposed routinely to any significant health risks from HCl.

## 2. SEARCH METHODS

### 2.1 Identifying Relevant Literature

In their Monograph Volume 54, published in 1992, IARC identified a total of 8 relevant epidemiological studies, including 3 cohort studies (Collins et al. 1989; Beaumont et al. 1967; Steenland et al. 1988) and 5 case-control studies (Bond et al., 1983; Bond et al., 1985; Bond et al., 1986; Bond et al., 1991; and Siemiatycki, 1991). IARC also identified a single experimental animal cancer study (Sellakumar et al., 1985), which examined rats exposed by inhalation to HCl.

In their SIDS document, OECD (2002) identified many of the same studies identified by IARC (1992), as well as one additional epidemiological study (Farrow et al., 1989) and one experimental animal study (Albert et al., 1982). They also discussed two experimental animal studies (a dermal exposure study, Narat, 1925; and an oral administration study, Dyer et al., 1946) which they judged, due to study design limitations, were not appropriate for assessing carcinogenic potential.

After starting with the literature identified by the authoritative reviews (ICPS, 1982; IARC, 1992; OECD, 2002), we developed a literature search strategy consisting of three different approaches: (1) Reviewing papers published since IARC considered the carcinogenicity of HCl in 1991 that cited the relevant epidemiological studies cited in the IARC monograph vol. 54; (2) a search of epidemiological studies addressing possible associations between exposure to HCl and cancer; and (3) a targeted search of chronic (long-term) bioassays for cancer associated with HCl exposure in experimental animals. Because HCl is a common laboratory ingredient used in many experimental set-ups, a broader literature search for animal studies or *in vitro* studies would have resulted in an overwhelming number of irrelevant papers. We therefore conducted a very targeted search for additional animal studies.

Both the search of epidemiological studies examining cancer as a health endpoint and the targeted search of chronic bioassay studies for cancer in animals used PubMed, a database developed by the National Library of Medicine that includes more than 32 million citations for biomedical literature from journal articles in life sciences with a concentration on biomedicine, and online books.

#### 2.1.1 Papers That Cited Epidemiological Papers Included in IARC or OECD

Usually, authors of journal articles cite previous relevant research in their manuscripts. Ramboll therefore conducted a search of scientific papers that cited the literature identified by IARC (1992) or OECD (2002).

Using the database Google Scholar, Ramboll conducted a search for any papers that cite one or more of the 9 studies identified by IARC (Sellakumar et al., 1985; Collins et al., 1989; Beaumont et al., 1967; Steenland et al., 1988; Bond et al., 1983; Bond et al., 1985; Bond et al., 1986; and Siemiatycki, 1991) or the additional epidemiological studies identified by OECD (Farrow et al., 1989). We did not perform citation searches on the experimental animal studies discussed by OECD (2002) because the Albert et al. (1982) bioassay study was superseded by the subsequent publication by the same group (Sellakumar et al., 1985), and because the two other cancer studies in experimental animals (Dyer et al., 1946; Naret, 1925) were judged by OECD (2002) as having major faults in their study design precluding conclusions to be drawn from their results.

### **2.1.2 PubMed Search of Epidemiological Literature**

A literature search was conducted using PubMed, based on using combinations of the following search terms: "occupational"; "human"; "human exposure"; "hydrochloric acid"; "hydrogen chloride"; "carcinogenicity"; "carcinogen"; "cancer"; "epidemiology"; "cohort"; and "case-control". When searches included "cancer", clinical studies were filtered out of the search so as to remove irrelevant studies of clinical trials.

### **2.1.3 Targeted PubMed Search of Animal Toxicity Literature**

A targeted literature search was conducted using PubMed, based on using combinations of the following search terms: "hydrochloric acid"; "hydrogen chloride"; "chronic bioassay"; and "lifetime cancer risk".

### **2.1.4 Exclusion criteria**

Publications were excluded at the screening stage if HCl was not an exposure variable assessed in the study or if HCl exposure was not assessed in human subjects (for the search targeting epidemiological studies) or if HCl was not the test material administered to animals or the study was an aquatic toxicity study (for the search targeting chronic bioassays for cancer in experimental animals).

## **3. RESULTS**

### **3.1 Literature Search Findings**

The results from different steps of this search process are outlined in Figure 1 (PRISMA diagram). A total of eight epidemiological studies (Beaumont et al., 1987; Bond et al., 1983; Bond et al., 1985; Bond et al., 1986; Bond et al., 1991; Collins et al. 1989; Siemiatycki, 1991; Steenland et al., 1988) and one cancer study in experimental animals (Sellakumar et al., 1985) were included in the IARC (2002) report. A total of six epidemiological studies (Beaumont et al., 1987; Bond et al., 1983; Bond et al., 1985; Bond et al., 1986; Bond et al., 1991; Farrow et al. 1989) and four cancer studies in experimental animals (Albert et al., 1982; Dyer et al., 1946; Narat, 1925; Sellakumar et al., 1985) were cited in OECD (2002)<sup>12</sup>. Note, there was some overlap between these two sets of studies. Together, a total of 13 unique studies were identified– nine

<sup>12</sup> Note, one further publication cited by OECD (ANON, ed. 1987. Pestic. Toxic. Chem. News., 15(43), 6.) was reported only in summary form and neither the publication nor the abstract could be found. It was not included in the counts. OECD reported that all respiratory cancer cases in this study were smokers; therefore, confounding cannot be ruled out.

epidemiological and four in animals (see Appendix A).

Conducting a search of scientific publications that cite these IARC-cited or OECD-cited studies resulted in a total of 1,008 publications to screen.<sup>13</sup> We screened the titles and abstracts of these publications, and identified five additional papers (Coggon et al. 1996; Hathaway et al. 1997; Soskolne et al. 2011; Fritschi and Siemiatycki 1996a; Fritschi and Siemiatycki 1996b).

The PubMed searches for epidemiological publications resulted in a total of 1,934 scientific publications; after removal of duplicates and publications that had been identified through authoritative searches or citation searches, 771 unique publications remained. The targeted PubMed search of the animal toxicological literature resulted in 56 publications; after removal of duplicates and publications that had been identified through authoritative searches or citation searches, 34 unique publications remained. Overall, 805 unique publications were identified through both PubMed search strategies. We screened the titles and abstracts of these unique publications to identify 24 publications which warranted a full text screen for relevance. Only one additional relevant publication was identified from this full text screen (Tsai et al. 2016).

A total of 19 relevant articles were identified through the combined literature search strategy, consisting of the initial nine epidemiological studies identified by IARC and OECD and four toxicology study identified by IARC and OECD, and the six additional articles (five epidemiological studies identified through the citation search of the initial articles, and one additional article resulting from the very broad PubMed searches) (Figure 1).

### **3.2 Summary of Findings**

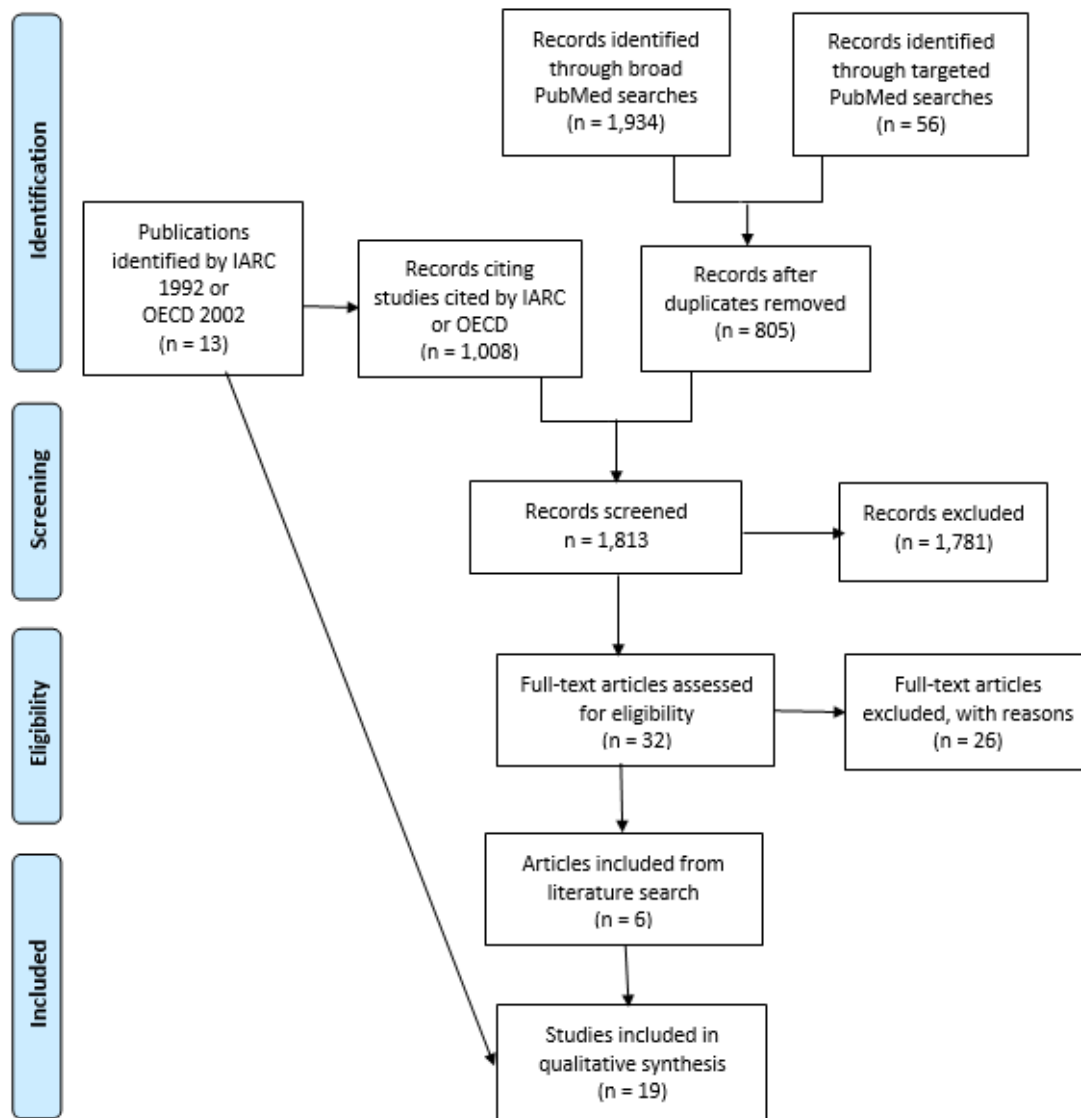
The 19 relevant publications identified through this extensive literature search included: 13 epidemiological studies containing statistical analyses of the association between exposure to HCl and cancer; four publications examining cancer in experimental animals; one commentary/letter to the editor, and one review. Below is a discussion of three cohort studies (Collins et al., 1989; Beaumont et al., 1987; Steenland et al., 1988), ten case-control studies (Bond et al., 1983; Bond et al., 1985; Bond et al., 1986; Bond et al., 1991; Siemiatycki, 1991; Fritschi and Siemiatycki 1996a; Fritschi and Siemiatycki 1996b; Farrow et al. 1989; Coggon et al., 1996; Soskolne et al., 2011), and four animal toxicity studies (Sellakumar et al., 1985; Albert et al., 1982; Dyer et al., 1946; Narat, 1925). See Appendix A for list of all relevant publications. A detailed summary of the epidemiological studies, including information on study characteristics, statistical analyses, and limitations, is included in Appendix B.

<sup>13</sup> Among the experimental animal studies, only the Sellakumar et al. 1985 study was the subject of our search because the Albert et al., 1982 publication was superseded by the subsequent Sellakumar et al., 1985 publication, and the other two experimental animal cancer studies were very old and inadequate.





**Figure 1. PRISMA Flow Diagram**



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

### 3.3 Discussion of Individual Publications

We discuss individual studies of the carcinogenicity of HCl and HCl mists below. Further details of these studies can be found in Appendix B.

### 3.3.1 Epidemiological Studies

In a cohort study of steel workers involved in pickling operations, Beaumont et al. (1987) examined lung cancer mortality patterns in 1,165 workers exposed to sulfuric acid mist and other acid mists (primarily HCl mist). Jobs were categorized by acid use (sulfuric acid or other acid) and exposure potential (i.e., the likelihood of daily exposure) in order to define the following exposure categories: (1) any acid exposure (the entire exposed cohort); (2) sulfuric acid exposure only; (3) sulfuric acid only with probable daily exposure (a subset of Group 3); (4) other (not sulfuric) acid exposure only; and (5) exposure to both sulfuric acid and other acids. The analyses included those who were employed for at least 6 months in a pickling-related job with at least 1 day of work prior to 1965. Compared with men in the general U.S. population, the 189 workers with exposure to other acids (not sulfuric acid) had a statistically significant increased lung cancer mortality rate (SMR 2.24, 95% CI 1.02, 4.26) based on 9 observed deaths. When they used a more appropriate comparison to US steel workers, however, the risk estimate was lower (SMR 2.0, 95% CI 1.06, 3.78). No data on other occupational exposures or smoking habits were included in the study, and confounding by smoking status, especially, cannot be ruled out. The authors attempted several indirect adjustments for smoking, with mixed results. The authors discussed several additional limitations of the study and suggested that chance cannot be ruled out as an explanation for the results.

Steenland et al. (1988) conducted a reanalysis of 879 members of the Beaumont et al. (1987) steelworker cohort who had information related to presence or absence of diagnosis of laryngeal cancer (Steenland et al., 1988). US referent rates, calculated using national surveys of cancer incidence, were used for comparison. Most workers in the analysis were exposed to sulfuric acid, either with or without other acids. Two of the laryngeal cancer cases were exposed to acids other than sulfuric acid and three were exposed to a mixture of acids; these numbers are too small to generate reliable statistical estimates of association. The authors reported an increased risk of laryngeal cancer in steel pickler workers compared to US referent rates (RR 2.6, 95% CI 1.2, 5.0 (as reported by IARC 1992), however this includes all 9 cases across all exposure groups (sulfuric acid, other acids only, and mixture of acids). In its evaluation, the IARC (1992) working group noted that confounding by sulfuric acid could not be ruled out. The authors compared the smoking habits of their incident cancer cohort obtained from next of kin interviews with the smoking habits of the US population in 1965. They found that in their cohort "there was a similar overall prevalence of smoking compared with all United States men but cohort members who did smoke smoked more than the United States average." The authors also used methods similar to those described by Beaumont et al. (1987) to indirectly adjust for smoking habits, but residual confounding by smoking, in addition to exposure to sulfuric acid in the mixed exposure group, cannot be ruled out as an explanation for the results.

Mortality patterns were examined in a follow-up study of 8,854 workers from four Cyanimid plants in the United States and the Netherlands, where 2,293 of the workers were believed to have been exposed to the chemical acrylamide (Collins et al., 1989). Each plant had mortality patterns similar to other worker populations, and no excess mortality across all plants was observed for any of the 26 cancer sites examined. However, an excess in lung cancer (SMR 1.32) was observed in one of the four facilities studied (the Warners facility). In this facility, 11 of the 63 lung cancer deaths were in a department where there was exposure to HCl (data not presented in paper). This paper was discussed by the IARC working group (1992), who noted that no information for the expected numbers of cases in that facility was provided, making it difficult to interpret that observation.

A case-control study of brain cancer mortality at a Dow Chemical plant in Texas included an evaluation of the potential association between brain cancer and occupational exposure to HCl (Bond et al., 1983). A total of 28 former workers were identified who had died from brain cancer; 13 of these had evidence of HCl exposure based on a review of job titles. The study incorporated data from two control groups selected from the plant: Group A selected from 110 white male deaths without cancer (42 with evidence of HCl exposure based on job title) and Group B selected from a random sample of 111 employees without regard to vital status or cancer status (51 with evidence of HCl exposure). There was no statistically significant association observed between any exposure to HCl and brain tumors among workers when compared to either control group (Odds ratio (OR) 1.40, 90% CI 0.70, 2.80; OR 1.02, 90% CI 0.81, 1.29). Sub-analyses based on duration of employment focused on those who were employed for 1-4 years, as there were only four cases with 20 or more years of employment. There was no evidence of an increase in risk of brain cancer associated with HCl exposure in this subgroup (cases: n = 5, controls: n = 15; OR 2.02, 90% CI 0.5, 8.1). Note that these authors reported 90% confidence intervals, rather than the usual 95% confidence intervals, which increases the likelihood of detecting an association. This choice is usually made when the focus is on screening for potential associations and generating hypotheses to be tested in future, more rigorous studies.

Subsequently, Bond et al. (1985) published a case-control study of renal cancer mortality and exposure to HCl based in the same Dow Chemical plant, using the same study population and control groups examined earlier (Bond et al., 1983). The authors did not observe an increased risk of renal cancer in workers exposed to HCl (26 deaths from renal cancer; 12 with evidence of exposure to HCl based on job title) as compared to either control group (OR 0.90, 90% CI 0.44, 1.83 based on 44 exposed out of 92 controls; OR 0.86, 90% CI 0.40, 1.86 based on 50 exposed out of 98 controls). Cases and controls were matched on age, race, and sex, but potential confounding by exposure to other occupational chemicals was not controlled. The authors did not observe substantial differences in smoking habits between groups and therefore reported that smoking was unlikely to have been a confounder.

In a third case-control study based in the same Dow Chemical plant, Bond et al. (1986) analyzed the risk of lung cancer associated with hydrogen chloride exposure based on job title. There were 308 lung cancer deaths compared with two control groups chosen from the plant: a decedent control group and a living control group. Each contained 308 men individually matched to cases on race, year of birth  $\pm$  5 years, and year of hire. Separate results of cases with each control group were similar, so the authors pooled the control groups for greater statistical power. The authors did not observe an association between HCl exposure and lung cancer overall (exposed cases: n = 129, exposed controls: n = 245, OR 1.02, 95% CI 0.77, 1.35) or with a 15 year latency period (exposed cases: n = 108, exposed controls: n = 218, OR 0.92, 95% CI 0.68, 1.24). The authors collected information on potential confounders and noted the following to be statistically significantly associated with lung cancer risk, as expected: cigarette smoking, vitamin A intake, use of vitamin supplements, and education level. These findings lend support to the validity of the main analyses. However, due to small number of subjects available for analysis, the authors appropriately chose not to control for these potential confounders.

The Dow chemical worker population was re-evaluated again, using exposure estimates derived from job assignments, duration of exposure, and cumulative exposure (Bond et al., 1991). Analyses to estimate the risk of mortality from lung, trachea, and bronchial cancer (combined) were performed without and with a 16-year latency period and controlling for pack-years of

smoking. There was no relationship between HCl exposure and lung cancer in any of the HCl exposure groups (see Appendix B).

Coggon et al. (1996) investigated the risk of upper aerodigestive cancer mortality from exposure to mineral acid mists (HCl and sulfuric acid) in a study of steel and battery manufacture workers (Coggon et al., 1996). The authors categorized exposure as (1) no exposure to any acid mists; (2) low exposure to acid mists ( $<1 \text{ mg/m}^3$  sulfuric acid or HCl); and high exposure to acid mists ( $\geq 1 \text{ mg/m}^3$  sulfuric acid or HCl). Based on just 15 cases, the authors reported no convincing association between exposure to mixed acid mists and upper aerodigestive cancer mortality in any category of exposure concentration and duration (see appendix B). The study also evaluated the association of "definite" exposure to mixed acid mists (HCl and sulfuric acid) and "all cancer" mortality compared to that in the national population and found no evidence of an increase in cancer mortality among the workers (full cohort SMR 0.88, 95% CI 0.79, 0.98; never exposed SMR 0.75, 95% CI 0.59, 0.91; definitely exposed SMR 0.92, 95% CI 0.79, 1.05).

Soskolne et al. (2011) examined the association between lung cancer and occupational exposure to specific acids (HCl, nitric acid, sulfuric acid, acetic acid, hydrofluoric acid, phosphoric acid, hydrocyanic acid, sulfuric dioxide, and oxides of nitrogen) in a population-based study of 178 cases and 167 controls in Toronto, Canada. Proxy interviews provided estimates of exposure concentration and frequency of exposure based on work history, which the authors used to calculate an exposure index that factored in the duration of exposure in months. There was no increase in risk of lung cancer for those "ever" exposed vs. unexposed to HCl (OR 0.98, 95% CI 0.71, 1.35) or for those with low estimated exposure vs. unexposed (OR 0.80, 95% CI 0.53, 1.22). The high exposure group had a non-statistically significant increase in risk, based on 83 cases (OR 1.24, 95% CI 0.79, 1.96) (see appendix B). The authors considered all cancers of the lip, mouth, retromolar area, nasopharynx, larynx, and nasal sinus as lung cancer for analysis.

In another population-based case-control study, this time in Montreal, Canada, Siemiatycki (1991) examined the associations between HCl exposure and 11 different cancers (esophagus, stomach, colon, rectum, pancreas, lung, prostate, bladder, kidney, skin melanoma, and non-Hodgkin's lymphoma). The target population was men aged 35 to 70 years who were living in the Montreal metropolitan area. Cases had a histologically confirmed diagnosis of one of the selected cancer sites with the date of initial diagnosis between September 1979 and June 1985. A total of 4,576 eligible cases were ascertained. Data were analyzed using cancer controls, i.e., all cancer cases with cancers of sites other than the site being analyzed, and population controls. Population controls had no cancer diagnoses and comprised an age-stratified random sample drawn from a list of all adult Canadian citizens resident in the province that were eligible to vote. Detailed job-history interviews were conducted amongst all cancer cases to classify exposure. The authors reported that population controls were interviewed in a manner as similar as possible to the cancer cases.

Exposure to specific substances and concentration and frequency of exposure were estimated based on job categories. Based on this coding, the authors analyzed the relationships between "any exposure" and "substantial exposure" (a subset of "any exposure") to HCl and each of the 11 cancer sites, with confounding assessed separately for each cancer site. Potential confounders included age, family income, ethnic origin, birthplace, smoking, alcohol intake, coffee consumption, body mass index, and self- or proxy-respondent. After adjustment, there was no statistically significant association between 10 of the 11 cancers and exposure to HCl (see

Appendix B). The risk of non-Hodgkins lymphoma was higher among those with any exposure to HCl vs. no exposure: OR=1.5 (90% CI 1.0, 2.2) based on 90% confidence intervals, which are used in hypothesis-generating analyses because they are more likely to detect associations than the standard 95% confidence interval.

The authors also evaluated the association between HCl exposure and certain cancer sites in subsets of the population: (1) all ethnic groups, cancer controls; (2) all ethnic groups, population controls; (3) French-Canadians only, cancer controls; and (4) French-Canadians only, population controls. Analyses within each group were conducted for any and substantial exposure to HCl. From these eight sets of analyses, the authors reported results for three cancer sites: rectum, lung-oat cell, and non-Hodgkin's lymphoma (see appendix B). There was borderline statistically significant elevated risk for non-Hodgkin's lymphoma in the French-Canadian cancer controls subset ( $n = 18$ , OR 1.6, 90% CI 1.0, 2.5) and lung-oat cell cancer in the all ethnic groups cancer control subset ( $n = 19$ , OR 1.6, 90% CI 1.0, 2.6) from "any exposure" to HCl. When limited to those with "substantial exposure" to HCl, results for lung-oat cell cancer remained borderline statistically significant ( $n=8$ , OR 2.1, 90% CI 1.0, 4.5) and results for non-Hodgkin's lymphoma were not statistically significant ( $n = 6$ , OR 1.5, 95% CI 0.7, 3.2). The authors reported a statistically significantly elevated risk of rectum cancer from "any exposure" to HCl ( $n = 18$ , OR 1.9, 90% CI 1.1, 3.4) in the French Canadian population subset, but this association was smaller and not statistically significant when limited to those with "substantial exposure" to HCl (rectum:  $n = 5$ , OR 1.5, 90% CI 0.5, 3.8). The very small number of cases and wide 90% confidence intervals around these estimates do not supply convincing evidence of an association between HCl exposure and risk of rectal cancer.

Fritschi and Siemiatycki (1996a) conducted additional analyses on the association of 11 substances and non-Hodgkin's lymphoma, adjusting for age, proxy status, income, and ethnicity. Exposure was categorized as "substantial", defined as having probable or definite exposure and more than 5 years of exposure at high frequency concentration, or "non-substantial" exposure. There was no statistically significant association between occupational HCl exposure and non-Hodgkin's lymphoma at either exposure level (substantial exposure  $n=6$ , OR 1.3, 95% CI 0.5, 3.4; non-substantial exposure  $n=16$ , OR 1.6, 95% CI 0.9, 3.0). Fritschi and Siemiatycki (1996b) further evaluated exposure to several chemicals and melanoma. Risk results for HCl and melanoma were not provided, because it was "not associated with melanoma in any multivariate analyses" (Fritschi and Siemiatycki 1996b).

In a pilot study preceding the full study by Siemiatycki et al, (1991), Farrow et al. (1989) interviewed 39 male and 24 female preleukemia patients diagnosed from September 30, 1985 to September 30, 1986 for lifetime occupational exposure to specific chemicals, one of which was HCl. When compared with controls from an outpatient ear, nose and throat (ENT) surgical clinic matched to cases on age and sex, there was no meaningful difference between cases and controls (cases:  $n = 5$ , mean exposure = 21,000 hours; controls:  $n = 4$ , mean exposure = 5,000 hours). The authors did not report odds ratios for these findings, which would have been approximately 1.0 based on the nearly identical numbers of cases and controls.

### 3.3.2 Cancer Studies in Experimental Animals

The carcinogenicity of HCl was examined in two chronic cancer studies in rats as part of studies designed to explore the combined impacts of inhaled HCl and another irritating gas, formaldehyde (Albert et al., 1982; Sellakumar et al., 1985). This combination of gases is found in the degradation of a carcinogen, bis(chloromethyl)ether (BCME). Since formaldehyde is both an irritating gas and a carcinogen in animal inhalation studies (Swenberg et al., 1980), and HCl is also an irritating gas, the studies reported in these two publications (Albert et al., 1982; Sellakumar et al., 1985) tested whether inhalation of the combination of formaldehyde and HCl were more carcinogenic than inhalation of formaldehyde alone. Part of the controls in these tests were groups of animals exposed only to formaldehyde, or only to HCl, allowing an assessment of the carcinogenicity of HCl.

In the earlier study (Albert et al., 1982), a group of 99 eight-week old male Sprague-Dawley rats were exposed by inhalation to a mixture of 10 ppm HCl and 14 ppm formaldehyde for 6 hours per day, 5 days per week, for their lifetime. Control groups (50 rats per group) were exposed to either air introduced to the cages in the same manner as the exposed group (the "sham" control), or simply held in exposure chambers without any exposure. Authors reported benign squamous metaplasia, and two types of nasal cancer — squamous papilloma and squamous cell carcinoma — in rats exposed to the mixture of HCl and formaldehyde; these lesions were not found in the control group. This result is consistent with previously published results obtained when rats were exposed to formaldehyde alone (Swenberg et al., 1980), and are consistent of the cancer resulting from exposure to formaldehyde.

A second experiment exposed groups of 100 nine-week old Sprague-Dawley rats to either inhaled HCl, formaldehyde, combinations of HCl and formaldehyde, or a control group of air alone for 6 hours per day, 5 days per week. This publication (Albert et al., 1982) reports interim results after 84 weeks; full results are reported in the Sellakumar et al. (1985) publication, below.

Groups of 100 nine-week old Sprague-Dawley rats were exposed by inhalation to either HCl[g], formaldehyde, two types of combinations of HCl[g] and formaldehyde, or a control group of air alone for 6 hours per day, 5 days per week over 122 weeks (Sellakumar et al., 1985). Results were also compared to unexposed control animals. HCl concentrations were 10 ppm (14.9 mg/m<sup>3</sup>) in the HCl-only exposure as well as the HCl plus formaldehyde exposure group. Following sacrifice, animals were examined for tissue abnormalities, including cancer, with special attention to the respiratory tract (the site of formaldehyde-induced tumors). While hyperplasia (indicative of cell proliferation) was evident in the larynx and trachea of animals exposed to HCl alone as compared to air controls or colony controls, no excess cancer was observed. In the groups exposed to both HCl and formaldehyde, the cancer response was attributed to formaldehyde.

Two other cancer studies in experimental animals were reported by OECD (2002) – a dermal exposure study (Narat, 1925) and an oral exposure study (Dyer et al., 1946). The dermal study included 99 mice were dermally exposed to an unknown volume of solutions containing 3-5% HCl every 1-2 days until skin lesions were observed and then weekly for 4-6 additional weeks (total exposure duration 25-46 weeks) (Narat, 1925). No malignant tumors were reported, and OECD concluded that the study is not appropriate for the assessment of carcinogenicity because of the shortcomings in the study design (lack of negative control, brief exposure period). The oral study Dyer et al., 1946) included was a study designed to examine whether acids present in the stomach, such as HCl, would modify the carcinogenicity of 1,2,5,6-dibenzanthracene. In this study, groups of mice (4 different strains) were exposed to a combination of HCl (1-2.5 moles

per liter) and either a “control emission” (58 mice) or HCl and 1,2,5,6-dibenzanthracene (40 mice) through a tube inserted into their stomachs (Dyer et al., 1946). Other exposure groups without HCl were also included in the study. No excess cancer or pre-cancerous lesions were observed in the stomachs of animals from either group exposed to HCl. However, OECD concluded the study is not appropriate for the assessment of carcinogenicity because of the shortcomings of the study design (inconsistent strain, short exposure duration, single exposure concentration).

### 3.3.3 Reviews and Commentaries Identified

Hathaway (1997) provided a commentary that was critical of the methodological quality of studies reviewed by IARC (1992). Among other concerns, Hathaway noted small numbers of cases leading to imprecise estimates, shown by wide confidence intervals, and likely misclassification when exposure to HCl was part of a mixed exposure category. Misattribution of risks associated with exposure to some other substance that was part of the mixture could have resulted in some of the elevated point estimates reported by the authors if that other substance was carcinogenic and HCl is not. Hathaway also noted inconsistencies in reporting the number of exposed and unexposed cases in at least one study, which would affect the results given the small number of exposed cases available for analysis.

Tsai et al. (2016) conducted a review of the regulatory systems and human health effects designated by the Taiwan government under the Air Pollution Control Act. The study reviewed carcinogenic and non-carcinogenic health risks for designated air toxics. The study compiled data from international agencies such as IARC, the National Toxicology Program (NTP) of the U.S. Department of Health and Human Services, and the American Conference of Governmental Industrial Hygienists (ACGIH) and based on this data categorized HCl as non-carcinogenic.

## 4. DISCUSSION

### 4.1 Conclusions of Authoritative Reviews

The consensus opinion of multiple authoritative bodies is that HCl is unlikely to be a carcinogen. IARC classified HCl in Group 3 (not classifiable), which is the classification group used when the chemical is considered least likely to present a cancer hazard. Note that IARC has only classified a single chemical as “*probably not carcinogenic to humans*” (Group 4), and they no longer consider this category. OECD went further, stating “In humans, no association between hydrogen chloride exposure and tumor incidence was observed.” IARC also reviewed other inorganic acids in the same monograph, including “sulfuric acid and other strong inorganic acids” (IARC 1992). In contrast to their conclusion for HCl, their conclusion for sulfuric acid and other strong inorganic acids was that “There is sufficient evidence that occupational exposure to strong-inorganic-acid mists containing sulfuric acid is carcinogenic.” IARC’s overall evaluation was that “Occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans (Group 1)” (IARC 1992). This is relevant because the conclusion is based on exposure to acid mists that must include sulfuric acid. While sulfuric acid and HCl often are found together in mixed acid exposures, the exposure contained in the mixture with the strongest relationship to the outcome (in this case, sulfuric acid) will drive the relationship for the whole mixture. This likely the explanation for the sporadic effects observed in occupational studies of mixed acids containing HCl.

ICPS did a broader assessment of potential toxicity to the general population and concluded that other than during accidental releases, it is most unlikely that the general population is exposed routinely to any significant health risks from HCl. Furthermore, neither US EPA nor the NTP have identified HCl as a chemical worthy of assessing for carcinogenicity. Thus, although HCl is a widely used chemical, no authoritative body has concluded that it poses a cancer risk. An extensive search of the primary published scientific literature identified a total of 4 publications not considered by the authoritative bodies discussed above. One of these publications is a review and one is a commentary; two publications are epidemiological studies. Neither alters the conclusions of the prior assessments.

## **4.2 Supporting Evidence**

### **4.2.1 Evidence Regarding Genotoxicity**

Mutation or genetic changes are often viewed as a first step in carcinogenicity, so various assays examining such changes, as well as assays designed to predict such changes (collectively referred to as genotoxicity assays) are often used to predict cancer potential. HCl did not induce mutations in six bacterial mutation assays or one mutation assay in yeast cells (reviewed by IARC, 1992; OECD, 2002). A qualitative predictive assay that examines cell survival in strains that have or lack the ability to repair damaged DNA had mixed results in two assays but OECD concluded the positive finding was unrelated to DNA damage (reviewed by OECD, 2002). A weakly positive response for mutations was observed in a mouse lymphoma cell assay; these results are interpreted as being an artifact of acidic conditions (pH 6.3 in buffered cell culture medium), which itself related to cell death. Other mutation assays in mammalian cell cultures were negative (reviewed by IARC, 1992; OECD, 2002). HCl induced chromosome aberrations in mammalian cells in culture when concentrations were in excess of 10 mM in the cell culture media (leading to an acidic environment with a pH of 5.8) and in a handful of studies in Chinese hamster ovary cells, mouse lymphoma cells, and in insect and plant cells in a very limited set of studies; both IARC (1992) and OECD (2002) found that the acidic pH is the responsible factor for these responses and that similar responses are observed for other inorganic acids and with acetic acid. These concentrations would not be found environmentally<sup>14</sup> and are thus not relevant for ambient air exposures to HCl.

### **4.2.2 Evidence for Inducing Cell Proliferation**

In addition to mutagenic carcinogens, there are some carcinogens that are believed to act through a nonmutagenic mechanism, often by inducing extensive cell turnover which leads to the possibility of replication errors leading to mutations. However, such mechanisms are believed to have a threshold concentration below which no effects are seen. In the case of HCl, there is further evidence from the co-exposure study of Sellakumar et al. (1985), where exposure to 10 ppm HCl did not cause serious irritating effects and did not enhance the carcinogenicity of formaldehyde. Thus, there is no evidence that HCl causes the types of cell proliferation that are typically associated with nongenotoxic carcinogens.

<sup>14</sup> 10 mM corresponds to ~355 ppm in solution or 355 mg/Liter. In comparison, HCl concentrations in the ambient air usually do not exceed 0.01 mg/m<sup>3</sup> (IARC, 1992). Conservative modelling data (unpublished Ramboll report to National Lime Association, 2019), predicts that the maximum concentration of HCl in the air at the fenceline kiln would be 0.0012 mg/m<sup>3</sup>.



### 4.3 Limitations of the Existing Literature (for client discussion only)

The epidemiological studies evaluated by IARC and OECD were methodologically limited. Limitations included lack of exposure verification or measurement; inadequate control for confounding exposures associated with certain cancers, small sample size or small numbers of cases, leading to lack of statistical power. In addition, many of the studies evaluated mixed exposures and mixed outcomes. The use of mixed exposure groups is particularly germane, as the mixtures often included sulfuric acid and other strong inorganic acid mists, which are classified as carcinogenic. By evaluating mixtures of HCl and these other acids, the apparent association between HCl and cancer will be inflated due to the effect of the other acids.

In spite of these weaknesses, the overall conclusion by IARC based on their review of the epidemiological data is supported by the small number of cases of cancers observed in various occupational cohorts as well as by the toxicological evidence that HCl does not have carcinogenic properties.

## 5. CONCLUSIONS

HCl has been assessed for carcinogenic potential by multiple authoritative bodies. After a thorough search for new studies post-dating those assessments, Ramboll concluded that the scientific evidence does not suggest it poses carcinogenic risks. In addition to direct studies of cancer associations, we also examined other supporting evidence in the form of genotoxicity studies or potential to induce cell proliferation. Taking both the epidemiological and toxicological data into account, the evidence does not indicate that HCl is a carcinogen.

IARC recognized that sulfuric acid and HCl are often found together in industrial processes. In assessing the scientific evidence for the grouping "sulfuric acid and other strong inorganic acids," IARC concluded that there was sufficient evidence associating occupational exposure to "strong-inorganic-acid mists containing sulfuric acid" with cancer. They therefore concluded that occupational exposure to strong inorganic acid mists **containing sulfuric acid** is carcinogenic to humans (i.e., a "Group 1" carcinogen) (IARC 1992). In contrast, IARC's conclusion regarding HCl was that there was **inadequate evidence** for the carcinogenicity of HCl, and they therefore assessed exposure to HCl as not classifiable as to its carcinogenicity to humans (i.e., a "Group 3"). This is relevant because the conclusion regarding acid mists is based on exposure to mixtures that must include sulfuric acid. While sulfuric acid and HCl often are found together in mixed acid exposures, the exposure contained in the mixture with the strongest relationship to the outcome (in this case, sulfuric acid) will drive the relationship for the whole mixture. This is likely the explanation for the sporadic, positive associations observed in occupational studies of mixed acids containing HCl.

HCl has not been identified as a carcinogen, despite its long history of use. Ramboll therefore recommends that based on our review of the science and the criteria in 42 U.S.C. § 7412(d), it would be entirely appropriate for EPA to base its standard for HCl on a health-based threshold, including an ample margin of safety.

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## **APPENDIX A**

### **RELEVANT REFERENCE LIST**

## Relevant Reference List

### Reviews and Assessments

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<sup>a</sup> Cannot obtain; not included in the counts

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<sup>c</sup> Review; no new data

## **APPENDIX B**

### **SUMMARY OF EPIDEMIOLOGICAL EVIDENCE**

**Table Appendix B: Summary of Epidemiological Evidence**

Author/ Year	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Beaumont et al., 1987	Steel pickling	Cohort	1,165 (1,156 men; 9 women)	Lung cancer (mortality)	Sulfuric acid and other acid mists (primarily HCl)	Group 1: any acid (entire cohort)	28	SMR: 1.35	0.92	1.97	Referent group: US general population; US steel workers  Two of the three facilities had consistent trends; the third facility had a small sample size and no lung cancer deaths observed.  Exposure categorization was based on job category and not specific measurements of exposure level.  Did not control for smoking or exposure to other potential lung carcinogens (besides coke operations).  In this cohort, 2 deaths from laryngeal cancer were detected (not statistically significant)
						Group 2: sulfuric acid only	13	SMR: 1.06	0.59	1.90	
						Group 3: sulfuric acid only, probable daily exposure (subset of Group 2)	12	SMR: 1.23	0.68	2.20	
						Group 4: other acid only	9	SMR: 2.00 (compared to other steel workers)	1.06	3.78	
								SMR: 2.24 (compared to US population)	1.02	4.26	
						Group 5: sulfuric acid and other acid	6	SMR: 1.49	0.54	3.86	
Steenland et al., 1988	Steel pickling	Cohort	879 men	Laryngeal cancer (diagnosis)	Sulfuric acid and other acid mists	Overall analysis	9 (4 sulfuric acid only; 2 other acids only; 3 mix of sulfuric acid and other acid)	SIR (observed/expe cted): 2.3	--	--	Referent groups: US population and other steel workers.  None of these associations were statistically significant  Insufficient power to detect statistically significant changes  No dose-response relationship shown  IARC (1992) notes confounding by exposure to sulfuric acid could not be ruled out.
						≤5 years exposure		SIR: 1.70	--	--	
						>5 years exposure		SIR: 2.76	--	--	
						≤20 years since first exposure		SIR: 3.27	--	--	
						>20 years since first exposure		SIR: 2.03	--	--	



Author/ Year	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Collins et al., 1989	Acryla- mide workers	Cohort	8,854 men (2,293 exposed to acryla- mide)	Respiratory cancers mortality (lung or larynx)	Hydro- chloric acid	Acrylamide	63 in group exposed to <0.001 mg/m <sup>3</sup> - years acrylamide (11 in a depart- ment using HCl)	No quantitative risk estimate presented for workers exposed to HCl	--	--	Subject of paper is exposure to acrylamide. It contains mention of workers in a unit with HCl exposure.  Subsequent discussion by IARC (1992) notes the expected numbers for that facility were not provided.
Bond et al 1983	Chemical workers (TX)	Case- control	19,608	Brain cancer mortality	Hydrogen chloride	Hydrogen chloride and 10 other chemical categories	28 (13 exposed to HCl)	Compared to control group A (110; 42 exposed to HCl)  OR: 1.40	0.70 *	2.80*	Exposure categories based on employment records and some job titles; categories were nonspecific.  Exposure misclassification was possible due to lack of records in early years of company operations.  Small number of cases
								Sample-based control group B (111; 51 exposed to HCl)  OR: 1.02	0.81*	1.29*	
								Cases employed 1 to 4 years with matched group B controls (5 cases, 15 controls exposed)  OR: 2.02	0.5*	8.1*	
Bond et al 1985	Chemical workers (TX)	Case control	19,608	Renal cancer mortality	Hydrogen chloride	Hydrogen chloride and other chemical agents	26 (12 exposed to HCl)	Compared to group A (92; 44 exposed to HCl)  OR: 0.90	0.44*	1.83*	Potential unaccounted lifestyle confounders  Exposure classification was based on job category and company work histories

Author/ Year	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
								Compared to Group B (98; 50 exposed to HCl)  OR: 0.86	0.40*	1.86*	
Bond et al., 1986	Chemical workers (TX)	Nested case- Control	19,608	Lung cancer mortality	Hydrogen chloride	Hydrogen chloride and other chemical agents	308 (237 exposed to HCl)	Without regard for interval prior to death:  OR: 1.02	0.77	1.35	Exposure measurement were not available.  Possible random misclassification of employee exposures  Possible chance variation  Possible protective role for one or more chemicals
							616 compar- ison workers, (463 exposed to HCl)	Excluding exposures occurring within 15 years of death  OR: 0.92	0.68	1.24	
Bond et al., 1991	Chemical workers (TX)	Nested case- Control	19,608	Lung, trachea, bronchus cancer mortality (note, results only presented for lung cancer)	Hydrogen chloride	HCl calculated by time spent on jobs and cumulative exposure score	308	All dates  RR: 1.0	0.8	1.3	Exposure was determined by job category  Differences in respirator policies at plant
							616 compar- ison workers from 2 control groups (308 each, pooled)	Excluding exposures occurring within 15 years of death  RR: 0.9	0.7	1.2	
						Cumulative Exposure (ppm-yr):  0.1-3.9 4.0-12.4 ≥12.5	62 45 22	Adj RR = 0.9 Adj RR = 1.2 Adj RR = 1.0	0.6 0.8 0.6	1.3 1.9 1.8	

Author/ Year	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
Coggon et al. 1996	Steel and battery manufac- ture workers	Nested case- control	4403	Upper aerodi- gestive cancer (UADC) mortality	Acid mists (hydrochl oric and sulfuric acid)	No exposure	3 exposed cases; 18 exposed controls	OR: 1.0	--	--	Estimates based on a small number of cases  Potential non-occupational and occupational confounders (tobacco, alcohol)  SMRs compare mortality in the worker population with mortality in the general US population.
						Low exposure (<1 mg/m <sup>3</sup> sulfuric or hydrochloric acid)	2 exposed cases; 7 exposed controls	OR: 1.9	0.2	15.8	
						High exposure (≥1 mg/m <sup>3</sup> sulfuric or hydrochloric acid)	9 exposed cases; 43 exposed controls	OR: 1.3	0.3	5.7	
						Uncertain	1 case exposed; 5 controls exposed	OR: 1.0	0.1	12	
						No exposure	3 exposed cases; 18 exposed controls	OR: 1.0	--	--	
						Intermediate or uncertain cumulative exposure	5 exposed cases; 32 exposed controls	OR: 1.0	0.2	4.6	
						At least 5 years high cumulative exposure	7 exposed cases; 23 exposed controls	OR: 2.0	0.4	10	
				All cancer mortality	Acid mists (hydrochl oric and sulfuric acid)	Full cohort (possibly exposed, never exposed, and definitely exposed)	324	SMR: 0.88	0.79	0.98	
						Never exposed to acid mists	88	SMR: 0.74	0.59	0.91	

Author/ Year	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
						Definitely exposed:	199	SMR: 0.92	0.79	1.05	
Soskolne et al. 2011	Male and females in Toronto, CA	Popula- tion based care- control	772	Lung cancer	10 acid categories including hydro- chloric acid	Any exposure to HCl	178 cases; 167 controls	OR: 0.98	0.71	1.35	Did not account for family history as a confounder  Exposure classification
						Low exposure to HCl	95 cases; 106 controls	OR: 0.80	0.53	1.22	
						High exposure to HCl	83 cases; 61 controls	OR: 1.24	0.79	1.96	
Siemia- tycki 1991	Popula- tion- based (residents of Montreal, Canada)	Case control	3730 cancer patients	11 cancers	Hydrogen chloride	Any exposure	Esophagus (8)	OR: 1.2	0.6*	2.3*	French Canadian population to avoid confounding from ethnicity  Did not carry out the analyses to rule out confounding co-exposures or occupational exposures associated with certain cancer types  Potential for exposure misclassification based on interviews
							Stomach (18)	OR: 1.1	0.7*	1.6*	
							Colon (28)	OR: 0.9	0.6*	1.2*	
							Rectum (21)	OR: 1.1	0.7*	1.6*	
							Pancreas (9)	OR: 1.2	0.7*	2.2*	
							Lung (59)	OR: 0.9	0.7*	1.2*	
							Prostate (25)	OR: 0.8	0.5*	1.2*	
							Bladder (34)	OR: 1.1	0.8*	1.5*	
							Kidney (12)	OR: 1.0	0.6*	1.6*	

Author/ Year	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
							Skin melanoma (5) <sup>b</sup>	OR: 0.7	0.3*	1.6*	
							NHL (22)	OR: 1.5	1.0*	2.2*	
						Substantial exposure	Esophagus (2)	OR: 1.1	0.3*	3.8*	
							Stomach (5)	OR: 0.9	0.4*	1.9*	
							Colon (15)	OR: 1.5	0.9*	2.4*	
							Rectum (6)	OR: 0.9	0.4*	2.0*	
							Pancreas (2)	OR: 0.7	0.2*	2.4*	
							Lung (20)	OR: 0.9	0.5*	1.5*	
							Prostate (11)	OR: 1.1	0.6*	2.0*	
							Bladder (13)	OR: 1.0	0.6*	1.8*	
							Kidney (3)	OR: 0.7	0.3*	1.8*	
							Skin melanoma (1)	OR: 0.4	0.1*	2.3*	
							NHL (6)	OR: 1.1	0.5*	2.3*	
						Subset analysis for these three cancer sites: Any exposure	Rectum (18)	<b>OR: 1.9</b>	<b>1.1*</b>	<b>3.4*</b>	
							Lung-oat cell (19)	OR: 1.6	1.0*	2.6*	
							NHL (18)	OR: 1.6	1.0*	2.5*	

Author/ Year	Industry	Study design	Pop. Size	Outcome	Exposure	Exposure Groups	# Cases	Risk Estimate	Lower 95% <sup>a</sup> CI	Upper 95% <sup>a</sup> CI	Comments (focus on potential causes of bias and/or confounding)
						Subset analysis for these three cancer sites: Substantial exposure	Rectum (5)	OR: 1.5	0.5*	3.8*	
							Lung-oat cell (8)	OR: 2.1	1.0*	4.5*	
							NHL (6)	OR: 1.5	0.7*	3.2*	
Fritschi and Siemia- tycki 1996a	Popula- tion- based (residents of Montreal, Canada)	Case control	3730 cancer patients	Lymphoma and myeloma	Hydrogen chloride	Substantial exposure (those defined as probable or definite exposure and that had more than 5 years of exposure at a high frequency concentration)	6	1.3	0.5	3.4	French Canadian population to avoid confounding from ethnicity  Not adjusted for other occupational exposures
						Non-substantial exposure (others not included above)	16	1.6	0.9	3.0	Potential for exposure misclassification based on interviews
Farrow et al. 1989	Popula- tion- based (Wales, UK)	Pilot case- control study	63	Myelodyspl astic syndrome (MDS)	HCl exposure	Any HCl exposure	5 exposed cases; 4 exposed controls	--	--	--	Study did not report an odds ratio. This was just an analysis to determine whether exposure was different between cases and controls based on p- value.  The number of cases and controls were small and equal in the two groups.  Exposure measurements were not available

<sup>a</sup> 95% CI unless otherwise noted

<sup>b</sup> An additional set of analyses was conducted (Fritschi and Siemiatycki 1996b) to expand on results and adjust for additional confounders. Authors did not present risk results for HCl and melanoma, however it was noted that HCl was not associated with melanoma in any multivariate analyses conducted.

\*90% Confidence Interval

Highlighted rows indicate the same cohort

Abbreviations: CI = confidence interval; HCl = hydrochloric acid; NHL = non-Hodgkin's lymphoma OR = odds ratio; ppm = parts per million; RR = relative risk; SIR = Standardized Infection Ratio; SMR = standardized mortality ratio; UADC = upper aerodigestive cancer; yr = year

**To:** National Lime Association  
**From:** Susan Barnes and Mike Remsberg, Trinity Consultants  
**Date:** March 7, 2024  
**RE:** Review of EPA's Modeling Setup and Procedure to Develop the Hydrochloric Acid Health-Based Emission Limit

In the U.S. Environmental Protection Agency's (EPA's) 2024 proposed rulemaking for lime industry, EPA is seeking comment on the establishment of a health-based emission limit (HBEL) for hydrochloric acid (HCl).<sup>1</sup> The National Lime Association (NLA) and its members support the use of an HBEL in the final rulemaking and requested assistance from Trinity Consultants (Trinity) with reviewing the proposed HBEL and calculation methodology as documented in EPA's *Risk Approach to Assess a Health-Based Emission Limitation for Hydrochloric Acid for the Lime Manufacturing Source Category*.<sup>2</sup>

In order to prepare the HBEL and support its proposed limit, EPA evaluated impacts from HCl emitted from lime plants and resulting impacts to ambient air or specific receptors. Trinity was asked to review the model setup, modeling procedures and input data to verify that EPA's approach was reasonable and consistent with the data provided to EPA by the industry. Below is a summary of our review.

Trinity first reviewed the modeling input parameters used by EPA.<sup>3</sup> This review focused on the facilities that EPA had determined were the "worst-case" and therefore were the basis of supporting the proposed HBEL. The three facilities that EPA concluded were the worst-case contributors to ambient HCl were: 1) Cemex Ponce, PR; 2) Carmeuse River Rouge, MI; and 3) Carmeuse Maysville, KY. The stack parameters for the two Carmeuse plants were compared to NLA's records as well as prior EPA modeling for this rulemaking. The stack parameters for Cemex were only compared to prior EPA modeling. Overall, the stack parameters were consistent with available data, even though we did identify minor differences in exhaust temperature (<0.01% deviation from available data). Additionally, Trinity reviewed the air dispersion modeling procedure (i.e., the modeling techniques and procedures applied) for developing the HBEL. We did not find any material errors or flaws in EPA's methodology and the analysis is consistent with prior methods for analyzing risk for the residual risk and technology review process.

Based on Trinity's review, EPA has proposed an HBEL for HCl providing conservative estimates of concentrations in ambient air, the analysis relies on input data from the industry for the "worst case" sources and applied the air dispersion in a manner consistent with accepted practice. Therefore, we believe the predicted modeling impacts support EPA's conclusion that "300 tpy of HCl emissions per Lime Manufacturing facility is unlikely to result in adverse chronic or acute human health effects at any facility in the source category".<sup>4</sup>

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<sup>1</sup> 89 FR 28, page 9092.

<sup>2</sup> EPA-HQ-OAR-2017-0015-0180.

<sup>3</sup> EPA-HQ-OAR-2017-0015-0184.

<sup>4</sup> EPA-HQ-OAR-2017-0015-0180.

**March 1, 2023**

Jonathan De'Ath  
National Lime Association  
200 North Glebe Rd. Ste 800  
Arlington, VA 22203

RE: Proposed Lime MACT Detection Limit Review

Dear Mr. De'Ath,

Alliance Technical Group, LLC (Alliance) has reviewed the series eleven (11) of reports that were provided to determine industry average achievable Minimum Detection Limit (MDL) for Organic Hazardous Air Pollutants (OHAPs) testing at Lime Kilns, specifically for formaldehyde and acetaldehyde. Two key considerations of this review were the way in which the MDL was determined in the source testing reports, and the consideration of bulk corrections for moisture and oxygen content that are called for in the proposed rule. Brief summaries follow immediately, with more detailed explanations on subsequent pages.

### **MDL Summary**

In brief, our position is that EPA selected improper MDLs from the reports by using the standard view of picking the lowest 5. This inherently selected 4 reports that use a noise value in lieu of a proper MDL, thereby biasing the outcome low. We propose that EPA revisits the achievable detection limit determination by excluding reported MDLs that do not conform to EPA's standards on determining the MDL for FTIR testing.

### **Moisture and Oxygen Corrections Summary**

MDLs presented in reports are a mix of wet (not corrected for moisture) basis and dry corrected basis. This creates some noise in the data set. Ultimately the values in the proposed rule do not appear to contain a correction for moisture in the source, which can cause a significant difference in the final result which is to be added to other components. For example, if a measured MDL is 1.0 ppmvw, when reported on a moisture corrected basis from a source that contains 15% moisture that becomes 1.176 ppmvd. We believe that especially in the case here where results from multiple compounds must be summed, they should be summed on the same basis, rather than a mix of wet and dry corrected results. As this total result may contain some mix of detected and non-detected compounds, the MDLs used for this level setting should include this adjustment criteria.

In a similar vein, as the final results are all to be corrected to a 7% oxygen concentration, we believe some average Oxygen concentration adjustment should also be made to the MDL values used for the emissions limit calculation.



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## MDL Discussion

Two common approaches were utilized to calculate the reportable MDL in the data submitted. Both are from ASTM D6348, which EPA has often regarded as equivalent to EPA Method 320, which is the standard method for FTIR testing of gas phase emissions from stationary sources. Two reports did not include any MDL documentation and are not included in further discussion.

The first MDL used in four of the reports is the MDC#1 calculation, which measures the detector noise in a pure blank sample, within the analytical region for a given compound. This is useful to determine the analytical uncertainty of a value but is commonly understood that it does not speak to actual detector sensitivity.

The second MDL used in five of the reports is MDC#2, which similarly measures the noise of the detector, but with the inclusion of major matrix interference. This is generally regarded as a more appropriate MDL determination since FTIR is an optical measurement, and elevated absorbances from interference can significantly impact the analyzer's ability to measure small changes in absorbance (and thereby concentration). Past EPA guidance has indicated that MDC#2 is the preferred approach for the purposes of normalizing data.

The reports including MDC#1 returned lower MDLs than the reports including MDC#2. (*Tables 1 & 2*). EPA's calculation of an appropriate MDL seems to consider these four reports, plus one MDC#2 calculated report in the determination of the proposed measurement limit.

We propose revisiting the MDL values considered here to conform to EPA's standard directive of using MDC#2 calculated results to determine an appropriate aggregated emissions limit.

Table 1 - MDC#1			Table 2 - MDC#2		
REPORT	Formaldehyde	Acetaldehyde	REPORT	Formaldehyde	Acetaldehyde
1	0.1426	0.2695	3	1.090	0.550
8	0.112	0.254	4	0.110	0.230
9	0.155	0.435	5	1.090	0.550
10	0.198	0.499	6	1.000	1.530
			11	0.340	0.980
Maximum	0.198	0.499	Maximum	1.090	1.530
Minimum	0.112	0.254	Minimum	0.110	0.230
Average	0.152	0.364	Average	0.726	0.768



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### Moisture and Oxygen Corrections Discussion

In the proposed rule, the value of multiple chemical species are summed to determine compliance with a limit that is based on a dry ppm basis, corrected to a 7% oxygen concentration. As such, and values included in the summation must be corrected to this basis. Therefore, we believe it is logical that for the purposes of setting a floor that includes detection limits, those limits must be adjusted and corrected to match before including them in the sum. From the reports included in this review, the average combined correction factor results in an increase of 22% to the results. However, we recognize that this is a source specific correction factor depending on the moisture and oxygen content native to the source. As such, attempting to normalize the emissions limit based on adjusted results can have varied impacts depending on the source operating conditions. Given the variability, we propose taking a bulk average correction factor to the MDLs used in calculating the aggregated emissions limit.

The data included in this analysis comprises multiple sources in some reports – in those cases the individual sources were averaged for inclusion in the presented table. Three reports were excluded due to the variety of testing conditions that included abnormally high or low oxygen and moisture concentrations.

Two separate calculations were performed – a combined correction factor (CF) determined by separately averaging the moisture and the oxygen to determine an average correction factor for each. These average factors were then combined for a total correction factor. A second calculation determines the total correction factor for each source, then looks at an average of these bulk correction factors. Both calculations are presented in *Table 3*. Notably, both approaches result in nearly an identical value; 1.217 for the total combined CF, and 1.218 for the average of total factors from each report.

Table 3 - Moisture and Oxygen Correction Factors					
REPORT	H2O%	O2%	Dry CF	7%O2 CF	Total CF
1	4.2	7.6	1.044	1.043	1.088
2	7.7	9.3	1.084	1.195	1.295
3	6.9	10.0	1.074	1.276	1.370
4	4.2	7.9	1.044	1.073	1.119
5	6.7	7.8	1.072	1.063	1.139
6	6.5	6.7	1.070	0.980	1.049
7	15.0	8.4	1.176	1.109	1.305
11	5.2	10.2	1.054	1.304	1.375
Maximum	15.0	10.2	1.176	1.304	1.375
Minimum	4.2	6.7	1.044	0.980	1.049
Standard Deviation	3.47	1.24	0.043	0.116	0.132
Average	7.0	8.5	1.077	1.130	1.218
STDEV contrib			4%	10%	11%
Combined CF					1.217



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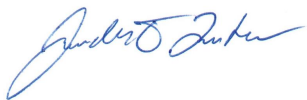
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### **Result of adjustments**

Using properly selected MDLs in the determination, and accounting for the corrections that must be applied to all data for the purposes of summation, our analysis shows a standard minimum reportable concentration of 0.88 ppmvd @7% O<sub>2</sub> formaldehyde, and 0.94 ppmvd @7%O<sub>2</sub> for acetaldehyde. We propose that this should be considered for the purposes of setting an aggregated emissions limit, and there should be strict adherence to an appropriate method for calculating MDLs in the reports submitted.

Please contact us at (256) 351-0121 or via email at [Jordan.Laster@alliancetg.com](mailto:Jordan.Laster@alliancetg.com) if you have any questions or need additional information.

Sincerely,



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