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The opinions expressed herein are our own and do not necessarily reflect the views of Johns Hopkins University.

Comment on the Interim Framework for Advancing Consideration of Cumulative Impacts (Docket ID No. EPA-HQ-OLEM-2024-0360; 89 Fed. Reg. 92125)

The Environmental Protection Agency's (EPA) effort to incorporate cumulative impacts into environmental decision-making is an important step forward in improving the health of communities across the US. Evaluating the current conditions in communities provides valuable context for regulatory decisions and promotes greater awareness of health disparities in environmental justice communities. The Interim Framework for Advancing Consideration of Cumulative Impacts (Framework) provides basic principles, definitions, and examples of existing work in overburdened communities that incorporate cumulative impacts. As faculty of the Bloomberg School of Public Health and the Whiting School of Engineering at the Johns Hopkins University with experience in measuring and characterizing community burdens associated with complex exposures to mixtures of environmental stressors, we offer the following comments on the Framework, emphasizing the importance of providing concrete guidance for federal, state, and local governments. We (1) highlight the need for better monitoring of air pollutants in disadvantaged communities to avoid underestimation of health risks, (2) encourage development of guidelines for when to approve or deny permits that require evaluation of cumulative impacts, and (3) recommend incorporation of science-based adjustment factors into cumulative impact assessments (CIA). Details on each recommendation to follow.

1. **EPA should invest in research efforts to improve pollutant monitoring in communities**

Accurate measurement of pollutant exposures is a critical input in assessing cumulative impacts faced by fenceline communities. As part of the Hazardous Air Pollutant Monitoring and Assessment Project (HAP-MAP),[1] we measured ethylene oxide concentrations along with approximately forty other hazardous air pollutants in an area with a high density of petrochemical manufacturers in southern Louisiana, also known as "Cancer Alley." We initially focused analysis on ethylene oxide due to it being a potent carcinogen and because regulatory based monitoring at typical outdoor concentration levels has been challenging to measure accurately. Using state-of-the-art techniques and a mobile laboratory, we measured air concentrations of ethylene oxide that exceeded modeled values in EPA's AirToxScreen for all census tracts in our study. Based on our measurements, cancer risk estimates for this single air

pollutant were 10 times higher than those based on modeled ethylene oxide concentrations from AirToxScreen. The majority of estimated risks were above EPA's maximum acceptable risk at remediated Superfund sites (10^{-4}). When we add cancer risks from other measured air pollutants, the cumulative burden for residents of these communities further increases.

In addition to revealing underestimated health risks in fenceline communities, our research underscores another major weakness in federal level efforts to assess cumulative impacts. Current screening tools may be unable to identify overburdened communities if chemicals like ethylene oxide are not measured accurately. Even at a very low percentage of total emissions (0.2%), ethylene oxide contributed over 65% of the hazard from all measured hazardous air pollutants in Louisiana's industrial corridor.[1]

The EPA can help reduce disproportionate risks in communities like Louisiana's Cancer Alley by improving monitoring capabilities. The Framework describes EPA efforts to invest in development of innovative tools and protocols to "expand and enhance the EPA's ability to characterize and address the burdens facing communities." As part of this effort, we encourage EPA to invest some of these resources into improving the accuracy and precision of air monitoring for chemicals which dominate cancer and non-cancer risks for communities burdened by exposure to hazardous air pollutants.

2. **EPA should provide decision-making guidelines for defining when a community is overburdened based on the existing conditions reports used in CIAs for permitting**

Existing conditions reports provide a profile of a community using a range of environmental, health, and socioeconomic indicators and are assembled prior to a proposed project. Several states already require existing conditions reports to be completed as part of a cumulative impact assessment for air permitting in environmental justice communities. For instance, the Massachusetts Department of Environmental Protection promulgated cumulative impact analysis regulations for air permitting in March 2024.[2] The regulations require permit applicants to evaluate and characterize the existing conditions of the community with 33 environmental, health, and socioeconomic indicators. Applicants must also provide opportunities for meaningful public involvement throughout the air permitting process and fulfill required steps for public notice. Finally, air dispersion modeling of criteria air pollutants must be conducted, and the applicant must characterize risk of cancer and non-cancer health endpoints.

Review and decisions on the final disposition of the air permit require that the above bulleted list be completed, and the risk thresholds are not exceeded. Risk thresholds take the form of hazard indices or the sum of hazard quotients from all expected hazardous air pollutant emissions. Given that current models underpredict ambient concentrations of hazardous air pollutants deriving from industry, additional examination of expected emission should be performed. Furthermore, the regulations do not describe how the existing conditions report or any input from community involvement will influence the outcome of the permitting decision beyond the results of the risk characterization. In other words, the applicant is required to provide specific documentation of the conditions in the fenceline community, but there is no guarantee that the documentation will be meaningfully considered or result in any additional mitigation steps to reduce impacts on the community.

Similarly, the Minnesota Pollution Control Agency (MCPA) requires applicants to complete a Cumulative Levels and Effects Analysis (similar to an existing conditions report) for air permits in a small geographically defined area near a Superfund site in South Minneapolis.[3] This analysis requires an evaluation of environmental health indicators in the community, air toxics modeling, and risk characterization. MCPA issues permits based on compliance with risk thresholds and NAAQS and does not have the authority to deny permits based on other criteria. However, a new law requires MCPA to develop criteria for requiring cumulative impacts analysis in air permitting.[4] It offers an opportunity to define circumstances "that establish an environmental or health impact as a substantial adverse impact" for use in decisions on permit issuance or denial.[4] Other states such as Pennsylvania,[5] Maryland,[6] New York,[7] and New Jersey,[8] are developing or have existing laws and regulations requiring some consideration of cumulative impacts for permits in environmental justice areas that could be enhanced with guidance on permit decision-making.

EPA can help protect fenceline communities by developing federal guidelines to describe conditions that would trigger permit denials, even when the traditional approach to risk assessment indicates facility emissions will result in no excess risk. As described in the appendix of the Framework, the Chicago Department of Public Health (CDPH) denied a permit application for a scrap metal facility in a vulnerable Southeast side community of Chicago. The permit was denied based on the results of the existing conditions analysis, not the risk assessment which indicated no increased risk of adverse health effects.[9] We encourage the EPA to address inconsistencies in decision-making processes through the development of guidelines for a variety of permits including air, waste, mining, land application of biosolids, concentrated animal feeding operations, sewage, underground injection, or any other project that may affect surrounding communities.

3. **EPA should provide recommendations for adjustment factors for use in risk assessments that protect fenceline communities**

Traditional risk assessment continues to serve as EPA's core science policy tool for characterizing the nature and magnitude of health risks. The Framework notes that "cumulative impacts assessment can employ key components of traditional risk assessment in combination with or as an input to cumulative impacts assessment (Fox et al., 2017)." Integrating risk into CIA provides an opportunity to protect vulnerable populations using science-based adjustment factors that account for the wide range of variability in human responses to chemical and nonchemical stressors.

Studies on human variability in response to chemical exposures have demonstrated that the default adjustment factor (10X) used by EPA for intra-species variability is not sufficient to protect human health. For example, the California EPA Office of Environmental Health Hazard Assessment[10] and the World Health Organization's International Programme on Chemical Safety[11] found chemical-specific adjustment factors of 30X and 42X, respectively, better reflect the range of human variability due to intrinsic factors such as age, health conditions, or metabolism. Building on this work, additional extrinsic variability factors have been recommended to address cumulative exposure to chemical and nonchemical stressors.[12] Extrinsic factors include stressors associated with socioeconomic status, nutrition, air pollution, and other external stressors that may be considered in a CIA.[12]

Addressing chemical and nonchemical exposures through the development of additional adjustment factors is key to integrating cumulative impacts described in existing conditions reports into risk assessment frameworks. Highlighted in Technical Guidance from EPA's Office of Policy, an important first step to incorporating environmental justice in risk assessment is producing a comprehensive review of "each relevant dose-response function that includes an analysis of baseline risk variation across different population groups."[13] This recommendation falls in line with suggestions to mine large epidemiologic studies (e.g., the Environmental influences on Child Health Outcomes Program) for estimates of variability in vulnerable subgroups, [12] and would allow risk analysts to account for a wider range of risk distributions. EPA can help strengthen CIAs by funding research on development of extrinsic variability factors and providing criteria for their application. These criteria would further bolster decision-making guidelines for federal, state, and local permitting programs.

Thank you for the opportunity to provide comments on the Framework. We applaud EPA's efforts to develop the science and tools necessary to operationalize cumulative impact assessment, and enthusiastically support the further refinement of resources presented in the Framework.

Sincerely,

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